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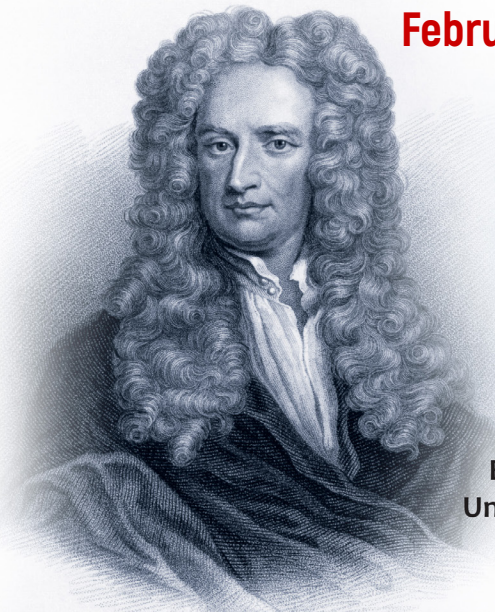
# PROCESS MANAGEMENT AND SCIENTIFIC DEVELOPMENTS

**February 23, 2022**





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TECHNICAL SCIENCES

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# ENSURING THE ECONOMIC SECURITY OF THE ENTERPRISE ON THE BASIS OF THE DEVELOPMENT OF ORGANIZATIONAL CULTURE

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**Abstract.** The article on the basis of the author's research covers the main areas of cooperation between the vectors of development of organizational culture and improve the security of the enterprise in order to achieve and maintain a high level of competitiveness. Selected cycle events - the characteristics of the enterprise, "organizational culture - economic security - competitive." Defined tools to ensure economic security through the development of its organizational culture.

**Keywords:** organizational culture, economic security, competitiveness, enterprise value, the formation of the system of internal communications

The definition of the content of the concept of "economic security" has been the subject of active discussions of the economic community for the second decade. The result of the analysis was the selection of a number of classification features in the approaches of the authors to understanding the essence of economic security (tab. 1.).

**Table 1.**
**Classification of approaches to the definition of the concept of "economic security"**

| Classification attribute | Defining characteristic |
|---|---|
| Object of economic security | The vital interests of the individual, society and the state in the economic sphere; national interests; economic interests; National economy; national economy; business entities |
| Characteristics of the object of economic security | Independence; stability; stability; development; production of economic resources; level of legal income |
| Mechanism for ensuring economic security | Budgetary, tax, monetary and investment; institutional, legislative, law enforcement, organizational and economic |

The main factors negatively affecting the security of entrepreneurial activity in Russia are the following:

- active participation of representatives of state power and economic management in commercial activities;
- use of criminal structures to influence competitors;
- weak effectiveness of laws designed to counteract unfair competition;
- lack of favorable conditions for scientific and technical research;
- lack of detailed and objective information about business entities and their financial situation;
- low level of culture of doing business in the business environment;
- use of illegitimate, operational and technical methods in order to obtain the necessary information about competitors.

The author's vision of the components of the economic security of an enterprise operating in the market of goods and services is represented by the area of interaction of the triad-structural orientation of the vectors of its functional activity. A flow of information enters the corresponding area, and the results (in the form of goods and services) of the internal functioning of the enterprise come out of it. The intersection of vector-oriented spheres of functioning is represented as a field for the effective operation of an enterprise (fig. 1).

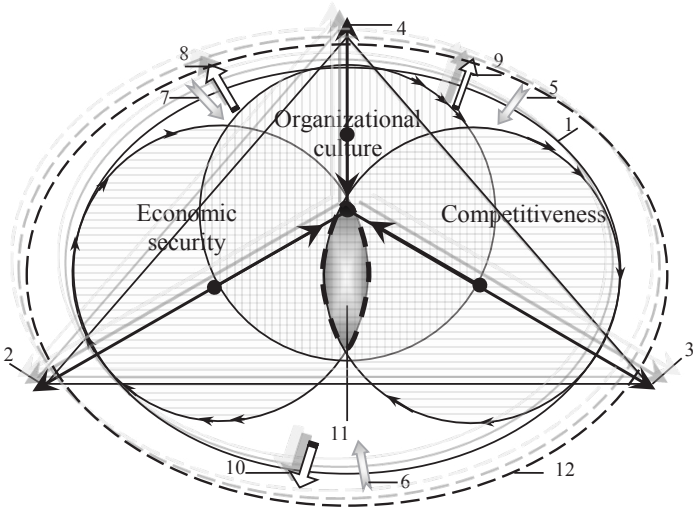


**Figure 1. The structure of the conceptual triad of ensuring the economic efficiency of the enterprise**

**Note:** 1 – the boundaries and scope of the enterprise; 2,3,4 – vectors of criteria for the quality of the enterprise; 5,6,7 – incoming information; 8,9,10 – outgoing results of the internal functioning of the enterprise on the market of goods and services; 11 – the area of intersection of triads, the field of the efficiency of the enterprise; 12 – the market of goods and services.

The goals of interaction between the vectors of development of organizational culture and improving the safety of the enterprise are focused on ensuring and maintaining the level of its competitiveness. It seems appropriate to highlight the cycle of phenomena - the characteristics of the enterprise: "organizational culture - economic security - competitiveness". The relationship of the elements of the cycle is shown in figure 2.

In our opinion, "economic security" is always contextual and refers to a specific object, as a rule, is used with the specification of subjectivity (security of the individual, society, state, enterprise, business) and characterizes the ability of this entity to self-realization in the presence and action of destructive factors. When analyzing security in the economic sphere, each object should be considered in three dimensions: as an object of security, as a subject of ensuring security (of one's own and other objects), as a potential source of danger.

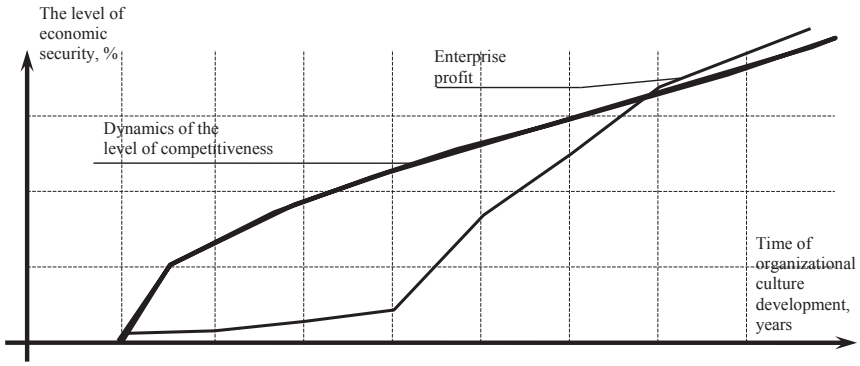


**Figure 2. The dynamics of increasing the potential of the competitiveness of an enterprise in terms of the level of its economic security and the time of development of organizational culture**

In general, economic security is a basic qualitative characteristic of an economic system (in our case, an enterprise), which determines its ability to withstand external and internal threats to maintain normal living conditions and sustainable resource provision.

In our opinion, one of the constructive methods for assessing the level of economic security of an enterprise can be the analysis of "gaps and trends". As an example, consider a variant of the structural-process scheme of the economic security of an enterprise, shown in Figure 3, in the form of a dependence of gaps and trends in the system for ensuring its economic security. This scheme was compiled using the work of V.S. Gershgorin [1] and adapted to the research object of the work.

The structural process diagram is based on the analysis of individual seven components of ensuring the economic security of the enterprise: production, technology, economy, personnel, organizational culture, innovation, regulation - and in relation to them is a "meta-subject" covering the enterprise as a whole. With this approach, the conceptual position on the need to consider economic security as a system technology is implemented.

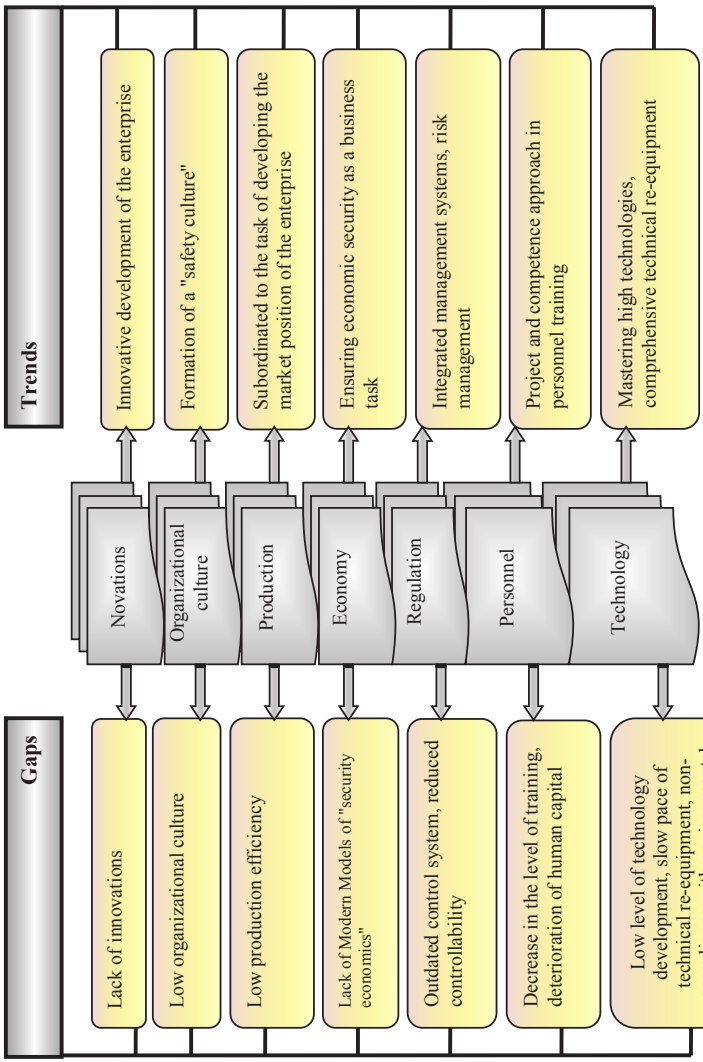


**Figure 3. Structural and process scheme for ensuring the economic security of an enterprise: a scheme of gaps and trends**

The term "organizational culture" is perceived by many as a system of common (corporate) opinion, and this characteristic distinguishes one organization from another. There are many approaches to identifying various attributes that characterize and identify a particular culture, both at the macro and micro levels.

An analysis of foreign and domestic research in the field of organizational culture has shown that the greatest controversy in the content of this phenomenon is caused by three questions: firstly, how to accurately determine organizational culture (questions of definitions); secondly, what tool to use to measure it (questions of measures); thirdly, what measurements most fully characterize the organizational culture (questions of measurements).

The following enlarged blocks of the main functions of organizational culture are distinguished: the formation of enterprise values, the accumulation of values; transfer of values; storage of valuables; formation of a knowledge system; formation of a system of internal communications along the "vertical" and "horizontal"; formation of a system of external communications and relations; goal setting; formation of a culture of labor, production and other material processes.

It seems that the organizational culture provides such characteristics of the enterprise as stability, predictability and orderliness of actions, the unity of the goals of the team, low conflict relations in it. It can be fixed in the form of a special document - the code of the enterprise, or it can exist without formal registration. In both cases, it is important to act effectively.

Economic security and organizational culture of the enterprise are interdependent. This confirms the analysis of the mechanism of the relationship between the state of economic security and the organizational culture of the enterprise, monitoring the impact of the process of improving the organizational culture on the economic security and efficiency of the enterprise.

Let us consider *"arbitrary"* violations of economic security that arise due to the inexperience of managers, the contentiousness of managerial decisions and other subjective factors in the field of production and economic activity of an enterprise, including: high level of commercial risk; insufficient knowledge of market conditions and inefficient financial management; lack of flexibility in management and deficiencies in the management of production costs; insufficiently high-quality system of management and "maneuvering" by the personnel of the enterprise; lack of unity and coordination of actions of the structural divisions of the enterprise and depreciation of fixed production assets; low labor productivity; congestion of the sphere of activity with objects of the social sphere; low competitiveness of products; dependence on a limited circle of suppliers and buyers.

In the list of "arbitrary" violations of economic security under consideration, it is worth highlighting the low-quality system of management and “maneuvering” by the personnel of the enterprise, which are associated with the state of personnel security. In our opinion, personnel security is an element of economic (and informational) security and acquires fundamental importance when considering the problems of improving the organizational culture of an enterprise.

To substantiate the impact of the level of organizational culture of the team of employees of the enterprise on various aspects of economic security, the method of a group questionnaire survey was used according to the Likert method, which made it possible to identify the degree of severity of latent attitudes. This technique is most convenient in the conditions in which the survey was supposed to be conducted (limited survey time, a large group of respondents, the need to study hidden settings).

The study revealed that 30.6% of respondents find it difficult to assess the significance of the work performed (fig. 4). To the question - "How do you assess the significance of the work you do?" the following answers were received: "it is very important" – 25.2%, "it is necessary" – 52.4%. Only 56% of respondents are proud of their work. To the question: "Does the manager correctly evaluate your contribution to the work?" 41.5% answered "yes", 28.8% answered "no", and almost 30% found it difficult to answer, which is reflected in fig. 5.

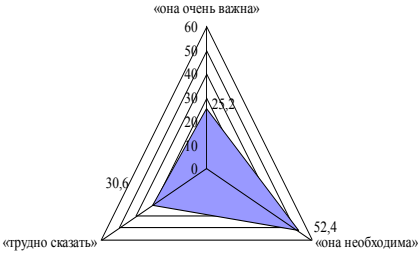


**Figure 4. Respondents' answers to the question about assessing the significance of the work performed; %**

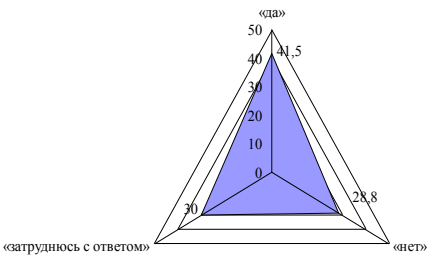


**Figure 5. Distribution of answers about the adequacy of the manager's assessment of the correctness of the employee's contribution to the work; %**

Thus, formed state of organizational culture does not yet create the necessary conditions for the possibility of identifying an employee with an enterprise.

The survey showed that the majority of respondents in the sample have a positive attitude towards organizational culture (51.9%), fewer subjects of the survey have a negative attitude (25.4%), and even fewer have an attitude close to positive (15.8%) and very few subjects with a borderline attitude (6.7%) (fig. 6).

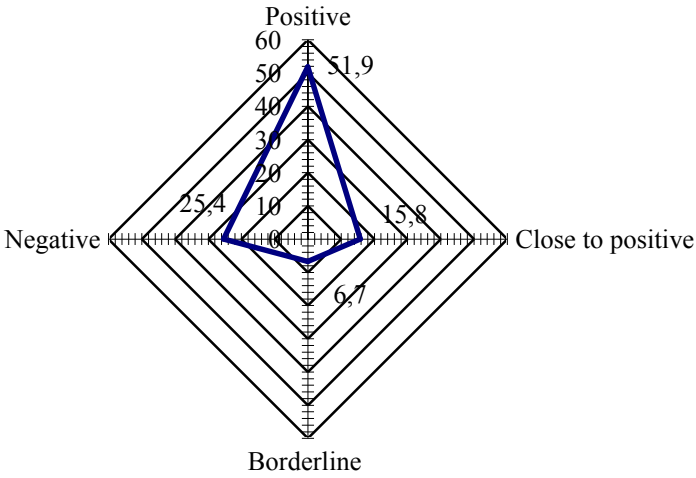


**Figure 6. Percentage of respondents with different types of attitudes towards organizational culture**

Despite the dominant value of positive characteristics, it should be noted that there are objective threats (32.1% of survey subjects with a negative and borderline attitude to organizational culture), which must be considered in the context of preventing possible negative situations for the enterprise economic security system.

An important role in ensuring the economic security of the enterprise based on the development of its organizational culture is called upon to play the appropriate tools, which include the means of the apparatus of instrumental and technological support for the economic security of the enterprise; two-loop model of formation and development of the organizational culture of the enterprise; strategic directions for its improvement in order to ensure economic security: integration, differentiation and adaptation.

In order to ensure economic security, in general, and protect intellectual property (trade secrets), in particular, it is proposed that enterprises intro-

duce a strict procedure for working with information and comply with the regulatory regime for access to it, determined by a set of administrative, legal, organizational, engineering and technical, socio-psychological and other measures based on legal norms and organizational and administrative regulations of the enterprise administration.

Effective provision of the economic security of the enterprise is possible with the obligatory implementation of a number of interrelated organizational and technological measures (fig. 7).

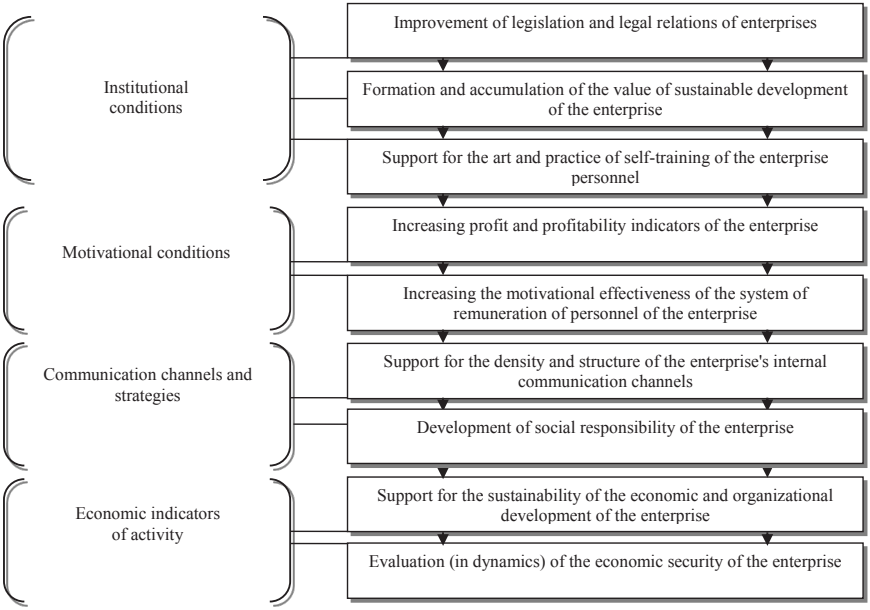


**Figure 7. Modular-block structure of the elements of the process of managing the economic security of an enterprise**

This management system is based on the principles of trust, mutual respect, responsibility and purposefulness of the team and allows you to achieve real loyalty and purposefulness of the team and, accordingly, increase the efficiency of its activities. It is advisable to introduce daily management reporting on control points for monitoring all business processes, from the purchase of raw materials, production, logistics, investments and ending with the sale, cash flow. Through trends and gaps, deviations from the budget, business plan, and strategy are constantly monitored.

In conjunction with end-to-end budgeting and management accounting, operational or strategic management decisions are made to reduce costs, increase revenues, and action plans are adjusted.

The formation and development of the organizational culture of the enterprise is important not only for maintaining the corporate spirit of the staff - the economic security of the enterprise largely depends on it. It can be stated that the personnel "sick" for the enterprise will not harm it. With the transfer of employees to another enterprise, a leak of trade secrets may occur, there may be cases when personnel "sell" important information. Many enterprises in post-reform Russia periodically check their personnel for loyalty. This assumes that people will speak out openly. Naturally, the security service is connected to loyalty checks.

When developing a conceptual two-loop organizational and economic model for the formation and development of the organizational culture of the team, the work analyzed changes in the activities of the enterprise, the dynamics of the effectiveness of the use of human resources, trends in the field of resource support of the enterprise. The integrating element of the organizational and economic components of the enterprise's activity is its result - the provision of quality goods and services to consumers. The organizational component contributes to the production of goods and services, the economic component - to increase the efficiency of distribution and exchange.

The effectiveness of using a two-loop organizational and economic model for the formation and development of organizational culture depends on the degree of implementation of the following principles: the effectiveness of the participation of all employees in the implementation of the mission of the enterprise; specifying the functional role of each subject of management and determining the conditions for their functioning within the system; the complexity of the elements of the system for the formation and development of organizational culture (coverage of all stages of the enterprise: preliminary, production and resulting); organization of communication between participants in the organizational and economic process in order to minimize the inertia of the entire system; integrativeness of the formation and development of organizational culture, determined by the mutually beneficial networking of links between internal links, external agents (partners) and consumers of goods and services of the entire system as a whole; the complexity of checking the compliance of the quality of goods and services received by the consumer with the needs of consumers through the organization of testing their opinions; the agreed position of commodity market participants in determining the boundaries of their

personal responsibility; taking into account globalist trends in the development of commodity markets.

To comply with the listed principles by the subjects of organizational and economic relations that arise in the process of formation and development of the organizational culture of the enterprise team, it is proposed to use a multicomponent double-loop organizational and economic model for the formation and development of organizational culture, covering all types, areas and taking into account the performance of the enterprise (fig. 8).

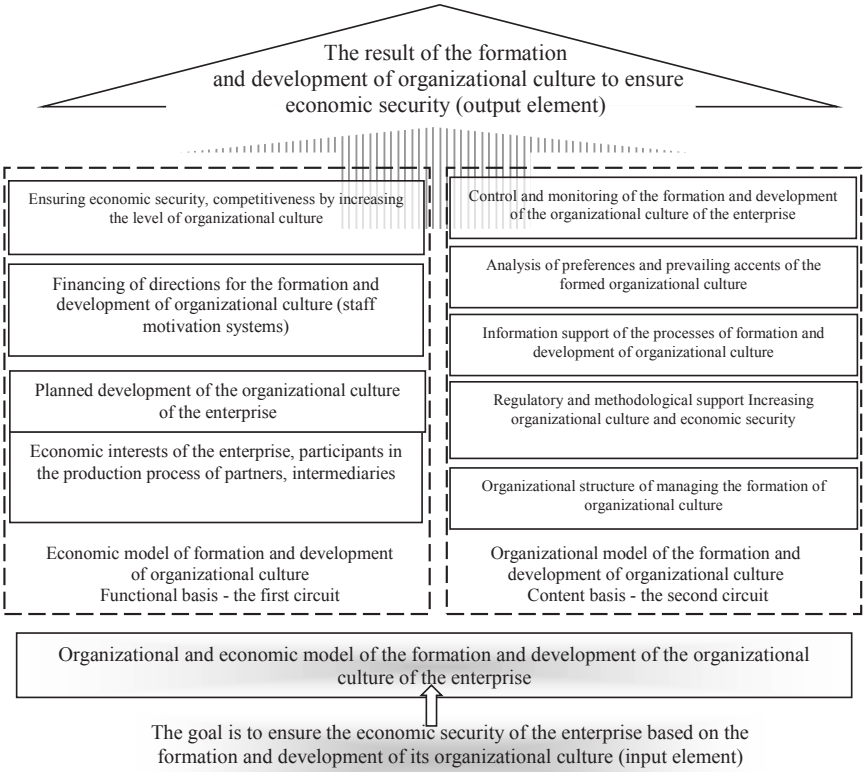


**Figure 8. Conceptual two-circuit organizational and economic model of formation and development of the organizational culture of the enterprise - a systematic approach**

In accordance with the system approach, the conceptual organizational and economic model is a set of interrelated elements combined into its subsystems:

- economic model of formation and development of organizational culture (functional basis - the first circuit);
- organizational model of the formation and development of organizational culture (substantive basis - the second contour).

Within the framework of the process approach, the organizational and economic model of the formation and development of organizational culture is an algorithmized sequence of stages (fig. 9):

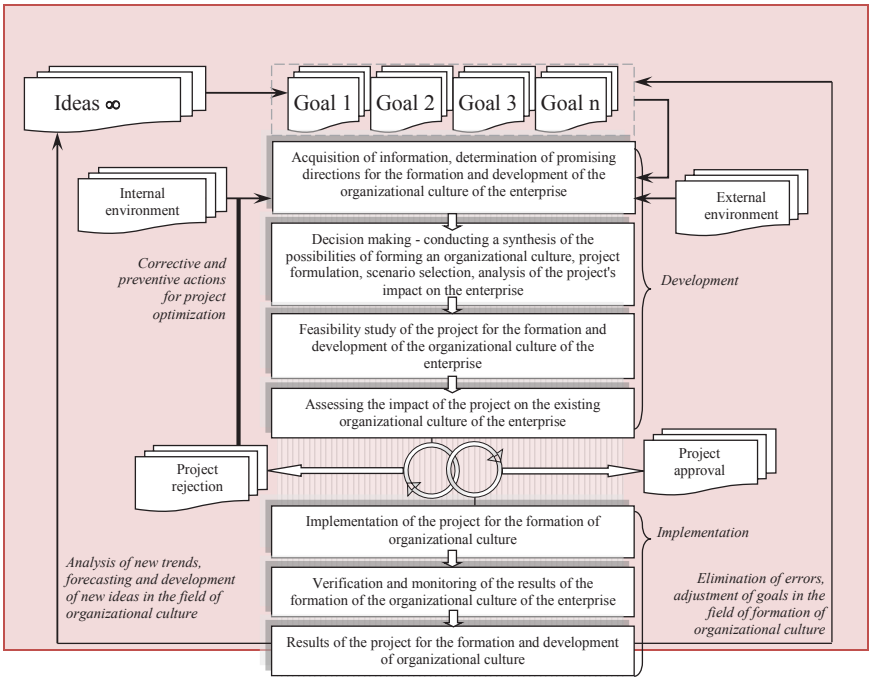


**Figure 9. Conceptual organizational and economic model of the formation and development of organizational culture - a process approach**

From the point of view of the process approach, the internal content of the organizational and economic model of the formation and development of organizational culture is indicated by blocks that group the entire com-

plex of actions of the enterprise management on the use of this model. The model ends with the block "Results of the implementation of the project for the formation and development of organizational culture", after consideration of which the management of the enterprise must analyze new trends, forecast and develop new ideas in the field of formation and development of organizational culture, as well as eliminate errors and adjust goals.

The current stage in the formation of the organizational culture of enterprises in the Krasnodar Territory involves, first of all, the development by the management of a strategic vision for the development of their enterprise, which in the future should be extended to ordinary employees.

An analysis of the situation that has developed at the enterprises of the Krasnodar Territory allows us to conclude that the purposeful development of organizational culture is still observed only in exceptional cases.

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# THE IMPACT OF DIGITAL REVOLUTION FACTORS ON THE STRATEGY OF CONSULTING COMPANIES

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**Abstract.** The article analyzes a consulting business that develops and transforms after a common business environment and the needs of its customers. Under the influence of the factors of the 4.0 consulting business, it is required to explore the new needs of the environment and adapt to them. The article discusses how a consulting company strategy expressed in a business model is changing under the influence of the fourth industrial (digital) revolution factors. It was concluded about the importance of the transition to digital transformation according to the "Consulting 4.0" model, using all the features of the formation of digital counseling in order to achieve digital leadership.

**Keywords:** management consulting, consulting companies, business models, digital technologies, consulting digitalization, "Consulting 4.0" model.

The occurring transition to a digital economy contributes to improving the productivity and competitiveness of companies and at the same time leads to increased competition, raising the level of complexity of business models, requires major changes in the models of behavior of manufacturers and consumers. Under the influence of cancellation, the majority of industries turn out to be [1], including management consulting.

Management consulting is a high-tech professional service that independent business professionals provide the management of the client company and which is an objective recommendation for the management solution: a decision of the client problem or the use of opportunities. It may also include support for management in the implementation of these recommendations and decisions [2].

Digital technologies undermine key competencies, on which consulting companies have built their business for decades - the ability to collect and analyze information, the ownership of expertise, the ability to penetrate

the essence of the problem situation and find solutions [3]. Access to large data and processing technologies enables companies to independently collect valuable and effective information about customers and competitors. The development of business analytics tools allows you to independently analyze and interpret information about the activities of your companies. If earlier consulting companies provided access to the expertise of their own and attracted experts, now customers may now receive advice from leading specialists in various fields - directly or through intermediary companies - thanks to the development of professional and educational network platforms. Thanks to the books and especially the Internet, the consulting process ceases to be a "black box", knowledge commodation occurs, and companies can use their tools without the help of consultants - the BCG, SWOTE and PESTEL matrix - for penetration into the essence of the problems of their business and find solutions. With the advent of artificial intelligence, opportunities are opening up opportunities for the development of automated inexpensive solutions - a kind of "self-service" tools, which will make consulting services available for small and medium businesses.

The increasing role of technology erases the boundaries between managerial consulting, traditionally engaged in issues of strategy, operating efficiency and personnel management, and consulting in the field of information technology, provided services for the development, implementation and support of information systems and applications.

In response to customer requirements - mobility, reduce project time, greater flexibility and adaptability of solutions, new digital products and services, - as well as in connection with the development of domestic consulting and the emergence of new players specializing in digital technologies in the market, traditional management consulting leaders and large companies are forced to change their proposal.

Modern consulting business includes a very wide range of services, consultants are shipped in all areas of business. Leading consulting firms include sustainable development practices in their recommendations, because this requires a business environment and customers. Recommendations should help the client to achieve sustainability, so firms need to develop these competencies, embed them in the essence of the business. The strategy of sustainable development should permeate all activities: and how the firm works herself, and what recommendations it gives.

The largest consulting firms change their business model, making more and more diverse services, such as the development of prototypes or the introduction of recommendations [4]. There is an increasing share of busi-

ness directly strategy, but the share of operating, digital and transformation projects is growing. Customers want to pay for a specific tangible result, switch to "success fee". New markets in the "embryonic" stage can be unattractive for large successful consulting firms, but if you do not go to them now, then later they will be occupied by new players and will be able to "undermine" established firms.

In general, there are four basic changes that the fourth industrial revolution provides: customer expectations, improved product, joint innovation and organizational forms [5].

These directions intersect with selected groups of factors (tab. 1) [6]. Each of these factors below is described in more detail through the prism of the impact on the consulting company strategy.

**Table 1.**
**Group of factors of the Fourth industrial revolution, relevant to the consulting industry**

| Factors | Description |
|---|---|
| Digitalization and big data analytics | - Cyberphysical systems (union of digital and physical world)<br>- Association of individuals and companies in the virtual world<br>- Automation and efficiency improvement<br>- overcoming restrictions of human consciousness<br>- increasing predictive opportunities<br>- New digital products<br>- Distributed registries, decentralization |
| Democratization of knowledge | - Fast and extensive distribution of information<br>- Drivers: the internet, media, books, "spill of knowledge", mobility of employees<br>- "Graduates" of the company distribute consulting knowledge to customers and society<br>- Improving the transparency of society and business |
| New business models | - It is growing need to unite with other companies: to form platforms and implement new forms of work with resources<br>- New customers, resources, suppliers<br>- Changes value offer and "package" of services |
| Culture of work | - Increasing competition for talents (global labor market, competition from other industries)<br>- The employment model change s (contracts, global outsourcing, loyalty)<br>- Getting rid of routine labor<br>- The need for new skills from employees<br>- Individualization and change in the culture of society |

**Digitalization and big data analytics**

The fourth industrial revolution (Industry 4.0) implies the unification of the digital and physical world (cyberphysical systems) in the field of technology. Big data from the physical world are collected, processed by a computer with artificial intelligence and the use of deep analytics, and then returned to the physical world as optimal recommendations and actions.

Patterns and models are formed that allow you to predict future scenarios. The first step is to perform the same functions, but faster and more efficient. The next step is new ways to create value and new business models. The 4.0 industry will help create interconnected "digital" teams, ecosystems, supply chain and consumer interactions that bind, analyze, study and apply information for solutions in the physical world [7].

Such ecosystems that unite suppliers, customers and competitors will reduce costs and improve the quality of products that exactly satisfy the needs of customers. Technologies will allow the entire system to be automated and flexible so much that transaction costs will reduce, the speed will increase, and this will allow you to displace traditional business.

Another important technology is the technology of distributed registries (blockchain), an approach to the exchange and storage of information. The blockchain will allow companies to reduce the costs of document management by automation, increase transparency of operations, confidence between the parties and security. Consulting companies will be able, for example, enter into smart contracts with customers and suppliers.

Digitalization of systems, developed technologies, sensors and the Internet allowed business and the state to accumulate huge data arrays that can be used for deep analytics. It will be possible to predict the scripts for the development of the future and take action now to avoid negative consequences, reduce risks and succeed on the basis of large data that a person cannot process in his head, and not on intuition and past situations [8].

Consulting firms will use "big" data both for themselves and to provide recommendations to customers. To work with them, you will need new competencies, a new type of specialists - a way to get knowledge about something, which will improve the quality of recommendations.

Business customers will increasingly go to cyberphysical systems, which will create demand for a new product. Consultation on transformation is needed to customers, but to win competition from IT players, consultants need to learn how to create working prototypes and deeply understand the digital products. Such firms like BCG and McKinsey have already created special units for the new business.

**Democratization of knowledge**

Knowledge applies faster and extensive than before. This is due to the Internet, media, "spill" of knowledge by service providers, people's mobility [2]. More and more people with less costs can access accumulated by other knowledge.

Customers now don't want to pay huge amounts of money to consultants for their knowledge if many others have this knowledge as well [9].

Journalism and training are no longer regions enshrined for specially trained people. Everyone has the opportunity to talk about his experience, share cases in a blog, media, at conferences. This allows the best practices to distribute in a business environment. Also, experience from one industry can be applied in others, as it was with a fashionable theme of the agile-transformation, which has spread from the field of software development in almost all of the industries.

In consulting, on average, a quarter of employees leaves the by "up-or-out" policy. Knowledge of consulting firms are distributed through "graduates" in business, reducing the value of these knowledge. Therefore, companies need to constantly invest in their intellectual capital. Otherwise, their most expensive asset - knowledge - will soon be widely accessible and will cease to give the company a competitive advantage, generate cash flows from orders.

In general, the transparency of society and business is growing. People talk about themselves a lot of information on the net, companies keep blogs and share experiences. There are platforms like Glassdoor, where you can learn about salary and working atmosphere in companies. Companies need to be more open to recognize society. Transparency is an important element of business legitimacy in the eyes of stakeholders.

**New business models**

The development of management practices, communications and the emergence of global and intersectoral competition has become an incentive of the birth of new business models, ways to create value. Digital technologies led to the popularity of the platform model, the examples of which are Uber, Alibaba, Facebook, SAP and others.

Traditional businesses like Apple also moved to the platform model, which allows them to create additional value from managing the providers network and the distribution of this value between the parties.

There is a growing need to find new ways to work with resources. To create a competitive advantage, many firms do not have enough of their own resources to compete, so it is necessary to involve other companies, new suppliers who can be entrusted with part of the tasks for outsourcing.

The main activity is often outsourced - analytics and recommendations. In the UK, there are business models in which only Partners work in a consulting firm, and Managers and Analysts are involved from outside for each specific project. This becomes possible in developed markets, where consulting specialists are freely available and there are quite a lot of them for each type of project. In Russia, there is also a practice of hiring "freelancers" in a team for a specific project, if specific expertise is needed or the workload increases sharply.

In the consulting business, the proportion of projects with a success fee is growing, which reduces the risks for the client, but increases the pressure on consultants, because it becomes not enough to present a "deck" of slides. Success fee forces companies to be more involved in the process of implementation of recommendations, lengthens the project period and requires new competencies from employees.

Thus, in the business models of consulting companies, the value proposition itself is changing (digital products, big data analytics, implementation support, a wider "package" of services), suppliers, partners and resources (IT, data scientists, designers, expert network facilitation, outsourcing), methods of generating income (success fee) are changing. The value proposition also includes the integration of sustainable development into the business of clients, because this is required by the environment.

**Work culture**

A significant part of the routine and algorithmic work can be replaced by artificial intelligence and robots. Thanks to developed communications, some of the functions that are not critical for the success of the company can be moved outside the company and even the country (global outsourcing). The added value of human labor will increase.

In companies where the main asset is human capital (and there will be more of them), other employees will be needed. And the competition for talent will become even tougher, because it will come not only from competing companies, but also from unrelated industries, from other countries (open-talent economy). Companies will have to adapt their HR policies to ensure they have a sustainable workforce.

Employees of the future should be some kind of entrepreneurs within the company [10] in order to create a learning organization capable of constant innovation and rapid adaptation to the environment. Creativity, "soft" skills are becoming more important in the automation economy, where fewer people are involved in direct production.

In its Fourth Industrial Revolution report, Deloitte [7] identified several potential factors affecting work culture in the future. For example, trends

such as new talent models, robotization and artificial intelligence, temporary employment, and "crowds-on-demand" teams stand out. In the "augmented" workforce model, not only direct employees in the company's office will work on the tasks of the company, but also a whole network of "outside" people, remote employees and external experts.

The Deloitte study [7] also states that under the influence of technology, the external environment is becoming more dynamic, companies and staff need to constantly change, create new employment models in order to meet new requirements. This can create additional stress for staff. But this also creates a new challenge - how to create a stable working environment, relieving people of the fear of losing a "roof over their heads" and "food on the table", while continuing to move in a transitional economy [7].

Companies need to create a culture that is geared towards continuous learning so that it is stress-free and built into the workflow. It will be necessary to look for talents in new unusual places, because in a complex technological world, companies will need people with different backgrounds.

Ethical expectations also increase with the development of culture and education. Companies must have a positive social impact on society, be more responsible in order to gain legitimacy.

There is a change in human consciousness and the structure of society in favor of "individualization of the human world" [11]. The role of man and human labor is growing, it becomes possible to build a unique life and career path. Business and the states of developed countries set the happiness of the individual as their goal, and not the power of the nation, because the borders between nations are being erased.

Modern digitalization processes have a significant impact on the consulting industry. The increase in demand for consulting services in the new digital environment leads to the formation of a new stage in the development of consulting activities, a new model of this business - "Consulting 4.0", the emergence of a new concept - digital-consulting. Consultants and clients of a modern consulting company become full-fledged partners. The environment of a particular business is subject to dynamic changes, develops according to a digital scenario, and it is the digital consultant who is called upon to competently and reasonably answer how a business should adapt to changes and function in a digital environment [12].

Unlike previous consulting business models, companies operating under the 4.0 model are not only focused on analyzing and optimizing the business processes of their clients. Their services also include recommendations on building completely new business processes for the client. This implies that consultants in the digital age can use their knowledge related

to the transformation of the economy, digital skills to identify new areas of business, as well as to shape and implement new business models on behalf of their clients [13; 14]. This radically changes the specifics of consulting work in the XXI century. With the transition to Consulting 4.0, consultants become not just consultants, but full-fledged competent partners, they play the role of creators of new opportunities, going beyond suggesting changes and adapting to their implementation.

The influence of the digital environment on the sphere of consulting can be reflected in the form of a model of the activity of a modern consulting company striving for digital leadership (fig. 1) [15, p. 80].

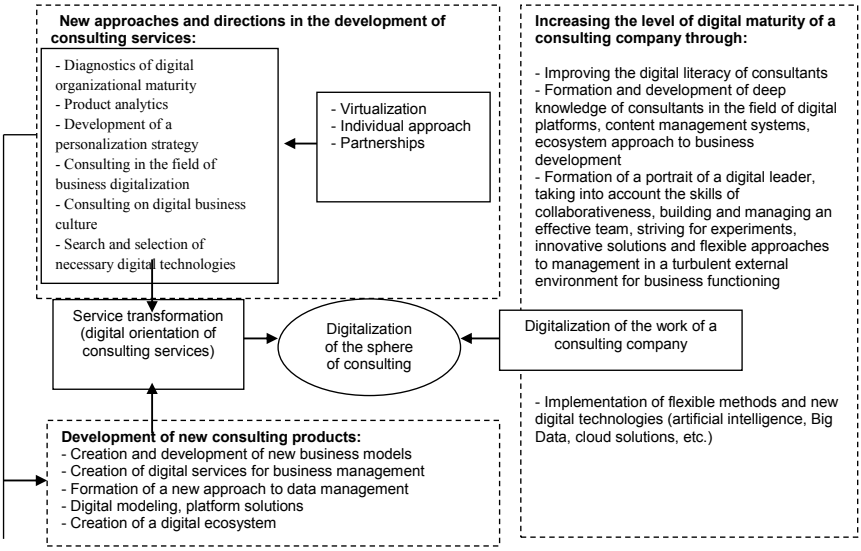


**Figure 1. Consulting 4.0 model, reflecting the digitalization of the consulting industry**

According to this model, two aspects comprehensively reflect the digitalization of the consulting industry.

1. Transformation of the work of consulting companies and consultants. Many market leaders are digitalizing work by introducing new technologies [16]. For example, digital big data solutions allow consultants to gain insight into the market and customers. The depth and detail of analysis provided by digitalization helps to find problems faster and offer the most effective solutions. While new technologies and consulting tools are im-

portant to the growth of the industry, the consulting sector should not rely solely on the advances of the digital age today, as many client companies are only adapting to the digital world and prefer traditional means of communication. Because of this, consultants have to balance between the use of traditional and new tools and technologies, adapting to modern trends and customer requirements.

2. The digitalization of consulting - is the transformation of the services provided, the emergence and development of a new direction - digital consulting.

Taking into account the modern challenges of the digital economy, promising areas for the development of the consulting sector are the transformation of consulting services through the formation of new approaches and directions for their development, the development of new consulting products, as well as the digitalization of the work of the consulting company itself through the formation of digital competence of its consultants and a constant increase in the level of digital maturity. According to a number of researchers, promising areas for the development of the consulting sector are "diversification in synergy with digitalization" [17].

In our opinion, the most important factors in the growth of demand in the field of consulting are not only the traditional needs of clients in automating business processes, but also the digitalization of their business, the formation of development strategies with the introduction of modern innovative technologies in production and management business processes. Companies need to create additional functions in information systems, the need for stable interaction of business processes and their digitalization. As the need to adapt to the digital environment remains a major theme for most large companies looking to tackle the challenges of new digitally savvy competitors, the market is expected to continue to move upwards and provide consulting with a major revenue opportunity in the coming years.

The scope of digital consulting is extensive and affects many innovative areas, and for the virtualization of consulting services, mobile technologies, cloud technologies, big data and analytics, social technologies, Internet of things, augmented reality, security technologies, environmentally friendly IT, machine learning, biometric identification systems [18; 19]. UX/UI design, Agile, digital marketing and many other digital areas and management tools are developed and implemented in the practice of the customer company. The demand for these services is due to the fact that it is much easier for many companies to turn to consulting companies that will develop and implement the necessary system than to independently select staff, think over a strategy and implement an idea.

Thus, the list of services provided by modern 4.0 consulting companies will only expand as clients demand faster and more tangible results from their consulting costs. As the speed of completing tasks becomes a determining factor in the competitive struggle, the responsiveness to customer requirements to create real products and implement digital solutions, taking into account market trends and the digitalization of the economy, will play an important role.

It seems that the "Consulting 4.0" model can become a basic tool for developing projects for the strategic development of consulting companies, their digitalization in accordance with the modern challenges of the digital economy. Putting into practice the transition to digital consulting is a very difficult and large-scale task on the way to digital leadership. Therefore, the scientific community, as well as companies and their representatives, face new questions. How to measure a company's readiness for digital transformation? How to prepare staff for changes in the format of their work in order to minimize resistance? What specific digital technologies need to be introduced into management practice in connection with a paradigm shift in the company's relationship with the digital environment? How to convey to clients the value of the digital orientation of the consulting proposal? How quickly can the planned initiatives be implemented? How to assess the level of formation of new digital competencies of employees and company managers in a digital environment? The answers to these questions require further research.

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# ORGANIZATION OF MONITORING OF THE PIPE-ROLLING INDUSTRY USING INDICATORS FOR THE IMPLEMENTATION OF THE ORGANIZATIONAL AND ECONOMIC MECHANISM FOR ENSURING THE ECONOMIC SECURITY OF ENTERPRISES

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**Abstract.** The article presents the results of the development of an organizational and economic mechanism for ensuring the economic security of enterprises in the pipe industry. The influence of representatives of the business environment and state regulation of the economy on the processes of ensuring the economic security of the enterprises under study is determined. The threats to the economic security of enterprises and the possibility of their neutralization are analyzed. For the functioning of the organizational and economic mechanism, a method for its information support is proposed in the form of collecting data from the entire set of indicators for assessing the significance and forecasting of certain probable threats, that is, a system of indicators that interact with each other and allow determining the parameters for further strategic planning at the industry level.

**Keywords:** economic security, indicators of economic security, threshold values, monitoring, pipe industry

## Introduction

The pipe-rolling industry is a strategic branch of the Russian economy. The implementation of large-scale projects in the energy sector, infrastructure development and other areas involves the use of significant volumes of pipe products. Increasing the economic security of these projects requires import substitution of pipe products and the development of fully domestic production, which will reduce the risks of implementing large-scale projects.

It should also be taken into account that the pipe industry is the sub-

sector of metallurgy with the largest value added. This is one of the most technological productions of high metallurgical processing. Stable growth and development of pipe-rolling production is largely determined by investments in the industry, which in turn are determined by the level of achieved economic security of enterprises - objects of investment.

The issues of the economy of the pipe-rolling industry and the development of enterprises in this industry were identified as the subject of research, the results of which are presented in the works of Bondarenko E.V., Zaionchik L.L. [1], Makarova E.V., Zemtsova E.M. [2], Samarina V.P., Ryabchukova O.Yu. [3], Yuzov O.V., Sedykh A.M., Petrakova T.M. [4], Bolgarin P.N., Ilyashenko S.N. [5], Pinchuk A.V., Kondratov L.A. [6], Oborsky V.B. [7], Ushakov A.S., Kondratov L.A. [8], Gurov S.A. [9; 10], Zhdankin N.A., Yatmanov A.V. [11]. Despite a wide range of issues resolved within the framework of the studies published in these papers, the problem of developing constructive tools to ensure the economic security of pipe-rolling enterprises has not received significant development at the level of individual scientific studies.

**Organizational and economic mechanism of management tools**

The results of assessing the level of economic security of Russian pipe-rolling enterprises, as well as an analysis of its individual parameters and factors, determine the need to develop specific management tools. This toolkit is aimed primarily at creating conditions for neutralizing threats and taking into account the dynamics of environmental factors that determine the prospective decline in economic security indicators of the enterprises under study.

The solution to the issue of developing such a toolkit is primarily associated with the formation of an organizational and economic mechanism with the aim of systematically solving a fairly wide list of interrelated and interdependent problematic issues of the organizational, financial, economic, administrative and managerial plan. It should also take into account the fact that this mechanism should be aimed at creating conditions for effective counteraction and neutralization of threats to the economic security of enterprises that are formed in the external environment, are of an objective nature and are actually exogenous factors of influence that are not amenable to corrective and preventive actions from the enterprise.

The organizational component of the mechanism involves the creation of an effective system for managing the interaction of internal and external stakeholders (as well as contact audiences) in order to achieve maximization of the results of using the competitive advantages and strengths of the enterprise, as well as minimizing external factors of adverse impact. The

solution of these issues is based on the correct goal setting, decomposition of goals into tasks and substantiation of the functions corresponding to these tasks and the principles of their implementation.

The economic component of the developed mechanism is aimed at solving the issues of finding sources of resource support, its mobilization and distribution in the areas of counteracting threats to economic security, characterized by the greatest risk of adverse economic consequences for the enterprises under study. Within the framework of the economic block of the mechanism, it is necessary to assess and analyze the main parameters of the functioning of the system for ensuring the economic security of an enterprise, as well as to carry out analytical work with information flows on the current and forecast state of the main external and internal factors influencing economic security. Among the tasks of the economic block, one should also mention the issues of planning measures to increase the level of economic security of enterprises.

The functioning of the organizational and economic mechanism is based on its information support. In this case, it should be noted the need for prompt provision of information that removes any uncertainty from the key parameters of the economic security of the enterprise, as well as the current and forecast state of the factors of influence. The processing of information (based on specific methodological support) and the adoption of appropriate decisions based on it should be defined as intermediate results of the functioning of the mechanism that determine the solution of the tasks underlying it and the subsequent achievement of its goal.

To diagnose the main factors influencing the state of economic security of an enterprise, it is justified to use the SWOT analysis methodology, which allows you to classify factors into endogenous and exogenous with their subsequent division into threats and opportunities (depending on the nature of the current impact and interaction with the external environment), as well as strengths and weaknesses [12].

Fig. 1 shows the organizational and economic mechanism for ensuring the economic security of enterprises in the pipe industry [13].

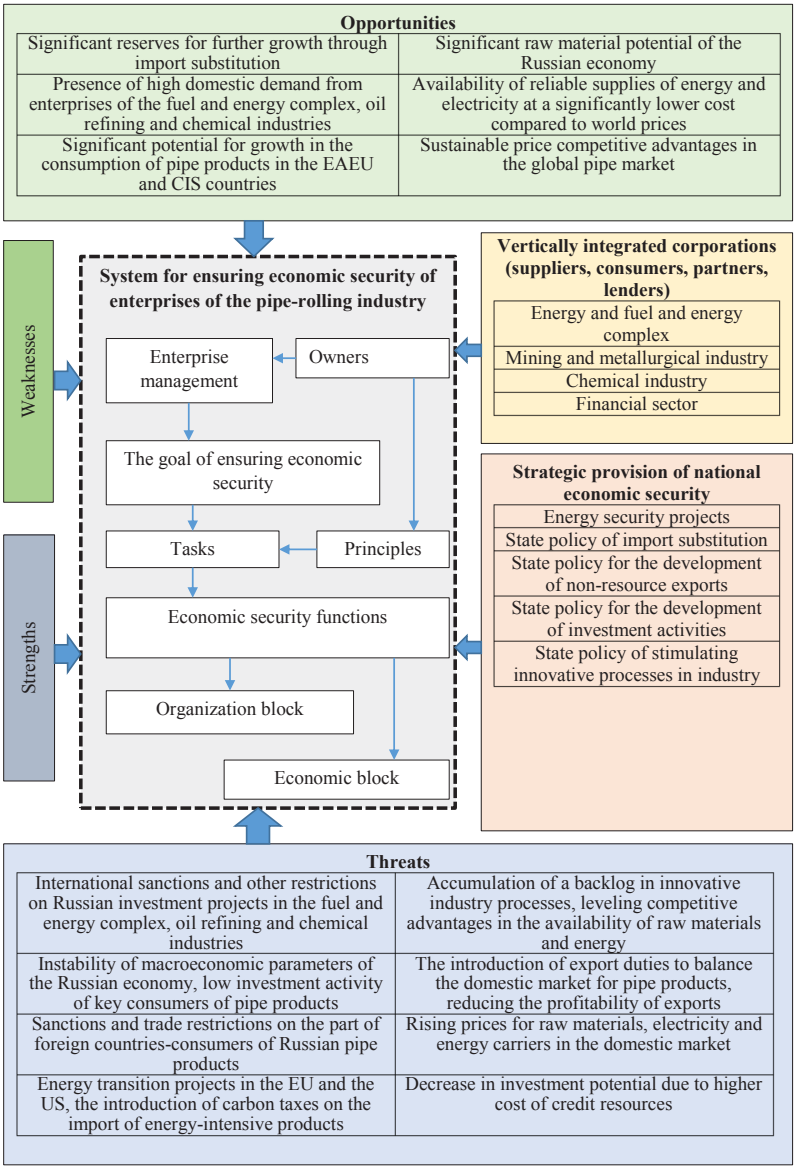


**Figure 1. Organizational and economic mechanism for ensuring the economic security of pipe-rolling enterprises. Source: compiled by the author**

The presented mechanism schematically displays the interaction between the internal and external environment of the pipe-rolling industry enterprise. The external environment is represented by objectively existing factors of influence, the dynamics of changes in the parameters of which directly affects the level of economic security of enterprises.

In the external environment, two groups of subjects have been identified that have a significant impact on the level of economic security of enterprises: the state and the business environment.

The state exercises direct influence through the implementation of the strategic provision of national economic security. In this case, we are talking about the implementation of projects to ensure energy security as well as state policy: import substitution, development of non-primary exports, development of investment activities, stimulation of innovative processes in industry.

The subjects of external influence from the business environment are vertically integrated corporations (suppliers, consumers, partners, lenders) that operate in the following industries: energy (supplier) and fuel and energy complex, mining and metallurgical industry (supplier), chemical industry (consumer), financial sector (creditor).

The internal environment of enterprises is characterized by their strengths and weaknesses, which characterize the following parameters:

- financial condition (efficiency of economic activity; availability of liquid assets; ratio of own and borrowed capital, etc.);
- efficiency of operational activities (production and logistics processes);
- availability of resources (material, labor, financial, energy, etc.).

The purpose of the functioning of the organizational and economic mechanism for ensuring the economic security of enterprises in the pipe-rolling industry is the timely identification, constant monitoring and prompt neutralization of threats to the security of enterprises. The mechanism is aimed at creating conditions for the long-term neutralization of threats from the external environment and maximizing economic benefits from the use of opportunities to solve the following tasks:

- ensuring a stable expanded reproduction process at enterprises through the use of strengths and opportunities that materialize in the external environment (in the national and world economy);
- expanding the range of manufactured products, substituting import supplies, ensuring production growth at the expense of the reserves of the domestic market and the markets of the EAEU countries;
- formation and development of competitive advantages, maximization

of the results of their use in the direction of stabilizing the position in the national and world market for pipe products.

Among the principles of the organizational and economic mechanism, the following should be highlighted:

- consistency (taking into account the mutual influence of the parameters of the internal environment of enterprises and the characteristics of the impact on them from environmental factors);
- adaptability (creation of conditions for ensuring efficient economic activity of enterprises in adverse conditions, including: strengthening of international sanctions, critical changes in market conditions, etc.)
- constructiveness (focus on expanding production, the range of products, deepening the processing of domestic raw materials);
- complexity (taking into account a wide range of risk factors, as well as parameters of the internal environment and resources for neutralizing threats);
- objectivity (taking into account objectively existing factors of influence and using the opportunities for making timely decisions in relation to objects that are amenable to corrective and preventive actions);
- novelty and originality (the use of new management tools that allow making effective and non-trivial management decisions in the course of neutralizing threats and maximizing economic benefits from the use of emerging opportunities).
- In order to solve the problems of the developed organizational and economic mechanism, on the basis of the principles defined above, the following list of functions is implemented:
- timely identification of threats, assessment and analysis of risks associated with them;
- forecasting the key parameters of the internal and external environment of enterprises from the point of view of ensuring economic security;
- neutralization of factors of negative influence, reduction of risks of materialization of threats to the economic security of enterprises;
- monitoring of weaknesses and vulnerabilities, ensuring the timely application of corrective and preventive actions.

**Ensuring monitoring and state strategic management of the economic efficiency of the industry**

Thus, it can be seen that the organizational and economic mechanism for ensuring the economic security of the industry is a complex integral system, which is a generalized reflection of a set of areas, including the solution of a number of tasks to ensure a stable state of production, scien-

tific, technical, information, personnel, investment, financial security for the possibility of effective operation of enterprises. And for this, it is necessary both to increase productivity while optimizing and modernizing production processes and innovative development of technologies, and to ensure the implementation of IT technologies, taking into account the protection of commercial interests with general information transparency. Equally important is the solution of the problem of the formation of qualified human resources with guarantees to minimize the risks associated with work. And also the economic stability of enterprises, their investment attractiveness while minimizing financial risks should be ensured.

In its most general form, the economic security of the pipe industry consists of providing favorable conditions and factors for its effective maintenance (Figure 2).

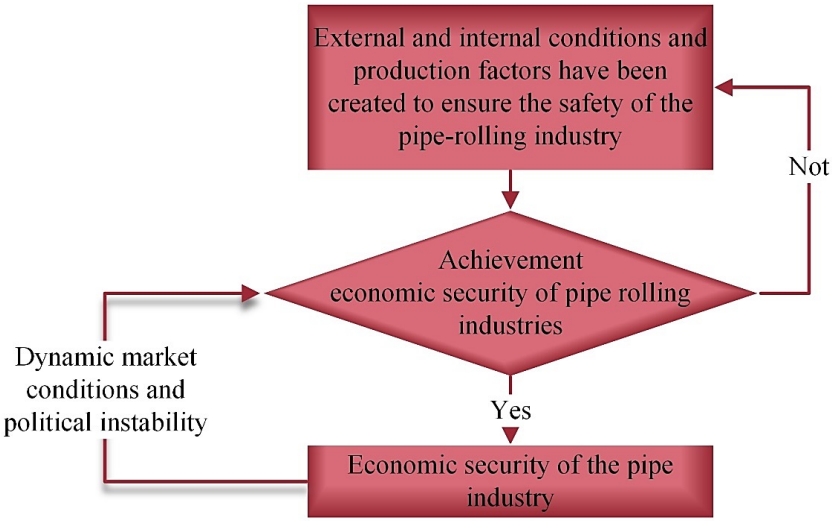


**Figure 2. A generalized closed scheme for ensuring the economic security of the pipe industry. Source: compiled by the author**

At the same time, "conditions" and "factors" are in a constantly changing dynamic process, depending both on the economic security of the state as a whole, its role in the control processes of the pipe rolling business, and the external influence of the business environment and internal production factors.

To maintain the effective functioning of pipe-rolling enterprises, it is necessary to ensure the possibility of continuous operational analysis of

sustainability and forecasting of their economic security, and this is associated with a clear definition in quantitative terms of the level of certain possible threats that have a negative impact on all components of production. That is, it is required to form a system of indicators of the level of economic security that interact with each other and make it possible to identify significant parameters for strategic planning at the industry level.

The algorithm for determining, further analyzing and evaluating indicator values is a complex multi-level process, which can be represented schematically as a first approximation (Figure 3).

To implement this process, it is necessary to provide an analysis of the threshold values of each of the proposed indicators. That is, an important task is to unambiguously determine the values, going "beyond" which within unacceptable limits will lead to negative consequences for the entire economy of the industry. In this case, it is necessary to consider the relationship between the calculated threshold values and the obtained indicator readings in constant dynamics.

The concept of the organizational and economic mechanism for ensuring the economic security of pipe-rolling enterprises should be based on the Strategy for the Economic Security of Russia, developed until 2030, approved by the President of the Russian Federation in May 2018. Figure 1 highlights the threats that have affected the industry to a greater or lesser extent over the past few years. The biggest difficulty for monitoring the industry is precisely the numerical expression of this very “"degree", which depends on the negative influence from the outside and is formed within the industry due to any prevailing situation or situation. It is necessary to develop variable coefficients that take into account the imbalance in the development of the entire world economy in today's time of the destruction of the unipolar world, the influence of the shadow economy, numerous sanctions measures, the threat of military conflicts hanging over the country and, of course, affecting the economic stability of development and security not only of the state, but also all its components, in particular in the pipe industry. The ongoing coronovirus pandemic with forced lockdowns, as well as uncontrollable changes in climatic and environmental components, have a direct impact on the constant adjustment of indicators and threshold values of indicators, the need to level risks.

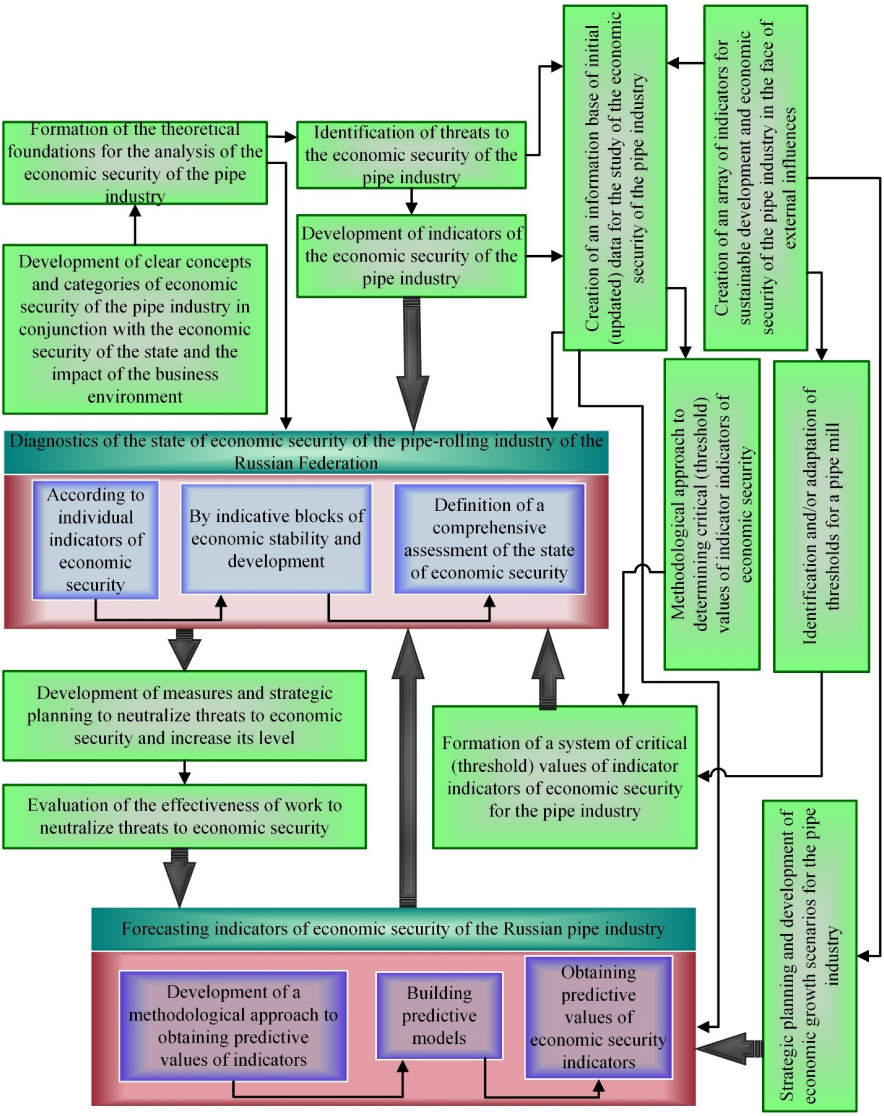


**Figure 3. Scheme for determining indicators of the level of economic security of pipe-rolling enterprises. Source: compiled by the author**

But the beginning of any monitoring to determine indicators is an analysis of the development of the pipe industry based on statistical data (Table 1)

**Table 1.**
**Development indicators of the Russian pipe industry in 2012-2020**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| **Production figures** | | | | | | | | | |
| - production volume, million tons | 9.7 | 10.0 | 11.5 | 11.4 | 10.1 | 11.2 | 11.8 | 12.3 | 10.9 |
| - change in production volume, % to the previous year | -3.6 | 3.1 | 15.0 | -0.9 | -11.4 | 10.9 | 5.4 | 4.2 | -11.4 |
| Production indices (the value of the indicator for the year, taking into account the dynamics of price changes), % | -3 | 4 | 11 | -1 | -5.5 | 10 | 3 | 4 | -14 |
| **Domestic market capacity** | | | | | | | | | |
| - volume of consumption, million tons | 8.94 | 9.37 | 10.57 | 10.7 | 9.5 | 10.3 | 10.5 | 10.8 | 9.3 |
| - change in market capacity (sales on the domestic market), % to the previous year | -15 | 5 | 13 | 1 | -12 | 9 | 3 | 3 | -14 |
| **Export potential level** | | | | | | | | | |
| - export volume, million tons | 1.53 | 1.55 | 1.60 | 1.23 | 1.3 | 2.1 | 2.5 | 2.1 | 1.9 |
| - change in export volume, % to the previous year | 2.1 | 1.3 | 3.2 | -23.1 | 5.6 | 61.5 | 19.0 | -16.0 | -9.5 |
| - share of export in production, % | 15.77 | 15.50 | 13.91 | 10.79 | 12.87 | 18.75 | 21.19 | 17.07 | 17.43 |
| **Satisfaction of the needs of the domestic market with Russian-made products** | | | | | | | | | |
| - volume of imports, million tons | 0.82 | 0.85 | 0.68 | 0.41 | 0.48 | 0.72 | 0.56 | 1.00 | 0.42 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| - change in import volumes, % to the previous year | 3.5 | 3.7 | -20.0 | -39.7 | 17.1 | 50.0 | -22.2 | 78.6 | -58.0 |
| - share of domestic products in the volume of apparent consumption, % | 90.8 | 90.9 | 93.6 | 96.2 | 94.9 | 93.0 | 94.7 | 90.7 | 95.5 |
| **Market conditions (December-January period)** | | | | | | | | | |
| - producer price indices in the domestic market, % (year on year) | -3.39 | -2.50 | 0.64 | 17.99 | 10.94 | 6.82 | 5.62 | 0.13 | -1.22 |
| - producer price indices for export deliveries, % (year on year) | 11.80 | -4.85 | 1.36 | 22.41 | -7.68 | 14.50 | 34.33 | 10.96 | 0.86 |
| - steel pipe production price indices, % (year on year) | -2.55 | -2.66 | 0.68 | 18.18 | 10.48 | 7.13 | 7.12 | 1.35 | -1.13 |
| **Production capacity** | | | | | | | | | |
| Production capacity, million tons | 12.62 | 14.50 | 14.57 | 15.74 | 16.26 | 17.42 | 17.81 | 17.80 | 17.80 |
| The level of utilization of production capacities for the production of steel pipes,% | 70.4 | 70.3 | 72.8 | 72.40 | 46.7 | 49.7 | 52.4 | 52.5 | 45.8 |
| **Financial performance indicators** | | | | | | | | | |
| Profit (loss) before taxation, billion rubles | 29.7 | 22.1 | 22.2 | 65.3 | 62.2 | 42.9 | 53.3 | 62.3 | 51.3 |
| Sales revenue (net of value added tax, excises and other similar obligatory payments), billion rubles | 464.5 | 467.6 | 527.6 | 647.9 | 597.7 | 694.1 | 775.9 | 854.6 | 719.3 |
| Return on sales, % | 6.4 | 4.7 | 4.2 | 10.1 | 10.4 | 6.4 | 7.1 | 7.3 | 7.0 |

| Employment and wage indicators | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average number of employees, pers. | 71 575 | 70 991 | 68 772 | 69 500 | 68 292 | 80 940 | 70 013 | 70 165 | 69 181 |
| Average monthly nominal accrued wages per employee, rub. (USD). | 29 581 (1022) | 31 584 (967) | 33 444 (869) | 35 267 (513) | 37 840 (550) | 41 259 (673) | 43 877 (690) | 48 052 (754) | 51 719 (688) |
| Change in the average monthly nominal accrued wages per employee adjusted for inflation, % to the previous year | 2.7 | -5.4 | -10.1 | -41.0 | 7.2 | 22.4 | 2.5 | 9.3 | -8.8 |

Source: compiled by the author according to Rosstat[1], Ru-Stat[2], FCS RF[3] , Trade Map[4], Commodity Trade Statistics Database (UN Comtrade)[5]

To build a median line of threshold values in the roughest approximation, we will take the average indicators of two pre-crisis years (2012-2013). Next, we will build a petal diagram of the economic security of the pipe industry by years from 2014 to 2020 (Figure 4). Sanctions and lockdowns from the COVID-19 pandemic led to a decrease in the volume of imports of pipe products, which can be called a positive component for the industry, but the general state economic instability led to a significant drop in the production index, which showed a relative cumulative drop (coefficient) in the production of all types of pipe products taking into account inflation and the general fall in prices. As a result, it can be seen that with a slight drop in the total number of employees, there is a decrease in the average monthly nominal wage. Also, a negative factor is that with a general increase in production capacities, a decrease in their workload is pronon

[1]Federal state statistics service (rosstat.gov.ru) (https://rosstat.gov.ru/)

[2]Export and import of Russia by goods: (ru-stat.com) (https://ru-stat.com/)

[3]Federal customs service (customs.gov.ru) (https://customs.gov.ru/)

[4]Trade Map - Trade statistics for international business development (https://www.trademap.org/Index.aspx)

[5]comtrade-| un world trade statistics database (un.org) (https://comtrade.un.org/ )

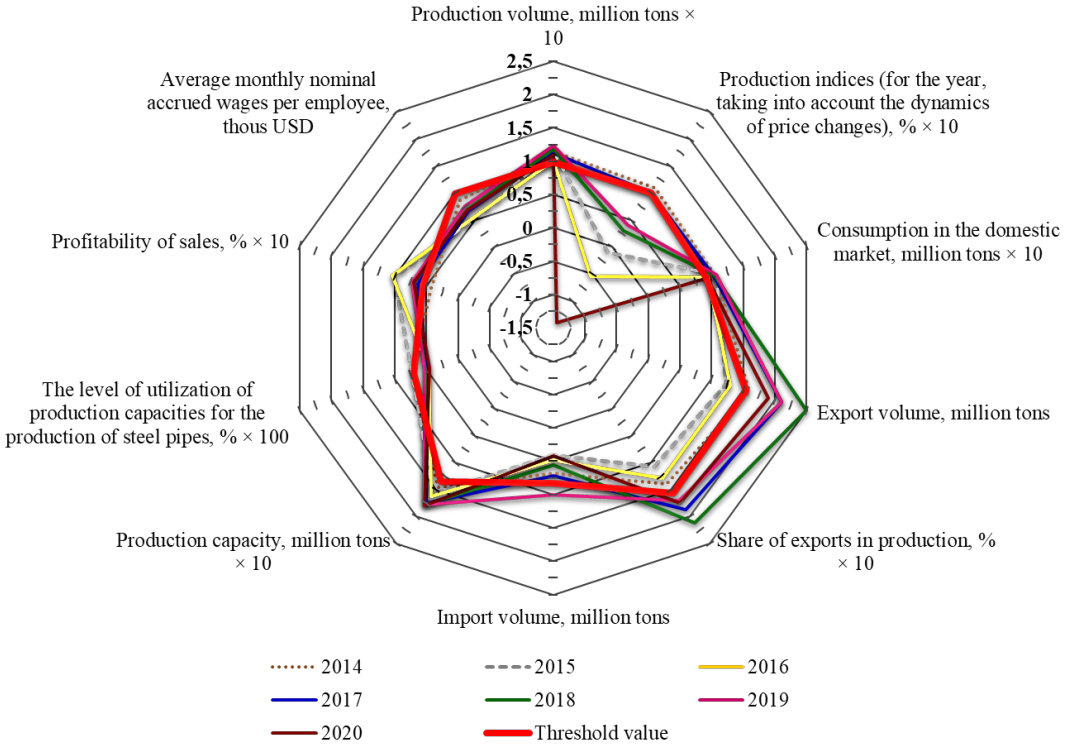


**Figure 4. Nominal values of the main indicators of economic security of the Russian pipe industry for 2014-2020. Source: compiled by the author**

But to determine the real threshold values of any indicator, it is necessary that they be based on certain quantitative indicators, which must be a strict qualitative reflection of all business processes present in the industry. It is also an axiom that each industrial sector has a completely different assessment of these indicators, but all of them must be associated with indicators of the economic security of the state as a whole. Of particular relevance to this problem is the fact that quantitative indicators of threshold values are almost impossible to accurately determine analytically. Outstanding figures in the field of economics V.K. Senchagov, E. S. Mityakov, Yu.L. Vorobyov, V.V. Karpov et al. [14-21] proposed to solve this problem using formulas that are systems of complex differential dependencies on the n-th number of indicators.

Currently, the method of limited enumeration, which is provided by the WizWhy[6] application software package from WizSoft, one of the leaders in the Data Mining products market, has found wide distribution. Today, this software product has found applications in medicine, allowing you to identify hidden patterns in a multidimensional array of studies and patient monitoring indicators, to form a knowledge base on the basis of which you can choose a treatment trajectory [22].

The use of the limited enumeration method using the WizWhy software to calculate the threshold values of economic security indicators for the industry will allow us to derive not only the patterns of their occurrence (a multidimensional array of economic indicators in direct proportion to external and internal threats and, at the same time, opportunities for the industry), but also, for adoption any strategic decisions, suggest ways to neutralize them, which will be taken by specialists both at the business level and the state, taking into account the organizational and economic mechanism proposed above to ensure the economic security of pipe rolling enterprises.

It should also be taken into account that the fall in the production index for the pipe-rolling industry (Figure 4) indicates the absence of positive dynamics in the significant development of pipe-rolling enterprises, and after all, it is one of the backbone links of the state industrial complex. Article 4 of the Federal Law "On Industrial Policy in the Russian Federation" dated 31.12.2014 N 488-FZ (as amended on 20.07.2020) specifies the goals, objectives and principles of industrial policy, which form a harmonious system of both the internal development of industrial sectors, aimed at their own sustainable functioning, and external, when a highly developed industry has a positive impact on the entire economy and its security of

[6]WizWhy [Electronic resource]. – [Tel-Aviv].: Wizsoft. 2013. – Access: http://www.wizsoft.com

the Russian state. In Russia's economic security strategy, planned until 2030 and signed by Decree of the President of the Russian Federation dated 13.05.2017 number 208, in order to fix the need to create special departments and services, whose task is to level or completely eliminate problems and negative factors affecting the undermining of the economic security of the country, regions and, accordingly, industries. All this suggests that a clear relationship between business and government agencies has not been established, and most importantly, business interest in this interaction has not been formed.

Deep constant external monitoring of the economic performance of the industry by the relevant ministries, together with the internal one by the industry enterprises, will allow timely taking emergency measures of state regulation in the formation of industrial policy, helping to ensure the economic security of not only the industry, but also the country.

**Conclusion**

The organizational and economic mechanism for ensuring the economic security of pipe-rolling enterprises allows, through monitoring, to determine a set of actions to identify and predict threats according to the formed system of indicators, assess their degree of deviation from threshold values at a given time stage, and develop recommendations for leveling conditional risk zones for applying corrective and preventive actions and opportunities for further strategic planning. The practical application of the developed organizational and economic mechanism for ensuring the economic security of pipe-rolling enterprises makes it possible to determine a higher degree of probability of making positive investment decisions in relation to pipe-rolling enterprises and a corresponding increase in the scale of their economic activity. At the same time, in the course of its improvement and further development, the state industrial policy should take into account the solution of tactical tasks to develop a common strategic direction for economic security and the mutual interest of the pipe rolling business and government.

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# THE INFLUENCE OF THE CNY/DOLLAR EXCHANGE RATE ON THE CHINESE ECONOMY

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**Abstract.** This article focuses on the influence of the Chinese Yuan and the US Dollar exchange rate on the Chinese economy. We consider the currency effect because of the trade war between the countries that issue the relevant currencies. Through the study we highlight the role played by the exchange rate policy, especially the devaluation policy of other international currencies and its clear impact on the volume of international trade by providing a competitive advantage to the exporters of the country that applies the devaluation policy. The econometric method is used to confirm our approach of a relation between the devaluation of Yuan and the Chinese-USA trade balance.

**Keywords:** Chinese Yuan, US Dollar, exchange rate, international trade, econometric analysis.

International trade has historical roots and its content and methods have developed along with the currency market relations. Mainly the currency exchange rate determines the balance of payments indicators. For example, the currency, backed by a strong export performance is accompanied by a reduced exchange rate that stimulates the country's exports. This applies to South Korea and Taiwan in the sixties and seventies as well as to Argentina, and especially to China since the nineties, when it received a huge boost to the national economy due to the devaluation of its currency. Actually, China is the country of a great global economic weight that is not underestimated. The country is acting within the global economic environment with its key currencies. The most widely used is the US Dollar, which influences the Chinese trade balance.

In order to test the existence of the causal relationship between the changes in the value of the Chinese Yuan against the US Dollar the standard model is built based on a simple linear regression method.

Thus, 19 observations this during the period of 2002 to 2021 is made, while the exchange rate is supposed to be an independent variable, and the intra-trade balance - a dependent one. The table below shows the series under study. The data for the analysis is taken from the Bloomberg by using TBCHNA Index function to find the trade balance between both countries, and the spot price of CNY by using function CNY CURNCY index. In my case I have taken annual data, the fact is that the data is for a long period, so it is difficult to analyze on a quarterly or monthly basis. (Table1)

**Table 1.**
**Series under study**

| Date | TBCHNA | CNY to $ |
|---|---|---|
| 12/31/2002 | -9575.89 | 8.277 |
| 12/31/2003 | -9883.17 | 8.2767 |
| 12/31/2004 | -14177.23 | 8.2765 |
| 12/30/2005 | -16316.2 | 8.0702 |
| 12/29/2006 | -19093.4 | 7.8045 |
| 12/31/2007 | -19107.68 | 7.3037 |
| 12/31/2008 | -19968.81 | 6.8277 |
| 12/31/2009 | -18145.09 | 6.8271 |
| 12/31/2010 | -20674.03 | 6.5933 |
| 12/30/2011 | -23124.62 | 6.2949 |
| 12/31/2012 | -24548.95 | 6.2303 |
| 12/31/2013 | -24511.55 | 6.054 |
| 12/31/2014 | -28220.69 | 6.2057 |
| 12/31/2015 | -27889.89 | 6.4937 |
| 12/30/2016 | -27714.12 | 6.945 |
| 12/29/2017 | -30809.51 | 6.5067 |
| 12/31/2018 | -36695.85 | 6.8785 |
| 12/31/2019 | -24762.55 | 6.9632 |
| 12/31/2020 | -27230.36 | 6.5272 |
| 12/31/2021 | -27320.30 | 6.5601 |

Source: Boomberg

In order to analyze the impact of the fluctuation of CNY on the trade balance between China and USA we need to identify the variables, independent and dependent ones in order to create the model for the analysis and tests.

**Table 2.**
**Variables defined**

| Dependent variable | |
|---|---|
| Y | TBCHNA(Trade balance between china and USA ) |
| Independent variables | |
| X | CNY to $(Chinese currency to US $) |

Source: Constructed by the authors

So we consider the trade balance represented as Y in the equation as dependent variable and CNY exchange rate as the independent variable to study the behavior of the dependent variable according to the independent.

The general form of the model for this case that we will use to build the final model. (Figure 1).

$$\begin{cases} Y_t = a_0 + a_1 \cdot CNY + \varepsilon_t \\ E(\varepsilon_t) = 0;\ \sigma(\varepsilon_t) = const \end{cases}$$

**Figure 1. general form of the econometric model**

Source: model generated by the authors

Where

- $a_0$ – intersection coefficient
- $a_1$ – slope coefficients
- $\varepsilon_t$ - the disturbance term

The first step is to do a Scatter plot analysis; the Scatter plot analysis gives us the visual view of correlation between the components of the study. (Figure 2).

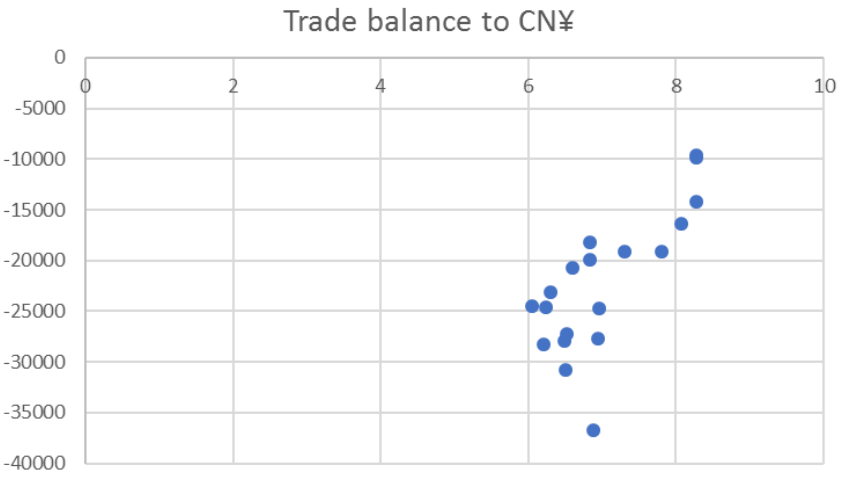


**Figure 2. Correlation between Trade balance and CNY to US$**

Source: constructed by the authors

According to this chart, we can see that there is a strong positive correlation between CNY currency devaluation and the trade balance. The higher the devaluation of CNY, the higher the deficit as Chinese exports increase or American exports decrease.

The next step is to do a Pair-matrix correlation analysis. Pair-matrix correlation analysis shows us the correlation according to the value of (r), by knowing the value we can tell how strong the correlation is. (Table3)

**Table 3.**
**The result of pair-matrix correlation analysis**

| | **TBCHNA** | ***CNY* to *$*** |
|---|---|---|
| TBCHNA | 1 | |
| CNY to $ | r=0.746302 | 1 |

Source: Calculated by the authors, using excel, data analysis, correlation.

According to the pair-matrix correlation analysis, we can see that there is also a strong positive correlation between the price of Chinese yuan and the trade balance as r=0.75 which is an indicator of this strong correlation (higher than 0.7).

The third step is using Ordinary Least Squares Regression analysis to the data that we obtained. By using excel, data analysis, regression with residuals.

According to the regression analysis results, we get the data shown in the table below. (Table 4)

**Table 4.**
**OLS regression analysis**

| *Regression Statistics* | | | | | |
|---|---|---|---|---|---|
| Multiple R | 0.739319863 | | | | |
| R Square | 0.54659386 | | | | |
| Adjusted R Square | 0.518255976 | | | | |
| Standard Error | 4918.015932 | | | | |
| Observations | 18 | | | | |
| | | | | | |
| ANOVA | | | Fcrit | 4.494 | |
| | *df* | *SS* | *MS* | *F* | *Significance F* |
| Regression | 1 | 466527443.8 | 466527443.8 | 19.2885 | 0.000454864 |
| Residual | 16 | 386990091.3 | 24186880.71 | | |
| Total | 17 | 853517535.1 | | | |
| | | | | | |
| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* |
| Intercept | -69853.65071 | 10967.29145 | -6.36927094 | 9.3E-06 | -93103.26998 |
| CNY to $ | 6797.723881 | 1547.800038 | 4.391861814 | 0.00045 | 3516.534379 |

Source: Calculated by the authors

The values of coefficients we can interpret as following:

- $a_0$= -69853.65071– if we assume that the value of the independent variable is zero, the value of CNY will be -69853.65071mln USD. This is negative not only because we do not include other indicators that also influence the trade balance, but also because this a0 is a coefficient which balances the model results, so the model is clear and adequate.
- If there is an increase in the spot price of CNY index by 1 point out of 100, then the value of trade balance will increase by 6797.72 mln USD.

These results that we obtained helps us to construct the econometric model for this case. Therefore, if I sum it up in the form of model give us this form that elaborate previous results. (Figure 3)

$$\begin{cases} Y_t = -69853.65071 + 6797.723881 \cdot CNY + \varepsilon_t \\ \quad (10967.29145) \quad (1547.800038) \ ) \\ E(\varepsilon_t) = 0;\ \sigma(\varepsilon_t) = const \end{cases}$$

**Figure 3. econometric model after obtaining primary results**

Source: Calculated by the authors

Several tests are made to ensure the validity of the econometrics model.

First, R test, from the previous results (Table 4), R squared =0.55 which means that 55% in variance of dependent variable is explained by variance in independent variable.

For the second - T test we use excel, function LINEST and the function T.INV.RT to find t calculated and t critical. Thus we got the following result. (Table 5)

**Table 5.**
**Result of the T-test (final model)**

| | a2 | a1 | a0 |
|---|---|---|---|
| t | 4.391861814 | -6.369270938 | #N/A |
| tcrit | 2.119905299 | | |

Source: Calculated by the authors

As we can see, the variables are significant. Where absolute value of (t) is bigger than (t) critical. Only a0 does not pass the test. However, in our case, we cannot delete it, as this indicator shows other variables that can influence the trade balance and this indicator balances our model. That is why we can say that the model has passed the test successfully.

The third calculation is the test of the 1st condition of Gauss-Markov. We calculate average of the residuals, received by regression analysis, using excel, function AVERAGE and we get -0.00000000001. So, the model passed the test as the value of the average of residuals sis close to zero.

The forth benchmark is the F-test, introduced by using the excel, function F.INV.RT/ As the result, we get the value of F critical as stated. (Table 6)

**Table 6.**
**F and Fcrit values**

| Fcrit | 4.493998 |
|---|---|
| *MS* | *F* |
| 4.67E+08 | 19.28845 |

Source: Calculated by the authors

The model has also passed F-test, as the F critical calculated during the regression analysis is bigger than the t critical. 2.12<4.5 It means that specification of the model is high and coefficients of determination are non-random.

The fifth assessment is the GQ test: we separate the data into two intervals to make the regression analysis of the intervals to obtain the data. (Table 7)

**Table 7.**
**GQ-test initial data**

| SUMMARY OUTPUT | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| *Regression Statistics* | | | | Interval 1 | |
| Multiple R | 0.366317316 | | | | |
| R Square | 0.134188376 | | | | |
| Adjusted R Square | 0.010501001 | | | | |
| Standard Error | 3965.076802 | | | | |
| Observations | 9 | | | | |
| | | | | | |
| ANOVA | | | | | |
| | *df* | *SS* | *MS* | *F* | *Significance F* |
| Regression | 1 | 17056610.55 | 17056610.5 | 1.0849 | 0.332236039 |
| Residual | 7 | 110052838.329 | 15721834 | | |
| Total | 8 | 127109448.9 | | | |

| SUMMARY OUTPUT | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| *Regression Statistics* | | | | Interval 2 | |
| Multiple R | 0.906548593 | | | | |
| R Square | 0.821830351 | | | | |
| Adjusted R Square | 0.796377544 | | | | |
| Standard Error | 3973.30531 | | | | |
| Observations | 9 | | | | |
| | | | | | |
| ANOVA | | | | | |
| | *df* | *SS* | *MS* | *F* | *Significance F* |
| Regression | 1 | 509741939.9 | 509741939.9 | 32.2884 | 0.000748953 |
| Residual | 7 | 110510086 | 15787155.09 | | |
| Total | 8 | 620252025.5 | | | |

Source: Calculated by the authors

Then we find the value of GQ and the value of FGQ by using the function F.INV.RT in excel. (Table 8)

**Table 8.**
**Results of the GQ test**

| | |
|---|---|
| GQ | 0.99586239 |
| 1/GQ | 1.0041548 |
| FGQ | 3.78704354 |

Source: Calculated by the authors

According to the results of the analysis we can come to conclusion that the model passed the GQ test, as the FGQ is greater than GQ and 1/GQ, which means that the expected value of the error is zero for all observations. In addition, Fcrit is bigger than GQ and 1/GQ, which means homoscedasticity of the model.

In the aim of the research, we have also made a DW test and used the data of the first regression analysis with residuals, followed by steps, indicated in the following table. (Table 9)

**Table 9.**
**DW-test**

| RESIDUAL OUTPUT | | | | | | |
|---|---|---|---|---|---|---|
| | | $e_i$ | $e_{i-1}$ | $e_i-e_{i-1}$ | $(e_i-e_{i-1})^2$ | $e_i^2$ |
| *Observation* | *Predicted TBCHNA* | *Residuals* | | | | |
| 1 | -13588.89 | 4013.00 | | | | 16104170.18 |
| 2 | -13590.93 | 3707.76 | 4013.00 | -305.24 | 93171.87 | 13747480.25 |
| 3 | -13592.29 | -584.94 | 3707.76 | -4292.70 | 18427277.20 | 342155.96 |
| 4 | -14994.66 | -1321.54 | -584.94 | -736.60 | 542578.92 | 1746469.44 |
| 5 | -16800.81 | -2292.59 | -1321.54 | -971.04 | 942927.94 | 5255947.44 |
| 6 | -20205.11 | 1097.43 | -2292.59 | 3390.02 | 11492236.41 | 1204363.14 |
| 7 | -23440.83 | 3472.02 | 1097.43 | 2374.59 | 5638661.37 | 12054932.38 |
| 8 | -23444.91 | 5299.82 | 3472.02 | 1827.80 | 3340847.85 | 28088092.06 |
| 9 | -25034.22 | 4360.19 | 5299.82 | -939.63 | 882908.59 | 19011238.05 |
| 10 | -27062.66 | 3938.04 | 4360.19 | -422.15 | 178209.94 | 15508148.42 |
| 11 | -27501.79 | 2952.84 | 3938.04 | -985.20 | 970613.20 | 8719273.60 |
| 12 | -28700.23 | 4188.68 | 2952.84 | 1235.84 | 1527297.34 | 17545042.95 |
| 13 | -27669.02 | -551.67 | 4188.68 | -4740.35 | 22470962.80 | 304344.62 |
| 14 | -25711.27 | -2178.62 | -551.67 | -1626.94 | 2646948.33 | 4746380.12 |
| 15 | -22643.46 | -5070.66 | -2178.62 | -2892.04 | 8363911.48 | 25711609.50 |
| 16 | -25622.90 | -5186.61 | -5070.66 | -115.95 | 13443.85 | 26900915.68 |
| 17 | -23095.51 | -13600.34 | -5186.61 | -8413.73 | 70790915.43 | 184969329.86 |
| 18 | -22519.74 | -2242.81 | -13600.34 | 11357.53 | 128993551.01 | 5030197.67 |
| | Average | -0.00000000001 | | sum | 277316463.54 | 386990091.32 |
| | | | | dw | 0.72 | |

Source: Calculated by the authors

Initial step is to find $(ei-ei-1)^2$ and $ei^2$ and the ratio of their sum. This ratio is the DW value, DW=0.72.

We find the value of dl and du that gives the integral that we should work with through Durbin Watson table. (Table 10)

**Table 10.**
**Results of the DW-test**

| 0 | $d_l$ | du | 2 | 4-$d_u$ | 4-$d_l$ | 4 |
|---|---|---|---|---|---|---|
| 0 | 0.902 | 1.118 | 2 | 2.882 | 3.098 | 4 |

Source: Calculated by the authors

Then we conclude that there is an autocorrelation between residuals in the model: the value of DW is located between 0 and dl which indicates the autocorrelation.

Summing all the results, we obtain the final model (figure 19)

$$\begin{cases} Y_t = -69853.65071 + 6797.723881 \cdot CNY + \varepsilon_t \\ \quad (10967.29145) \quad (1547.800038) \ ) \\ E(\varepsilon_t) = 0;\ \sigma(\varepsilon_t) = const \\ Fcrit = 4{,}5; t\ crit = 2{,}12; R^2 = 0{,}55; F = 19{,}3 \\ df = 16; GQ = 0{,}1\ ; DW = 0.72 \end{cases}$$

**Figure 19-Final model**

Source: Calculated by the authors

This model elaborates all our previous results.

As a result, we conclude that there is a relevant auto correlation, which displays a respected relation between the devaluation of the Chinese currency, its trade balance and the USA Dollar rate. Considered an example presented, we prove the distinct relation between the currency and the trade balance, which finds the expression in the influence of the CNY/Dollar exchange rate on the Chinese economy.

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# TUTOR MANAGEMENT OF EDUCATIONAL TRAJECTORIES

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**Abstract.** One of the ways to achieve the effectiveness of the educational process is the use of individual educational trajectories. The trajectories are managed by a tutor who is able to offer the student versions of the trajectories, motivate the choice and follow the route from one reference point to another. Tutor management is applicable in system of common (school), additional, secondary vocational and higher education. The specifics of managing educational routes require special training of tutors in the system of additional education and in higher educational institutions.

**Keywords:** educational trajectory, tutor, mentor, pushing pedagogical model

In the modern education system, much attention is paid to the effectiveness of training, which is evaluated by monitoring the formation of fundamental knowledge, practical skills and skills for solving urgent problems. Since the cognitive potential of students initially differs, the use of the same forms and methods of teaching cannot ensure the same effectiveness of the educational process for all students. The selection of pedagogical tools that allow achieving sufficiently high learning outcomes for the majority of students in the group is a matter of professional training of the teacher, his personal professional experience, taking into account the psychological characteristics of individual students and the psychological climate in the team. This experience of managing educational trajectories is quite difficult to replicate, because it is individual, subjective by definition. Some solution to the problem is the "pulling" pedagogical model, which allows the student to develop his own trajectory from the set offered by the teacher [4]. In this case, the teacher acts not only as a subject specialist, but as a tutor who manages the movement of the student along the chosen trajectory; he sets some reference points on the trajectory and correlates the movement from one to another, sometimes changing the educational route itself based on the success or problem of movement along it.

If we talk not about the content of training, but about ways to achieve educational goals, then the importance of the tutor as a person guiding the movement along the educational trajectory comes out to the first place. The system of tutor support of the educational process is applicable in the system of common (school), additional, secondary vocational and higher education. By and large, the essence of tutoring does not change at the same time - the tools of motivation and support of the educational process change.

Tutoring originated in England in the XIV century and initially carried educational functions, which were replaced by educational ones by the XVII century. In Russia tutoring, as an independent pedagogical movement, unfolded and began to take shape in the late 1980s [2]. Tutor support is a pedagogical activity for the individualization of education, the formation of an individual image of one's future by a person, an independently built individual educational and professional trajectory and the construction of the most adequate program to achieve them.

In the modern education system in Russia, the concept of "tutoring" has been actively replaced in recent years by the concept of "mentoring", which, however, does not affect the content side of the activities of these teachers. Scientists and specialists are most often invited to a modern school as mentors, who conduct classes or accompany the project activities of a group of students to prepare their competitive works, studies, projects for participation in competitions and Olympiads of various levels.

In the system of additional education, mentoring is part of the system of improving the qualifications of teaching staff (a mentor, as a more experienced teacher, consultatively accompanies the work of less experienced colleagues). In some educational institutions (for example, in the network of children's technoparks "Quantorium"), teachers of additional education themselves are called mentors. This emphasizes their status of specialization (most often technical orientation) and indicates the type of relationship between students and mentor (mentor not only gives knowledge, he oversees the independent work of students). In the system of secondary vocational education, mentors (tutors) perform mainly control educational functions, i.e. they are curators.

In the higher school system, through tutoring, one of the contradictions inherent in the student age is resolved – the desire for independence in the selection of knowledge, ways of acquiring them and rather rigid forms and methods of training a specialist at a university [1]. In the process of extracurricular independent work, the student lays the foundations of self-knowledge, self-organization and self-education, develops the ability to continuously improve his qualifications in the future, "the need to

learn, master something new, unknown, necessary, important for himself" is formed on the basis of "a program of assimilation of any material developed by himself" [6].

Since one of the urgent issues of the development of higher education at the present time is practically oriented education of students, when a graduate must have not only a wide range of theoretical general professional and special competencies, but also the skills to apply the acquired knowledge in practical activities. For students receiving education in the field of biology, without taking into account specialization, the availability of practical knowledge, skills and abilities is an indispensable condition for graduate training [5]. Some of these skills related to practical activities are acquired by students in the framework of classroom - laboratory classes. These skills ensure that students are ready for in-house processing of data collected in field (expedition) conditions. A slightly different aspect of practical training of students is conducting field training practices on various topics, during which students gain skills in collecting and primary analysis of field data, have the opportunity to get acquainted with biological objects in native conditions, better remember them physiognomically, independently assess the condition of these objects and their complexes and, using instrumental methods, assess the state of their environment.

Field practices in various biological disciplines are an obligatory part of the educational process within the framework of training specialists and bachelors in the field of biology, however, the forms of their conduct are often very traditional, which reduces the potential positive effect of this form of classes. This decrease in efficiency is often due to insufficient material resources for conducting practices, insufficient practical qualifications of teachers leading the practice, and a number of other reasons. Orenburg State University is experimentally implementing a model for organizing and conducting field practices in biological disciplines based on the principle of tutor support.

As part of the experiment, an initiative group of teachers created a team of students focused on completing final qualifying works related to conducting native observations and experiments. Each of the teachers was officially assigned students of different courses (1-4), the subject of whose work corresponded to one of the proposed areas of work corresponding to the branches of biology: botany, mycology, entomology, zoology, ecology. Students were offered a wide range of specific topics that could be implemented within the framework of tutor support. Examples of enlarged areas of work are: "Study of the fauna and ecology of small mouse-like rodents", "Study of the biota of fungi-macromycetes", "Study of flora and vegetation",

"Study of the specifics of the ecotone effect", "Study of the ecology of mycogenic destruction of wood" and a number of others [3]. During the year, the members of the tutor groups were offered tasks for the preparation of a theoretical justification of the selected works, which included the study and justification of the choice of methods for collecting and analyzing material, an assessment of the level of knowledge of the chosen research topic.

During the expeditions, students developed communication skills, skills of caring for nature, practical skills related to the arrangement of a field camp, and, first of all, skills in collecting and primary analysis of the materials obtained.

During the expedition, temporary field detachments of 3-7 people were formed to carry out various works, depending on their complexity. At the same time, students had the opportunity to get acquainted with the methods of collecting material not only in their field of research, but also to expand their horizons in relation to other areas, which is especially valuable for junior students who have not yet made the final choice of the subject of their graduation papers.

In an atmosphere of mutual understanding and friendly communication between students and tutors, information was exchanged concerning the problems of modern biology and the methodology of biological research. Students received practically and theoretically justified explanations about the applicability of certain methods to solve specific problems, as well as a preliminary review of the results of the work performed. As a result, through the efforts of tutors, a temporary research team was formed, which formed its own traditions, its own system of values. A distinctive feature of the conducted experiment was the formation of a tutor group of different ages, which is generally accepted in the European tradition of tutoring, but, for unknown reasons, remained outside the sphere of attention of supporters of tutoring in Russia. Due to different ages, the continuity of accumulated traditions, interpersonal interaction skills in expeditionary conditions is carried out, the accumulated research experience is preserved and multiplied, in the sense that the research of students of each of the courses is based on the results of research received by their senior comrades.

The attempted work of the tutor group within the framework of field practices can be considered quite successful, however, it should be noted that the main obstacle to replicating this positive experience is the readiness of teachers for tutoring; this problem was previously noted by many authors in relation to tutoring in the school education system. Probably, to solve this problem, an effective system of training tutors for educational institutions of different levels is needed.

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# ABOUT THE MORAL FOUNDATIONS OF FAMILY EDUCATION

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**Abstract.** In the paper, the author reveals the relevance of the problem under consideration. Family education is a complex process, a multifaceted phenomenon, for which parents are responsible. The basis of family education is love for the child, his understanding, care and education of moral qualities, and moral education occupies a central place. The family forms moral values in the child, the necessary moral qualities: responsibility, decency, kindness, honesty, dignity, conscientiousness, justice, etc.

**Keywords:** morality, family education, the atmosphere of sanity and humanity, moral values, parents, family, pedagogical culture of parents.

*People brought up without parental affection are often crippled people.*
***A.S. Makarenko***

The problem of family education today remains relevant, since there is a crisis in family relations, which affects the upbringing and development of children. In the family, a child is significantly influenced at all stages of his development, but this is especially important at the initial stage of a growing child's life. Gradually, a growing child joins family traditions, which are fixed in his mind, behavior, actions, deeds. The family is an institution of educational influences on a child in significant periods of his life; in the family, relatives and close people, of course, influence all aspects of his life. All family members influence the child's assimilation of moral concepts, such as good and evil, duty, responsibility, diligence, goodwill, mercy towards others; the family lays the basic moral qualities in the child. Family education is a multidimensional educational process that requires parents to have a moral culture, pedagogical culture, the ability to show love for children, patience, skills in the formation of the necessary personality traits that will help overcome difficulties and solve problems in adulthood. Family

moral relations in the future will be the core of family relations of an emerging personality. Moral values are love and respect, kindness and decency, honesty and justice, conscience, dignity, independence and other moral personal qualities of a child will help him become a person and remain a Human in any life situations. V.A. Sukhomlinsky wrote about the importance of developing the moral feelings of children - this is the development of increased emotional susceptibility: "In young children, experiences fill the whole soul, completely seize thoughts". Therefore, while shaping the emotional culture of children, parents should create prerequisites for the development of important humane feelings such as sympathy, compassion, responsiveness, etc.

In the process of growing up, children can do different things, for some of them they are ashamed, uncomfortable or conscientious. In this situation, parents should show a pedagogical culture and not immediately punish the child severely, but they should be explained with examples that such behavior is not the norm in relations between people and is not accepted in society. Parents need to do this so that the child feels that he is understood, protected, loved and dear to them, it is important that the child does not experience fear, humiliation or fear. Therefore, we advise all parents to study the works of great teachers, in whose works the foundations of the moral education of children are spelled out, for example, in the basis of the method of moral education according to K.D. Ushinsky is offered a rejection of the pedagogy of fear... In his works, he noted that fear in a child is the most abundant source of vices: cruelty, opportunism, servility, etc. K.D. Ushinsky emphasized that in the family it is necessary to create an atmosphere of sanity and humanity in the process of education... He believed that persuasion with a word is an effective way of morally influencing a child. K.D. Ushinsky considered the primary task in family education to be the preparation of a growing child for life in a multicultural society. We share the opinion of K.D. Ushinsky that family education is considered to be "the creation of history", it is a social phenomenon, a socially significant process. Communicating with the child, parents should help him to socialize and become a full-fledged citizen of his country.

Today he is a child in the family, tomorrow he became a schoolboy, the day after tomorrow he is a graduate, and ahead of him is a meaningful professional choice that will determine his life path. Today, the words of K.D. Ushinsky, important for parents and teachers, sound like a guide and an appeal: "If pedagogy wants to educate a person in all respects, then she must first recognize him in all respects too". Sensitivity on the part of parents to their child, to his interests, dreams involves the creation of a fa-

vorable moral and psychological climate, healthy relationships in the family circle between all its members. The moral ideas that are laid down by the family in the child should smoothly pass into their convictions, and convictions into moral habits. When raising a child, parents should be guided by the democratic style of family education. But we know that there are families in which an authoritarian style prevails, which affects the psyche of the child, suppresses the will of children, and influences the formation of moral values. The abnormal behavior of some parents leads to the manifestation of nervousness and temper, to which the children react very painfully and they lose the ability to understand each other, which leads to alienation.

There are various reasons that cause dysfunction in family relationships - these are economic, asocial, psychological, medical, etc. Therefore, the state needs to take care of families that are experiencing difficulties, show attention to children in need of support and build and finance all programs, the implementation of which will provide social protection for both the child and the family as a whole.

V.A. Sukhomlinsky in his works emphasized that the world of beauty in a child begins and is laid down in the family. "The subtlety of a person's sensation, emotional susceptibility, impressionability, sensitivity, empathy, penetration into the spiritual world of another person - all this is comprehended primarily in the family". V.A. Sukhomlinsky wrote that a mother is not only warmth, comfort, attention, but a mother for a child is the world of the sun, love, kindness, affection, and he wrote that the whole future world of children is in the hands of the mother, and what this world will be like depends on how a person grows up and whether he becomes a Human.

A mother's affectionate word evokes positive emotions, feelings, reactions, the child rejoices, smiles. Therefore, the statement of V. A. Sukhomlinsky emphasizes the role and significance of the word, its influence on the child – "the word should be applied specifically to a specific person, the word should be meaningful, have a deep meaning and emotional coloring. In order for a word to educate, it must leave a mark on the thoughts and soul of the pupil, and for this it is necessary to teach to delve into the meaning of words. Only then can we expect an emotional impact. The educator must timely move from specific facts, events, phenomena to the disclosure of generalized truths, principles of behavior. Teenagers love to reason, but parents often stop this reasoning, emphasizing their immaturity, explaining it by the fact that they are still small, and therefore it is too early for them to express their opinions. But it is in the course of these reasonings that adolescents comprehend moral values.

Heraclitus, the philosopher of Ancient Greece, was one of the first to

express important pedagogical ideas: ... about the development of morality as a human property ... "All people need to know themselves and be chaste". Aristotle, in his philosophical and pedagogical views, condemned the self-elimination of parents from raising children and the custom of some parents to transfer them into the wrong hands. He insisted that family education be under the supervision of the state. It is appropriate to quote the rule of Pythagoras - "respect the law", which, in his understanding, means a call for respect for parents, restraint and laconicism. In his works, Democritus noted how important it is for parents to devote themselves to raising children, condemned stingy parents who did not want to work to educate children and doomed them to ignorance.

Democritus saw education as a business with the risk of failure. To prevent this from happening, it was proposed to educate on positive examples, to exercise in moral deeds, to conform education with children's nature. The process of training and education is hard, noble work that transforms human nature, Democritus believed. "Good people become more from exercise than from nature ..., education rebuilds a person and creates (for him a second) nature" [2, p. 40].

Therefore, the duty of parents is to form in the child a moral consciousness, stable moral feelings and moral qualities, a high culture of behavior as the basis for showing respect for other people; develop moral habits and beliefs. Analyzing folk pedagogy V.A. Sukhomlinsky, we see in it the recognition of the personality of the child as the highest jewel. His upbringing was focused on the education of the word in children of morality and spirituality.

The family is considered the first instance on the path of a growing child to a great life. "The richness of spiritual life begins where noble thought and moral feeling, merging together, live in a highly moral act" (V.A. Sukhomlinsky). It should be noted that today in family education there are quite a few problems associated with approaches to raising children. There are different families that differ in the relationship between parents and children, differ in moral values - these are families in which children are respected, sympathetic families, materially oriented families, hostile families, antisocial families and others. It is not difficult to understand how moral relations are built, what kind of atmosphere is created in such families.

… Morality is a set of behavioral standards, attitudes, beliefs, ideas about what is due and accessible, and conscience is a mechanism for implementing them in the behavior of an individual by using the energy of will" [2, p. 133]. The content of moral education, as noted by V. A. Sukhomlinsky, should be aimed at the formation of the necessary moral qualities of

a growing personality - this is the formation of ideology, humanism, citizenship, responsibility, diligence, nobility and the ability to manage oneself. It is important to educate in children all the components of the content of the moral world in the child.

The totality of moral ideals, needs is not given from birth, they need to be brought up, without which there is no high spirituality, harmony of the moral world of people. The process of family education is logically and inextricably linked with the life of a multicultural society and the state as a whole. In a holistic family educational process, concepts such as family, child, society, morality, values, culture, etc. dominate. It is important for parents to be an example for their child always and in everything.

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# ANALYSIS OF THE ORGANIZATION OF EDUCATIONAL AND SCIENTIFIC RESEARCH PROCESS IN UNIVERSITIES FRANCE

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**Annotation.** In this article the author considers the using European experience of students' research activities in France universities. In this context, the theoretical achievements of European scientists on the methodology of student research activities accumulated in new historical conditions are very important for our research.

**Keywords***:* higher pedagogical education, college, university, scientific activity, student's scientific-research activity.

The creation of a single European educational space led to the development of uniform criteria for educational policy within the Bologna process and turned science into one of the most important elements of the social infrastructure of European states. With the solution of a wide range of socio-economic problems, a special place in the university is occupied by the preparation of students for research activities, the formation of young people not only knowledge, skills and abilities, but also the necessary research qualities and competencies, an active life position, motives for realizing their own potential, self-development and self-improvement throughout life.

To this end, the primary task of training specialists in the higher education system is not only the need to provide trainees with a system of professional knowledge, but also to equip them with the skills to acquire and apply them in practice, in addition, independently transform and develop new scientific knowledge in the field of their future professional activities. ... Statement of the purpose of the article.

Currently, in the countries of Europe, there is a methodological and technological potential, methods, forms and methods of organizing both the educational process and research activities of students have been developed. Let us consider the peculiarities of the organization of the educational process in general and the research activities of students in particu-

lar on the example of France, according to the Academic Ranking of World Universities - ARWU [1].

The system of higher education in France has gone through a long period of reform and is presented as follows: according to the Faure law (1968), the entire system of higher education was reorganized: universities received full autonomy, and students and teachers - participation in their management; the introduction of the diplomas of general university education (DEUG); issued a decree on state higher education diplomas; with the enactment of the Jospin Act, teacher training institutes and professional institutes at universities (IUFM) were established; according to the Savary law (1984), the specialization of education and the creation of the level of professional licensure were introduced; introduced a European university diploma of a single sample in relation to academic degrees (licentiate, master, doctor); adopted the European Credit Accumulation System (ECTS) and the establishment of the Agency for the Evaluation of Research and the Effectiveness of Higher Education the law on freedoms, responsibility and career guidance of universities, as well as lifelong education.

Further, with the adoption of the new Law "On Higher Education" (1984), "University - 2000" (1990), "University of the 3rd Millennium" (1997), "On the implementation of the principles of the European Higher Education Area in system of higher education in France "(2005)," Law of Pécres ""On higher professional education "(2007), there is a" scientific explosion "and the number of students in universities has increased markedly. The main directions of these reforms were as follows: Higher educational institutions, training centers of large industrial firms and professional societies became the most important links in the system of lifelong education; - liaison of research organizations with industry, including legislative regulation of intellectual property issues; - the creation of non-traditional higher educational institutions (open universities, radio and television colleges, universities without walls, etc.) with the organization of training in them on the basis of the widespread use of new information technologies (computer systems, satellite communication systems, e-mail, cable TV, video and audio systems, etc.); - the establishment of stricter accountability of higher education institutions to public authorities; - expansion of international cooperation in the field of research activities at the national, regional and international levels, including issues of international mobility of students, teachers and young researchers; - recognition of documents on higher education, academic degrees, titles and periods of study in other countries.

Thus, the reforms carried out in France in the 2nd half. XX - early. XXI centuries. were aimed, first of all, at mastering certain scientific skills,

knowledge, skills by young specialists and at preparing young people for research activities. When analyzing the French system of students' research activities, I would like to emphasize that in this country the pedagogical institutes at universities are recognized as the main type of higher pedagogical educational institutions [2].

Since the problem of the development of research activities in France is quite acute, in order to solve it, various research areas at universities have been expanded, research programs have been developed that allow combining training and research activities. Of course, serious changes have taken place in the structure of French universities, as well as in the content and forms of organization of research activities, which suggests a significant modernization of the country's higher education. Obviously, the structural, scientific and administrative reorganization of higher education in France implied further decentralization of universities, growth of the autonomy of universities and their divisions, further development of research activities of students.

Thus, in the 2nd half XX - early XXI centuries in the system of research activities in France, great positive shifts have occurred, which is supported by legislative acts at the state level: the structure of higher education has become more simplified and flexible, there has been a certain convergence of the educational process with research activities, and university scientific councils have become more empowered.

The research atmosphere in universities led to the emergence of joint scientific research, students were given the opportunity to undergo practical training in specially equipped scientific laboratories, which led to the strengthening of partnerships between universities. However, despite structural and quantitative changes in higher education in France, educational reforms were not reflected at the legislative level. To this end, the French Ministry of National Education has decided to develop a university education system based on three levels: licentiate (3 years), master (2 years), doctorate (3 years) (license, master, doctorat - LMD). The 3 + 2 + 3 or (LMD) scheme should ensure the transparency of the educational, research process and was divided into two cycles [4]:

- the first cycle of research activities involves the study and application of scientific concepts and scientific methodology in research activities. Research programs involve 50-60% of compulsory scientific courses, the content of which is regulated for each scientific direction by state documents; 5% are devoted to learning foreign languages; 30-40% - for scientific courses at the choice of the university, of which 10-20% are research courses chosen by students in the scientific direction of training (for ex-

ample, a course in sociology and social psychology for students of natural sciences);

- the second cycle involves the introduction into the curriculum of general scientific subjects of a research nature and maximum research specialization. Universities received the right to issue their own licentiate and master's degrees, which was a reflection of the state policy of "regionalization" of education. Admission of students to this cycle is carried out on the basis of the diploma "metriz" and the entrance exam.

Education is conducted for the purpose of professional training through independent scientific research. The duration of study in a licentiate is three years and implies 180 ECTS credits. Master's studies last 2 years (120 ECTS credits), doctoral studies - 3 years (180 ECTS credits) [3].

Consider the research cycle of a licentiate, which is distributed over six semesters, structured by areas and has the form of typical cycles of higher and continuing education. These cycles provide for obtaining licentiate diplomas in various specialties and correspond to 180 credits in the European system, and also allow you to receive at the intermediate level state diplomas of various types, corresponding to an additional 120 ECTS credits.

Since research activities include seminars and practical classes, less often - lectures, according to the Ministry of Higher Education and Scientific Research of France dated 01.08.2011, "On the organization of training in a license", the number of academic hours for research activities of students is established by the educational institution itself. Particular attention is paid to: methods of independent scientific research; methods of working with scientific literature; critical and analytical reading; knowledge of information and communication technologies (ICT); the pedagogical support of students is strengthened and, without fail, control over the implementation of the individual plan of the student's research development (Le Projet Personnel et Professionnel).

Study programs are designed to expand the scientific range of students' knowledge and are of a research nature. For example, the course "General Pedagogy" is designed for 55 academic hours and provides for the study of four areas: basic pedagogical concepts and methods of scientific research of topical problems of modern pedagogy; pedagogical experimentation and innovation; the relationship between philosophy, pedagogy and other sciences that study man; studying the pedagogical works of the classics of pedagogical science [4].

Thus, in the licentiate: - study programs include theoretical, methodological, practical and applied modules; training may include, in addition to

general education, elements of pre-vocational and vocational training, individual and collective projects or internships; - study cycles are structured into study modules, which are coordinated with each other in accordance with educational goals (compulsory academic subjects, as well as disciplines of free choice, optional disciplines); - academic disciplines are credited and accumulated if the student received a passing grade from them, enrollment in an academic discipline means obtaining the corresponding European credits.

Universities organize a two-year course of study between the licentiate degree and the doctoral degree, at the end of which a state diploma of a new master type is issued. The master level corresponds to 120 European credits, which are attached to the amount of the licensee's credits. It is noteworthy that in each direction of study the master guarantees the possibility of choosing academic subjects that provide consistent orientation of students either to the professional component - in this case, the student receives the degree of "master - practitioner" (master professionnel) - or to the scientific direction - the student receives the degree of "master - researcher" "(Master recherche). The named diplomas of the new type meet the regulatory requirements of the Bologna Process and are France's contribution to the development of the European higher education area.

Consequently, in order to facilitate the restructuring of the system and the phased implementation of innovations, universities are given the opportunity, as an exception, to leave specialized university institutes (IUP) in the short-cycle university education system for five years, which train specialists with diplomas MST (scientific and technical metriza), MSG, MIAGE (scientific and management and metriza in informatics and management) [5; 6]. However, specialists with a master's degree have the right to train other higher specialized educational institutions as well.

Obtaining a master's degree, according to a government decree, allows universities to carry out vocational training in the form of cycles of academic disciplines, which, as a rule, differentiate after receiving the first 60 European credits. Consequently, metrics (bachelor + 4) provide students with the opportunity to obtain a master's degree - practice or master - researcher. Such an organization of university education is aimed at fulfilling orders from the state and large enterprises, accumulating existing and new tasks.

At the suggestion of the director of doctoral studies and the permission of the head of the educational institution, admission to the standard training course for the master - researcher takes place. On the contrary, admission to a standard training course for a master master is also carried out by the decision of the president of the university, but on the proposal of

the person in charge of the training course.

Thus, the level of masters provides for: gradual professional orientation of students; theoretical training and industrial practice, which allows you to determine an individual plan of theoretical and vocational training and better understand the requirements of the proposed standard courses; the system of transitional training courses allows the student to change their specialization.

Further, the preparation of an advanced education diploma for a doctorate degree is provided for a period of three years. Teaching in doctoral studies provides for a volume of theoretical, methodological and applied courses, which are distributed between different stages. The teaching load should not exceed 160 hours when preparing an advanced education diploma or in accordance with a master-researcher [7]. So, at the first stage of doctoral studies, the goal is to attract students to research activities, to identify and confirm their ability to scientific research. It ends with the receipt of a Master Researcher diploma, which indicates the relevant academic disciplines. During the internship, students learn the technique of scientific search, which is carried out in experimental and scientific laboratories, as well as by processing documents, works of famous scientists or conducting research activities. Thus, doctoral studies, as a structural unit, unites research groups around an educational project and is considered accredited only with a positive assessment by the ministers responsible for higher education and research activities at the university.

For example, according to the structure of the educational process at the University of Lile, the academic year is divided into 2 semesters: from October to February and from March to June. Each semester includes 30 ECTS credits. The semester is divided into research modules (Unités d'Enseignement), the volume of each module is expressed in ECTS credits and can include either one discipline or a cycle of disciplines. Research modules are divided into three categories: fundamental, research, optional: fundamental training modules are mandatory for all students in a specific field of study; research training modules are selected by the student from the list proposed by the university; optional training modules are also chosen by the student independently [8].

Thus, based on the analysis of the organizational and research process in the universities of France, the author highlighted the following: - the system of higher university education in France develops on the basis of three stages: licentiate, master, doctorate; - research activity remains one of the main elements of the French higher education system; - the structure of research activities in French universi-

ties has become more simplified and flexible; - there was a certain convergence of the educational process with research activities; - - research councils at universities have become more empowered. Despite the structural and quantitative changes in higher education in France, the gap between the development of higher education and the needs for research and development remains quite significant. The French model based on the separation of teaching and research is currently experiencing a deep crisis not only in France, but also in other European countries. However, the principle of division of research activities in conjunction with a centralized, bureaucratic management system is recognized in France as a poorly managed and ineffective model. This form of organization is not optimal, but the problem here lies in a different plane: how to carry out reforms when the potential for resistance is such that real changes will require a revolution.

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# PEDAGOGICAL DESIGN IN CREATING A PSYCHOLOGICALLY SAFE EDUCATIONAL ENVIRONMENT IN THE PROFESSIONAL ACTIVITIES OF A TEACHER

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**Abstract.** The creation of a psychologically safe and comfortable educational environment is a problem of the education system in modern social and cultural conditions. The aggressive behavior of the subjects of educational relations, manifested in various asocial forms, is a threat to the psychological safety of the individual, his/her mental health and integrity. Preparing teachers for activities for designing a psychologically safe educational environment as a type of professional activity of a teacher requires a phased structural formation of readiness for this type of professional activity through the educational process in a higher educational institution in accordance with educational and professional standards. We believe that the scientific development of this topic and the construction of a model for the formation of the readiness of teachers to work on the design of a psychologically safe educational environment are required.

**Keywords:** Psychologically safe educational environment, psychological safety of a person, pedagogical design, professional activity of a teacher, psychological health, readiness for professional activity.

Currently, the aggressive behavior of children and adolescents in educational institutions, manifested in various antisocial forms from verbal abuse to violent fights with peers, both in real and virtual, educational space with infliction of harm to the physical and psychological health of the victim, violence against the child or ill-treatment by adults, other people in the future can lead to severe psychological and social problems in various areas of a person's life.

Therefore, the creation of a psychologically safe and comfortable educational environment is an urgent problem in the modern education system.

E.N. Volkova [4] defines violence against a person as a physical, psychological, social influence that interrupts a significant activity of a person and forces him/her to perform activities that threaten his/her physical or psychological health and integrity.

A psychologically safe educational environment in an educational institution involves the creation of security in three aspects: in the spatial environment, safe equipment, building architecture, in the psychodidactic, in the system of safe developing technologies and programs, in the social, in the existing form of the child-adult community [5]. By the psychologically safe educational environment I.A. Bayeva [2] means a state free from manifestations of psychological violence in interaction. An environment where the needs of the subjects in personal-confidential communication are satisfied, the reference environment and the mental health of the participants included in it are provided.

Pedagogical design of a safe educational environment as a type of professional activity, in a broad sense, involves [3] the construction of theoretical and normative educational models based on general pedagogical theory, in a narrow sense, involves the creation of pedagogical projects that guide practical teaching and educational activities.

E.S. Babayeva identified in the structure of pedagogical design as a type of professional activity of a teacher the following components:

- motivational (a set of motives that encourage the implementation of design: professional motives, motives for personal self-realization, the desire for professional self-determination);
- pragmatist (individual style of the teacher's activity);
- a reflexive component (permanent critical comprehension by the teacher of his/her activity and its correction) [1].

We consider it necessary to expand the semantic field of the concept of pedagogical design in the aspect of creating a psychologically safe educational environment, to supplement and modernize the structure of the concept with an axiological, gnostic, communicative, reflexive, operational-practical component, since the professional activity of teachers in designing a safe educational environment involves activity in a situation of uncertainty, emotiveness, emotional tension, high conflict potential. Let us reveal the essence of the components of this structure.

**The axiological component** implies a motivational component that determines the activities of teachers in creating a regulatory framework, creating documents, local acts, programs, modules of an educational program based on national legislation on education and protecting children from violence, which outline general approaches, principles, pedagogi-

cal attitudes, worldview positions, a common understanding, the policy of the educational institution, its management, the administration of the educational institution, employees, specialists, students and parents of the educational institution to violence, its types, forms of manifestation, which reflect the readiness to resist any manifestations of violence. The gnostic component implies the professional knowledge and skills of teachers to maintain and create, based on an assessment of the necessary indicators of a psychologically safe educational environment: 1) a low level of psychological violence; 2) positive attitude of participants to the parameters of the educational environment; 3) a high level of satisfaction with the educational environment of the subjects of educational relations. These parameters are the main triggers for maintaining the mental health of environmental subjects and individual safety.

**The gnostic component** of teachers' readiness implies the ability to create a safe educational environment through programs for the prevention and correction of interpersonal interaction, teaching social skills to subjects of the educational space. The communicative component, knowledge and implementation of the principles of designing a psychologically safe educational environment: protecting the personality of each subject of the educational process, relying on developmental education, the purpose of which is personal development, assistance in the formation of social and psychological skills that allow building subject relationships, communicative competence.

**The reflexive component**, self-regulation skills in complex emotive, tense, conflict situations, the ability to make sense of one's own actions, decisions, acts, the desire for self-knowledge, autopsychological competence.

**The operational-practical component** involves analytical and evaluation activities, forecasting possible risks, planning, developing targeted measures for prevention, correction and training in social and psychological skills, psychological and pedagogical competence of subjects of educational relations, management practices and conflict resolution.

It seems that readiness for professional activity presupposes a dialectical unity of structural components that are closely interconnected and interdependent in formation.

Based on the foregoing, there is a need for a phased structural formation of readiness for this type of professional activity through the educational process in a higher educational institution in accordance with educational and professional standards by building a model for the formation of teachers' readiness for activities to design a psychologically safe educational environment.

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# CREATIVE SPIRIT PHENOMENOLOGY IN SYMBOLIC IMAGERY OF DIFFERENT KINDS OF ARTISTIC DISCOURSE

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**Abstract.** The article presents the author's category of the phenomenology of the creative spirit, first introduced by the author in the monograph "The Poetics of Modernism as a Metatext and Its Origins" in 2010 and widely considered both in this work and in all subsequent works of the author. The phenomenology of the creative spirit is revealed in a number of its aspects on the material of the imagery of various types of artistic discourse, namely: literature, drama, cinema. By means of structural-semiotic analysis, comparative method and the author's method of metatextual invariance, characters are analyzed, the semantics of which relate to such phenomena as creative individuality; phenomenology of creative cognition with its inherent categories of creative search; visibility of phenomena and their essence; error and truth. The very phenomenon of the existence of the creative spirit is established, acting as a phased evolution in individual creative development.

**Keywords:** phenomenology of the creative spirit, creative individuality, artistic figurativeness, artistic structure, symbol, invariance.

The phenomenology of the creative spirit is the phenomena of creative perception that appear in the mentality of the creator as problems that he encounters when creating his creations, trying to find an adequate artistic form to embody his creative idea. These problems are purely speculative, relating to the state of the soul of the creator as the soil on the basis of which he alone can create his works. So, when creating the novel "Madame Bovary", Flaubert faced the problem of finding such expressive means that could convey the world of the soul of his heroine, hidden from prying eyes, where, as if on a stage, the tragedy of the incompatibility of her romantic ideals with the unsightly picture of the reality of the life around her, where they do not exist, was played out. Verbal discourse, in this case, should be a synthesis of Emma Bovary's inner speech and the

author's speech, from where the emergence of a non-proprietary-author's speech of a phenomenological nature, capable of conveying the phenomena of perception - the state of mind of the heroine.

All this must be considered from the point of view of the main postulate in the phenomenology of the creative spirit, namely, the search by the author of his creative face, his creative individuality: it must have the same difference factor that is inherent in the individual external and internal appearance of each person. Thanks to this, we can distinguish one person from another, without which humanity would be a faceless multitude of people, devoid of any individual characteristics by which they could be recognized. The individual factor has a universal character, since it is inherent in all being, from a tiny blade of grass to giant cosmic bodies, and in order to recognize their individual features, our thinking has the ability to distinguish them. The phenomena of individual and *differential cognition* as the distinguishing ability of our mechanism of cognition are thus inextricably linked. If we could perceive only the unitary, the identical and not see what distinguishes one object from another, then the very phenomenon of the individual would not exist.

A. Robbe-Grillet in the novel "In the Labyrinth" created the image of such a unitary identity in the image of the city, where all city objects are covered with an even snow veil, due to which they become indistinguishable from each other. The hero of the novel, a soldier who is given the task of handing over a parcel to someone in this city, vainly circles around it in search of its addressee, but never finds it, because due to the thick layer of snow covering the city, he loses his bearings in his movement, and the city turns into a hopeless labyrinth for him.

Such a symbol is created by Robbe-Grillet to show the absence of the author's individuality in works of art, due to which they become as indistinguishable from each other as urban objects, devoid of distinctive features, were for the hero of his novel [6, p. 203-205; 7, p.134]. A symbol with the same semantics, but this time referring to personological images, is also created by T.S. Eliot in the poem "What the thunder said", depicting people whose faces and figures are hidden under cloaks with hoods, so that they cannot be identified, since they are devoid of individual differences, identical to each other, and the only thing that can be seen is their anthropomorphic outlines. The image of cloaks with hoods, which hide the true appearance of people, is synonymous in its meaning with the image of a snow cover, which hides the true configuration of urban objects. In both cases, the naturalistic reproduction of the phenomena of the surrounding world is criticized, which does not reveal their essence, as it should correspond to

the very function of artistic imagery, but, on the contrary, hides it.

Such criticism, expressed by artistic means, refers to metatextuality, since the purpose of any metatext is to challenge the epistemology of its text-object in one way or another, i.e. the object against which this criticism is directed [6, p. 12-38].

The absence of the author's own face also finds artistic embodiment, which we see in the image of the hero of Edgar Allan Poe's story "The Man of the Crowd". He is depicted aimlessly wandering the streets of London and fearing only one thing: not to be left alone, therefore, every time he sees crowds of people, he rushes there to merge with them and become indistinguishable from them, which the author characterizes as the narrator as " the most serious crime", on the basis of which he calls him "a man of the crowd" [10, 158].

Such a characteristic is due to the fear of the creator to move away from the usual canons of creating works, from that network of well-known concepts, views, points of view that are rooted in the public consciousness and through the prism of which it perceives the world. In the terminology of our research, we define it as a *generally accepted language*, as opposed to the category of *individual language* as the author's individual worldview, his unique vision of reality [4, c.12-15].

The artistic forms in which the phenomena of the creative spirit are embodied can be very diverse, determined by only one principle: their ability to convey the information that could most adequately express the author's intention. Such forms can act in a different emotional way: both comic and tragic.

So, the plot of Edgar Allan Poe's story "Glasses", which is based on love relationships, appears in the form of the collapse of beautiful illusions transferred to the comic plane. However, the meaning of the images is far from comical and does not lie in the situation depicted here of the hero who married his great-great-grandmother, because due to his short-sightedness and stubborn unwillingness to wear glasses, he mistook her for a young beauty, but in the phenomenon of taking the appearance of things for their essence, false for true, inability to recognize behind the external beauty of the phenomenon its hidden ugliness.

The depicted situation is made up of symbolic images, where we are talking about nothing more than the phenomenology of the process of cognition, namely, the cognition of the creative, cognitive ability of our mind, which can be as short-sighted and helpless as the hero of the story turned out to be, who did not see the thick layer of makeup on his great-great-grandmother's face. But his delusion dissipates as soon as he puts on his glasses.

In such symbols, the author depicts a cognitive process related to the phenomenology of the creative spirit, when the author, who is at the beginning of his creative path, is just starting to cognize reality, taking the first, still timid and clumsy steps and coming to erroneous conclusions, because at this stage he cannot see the true appearance of what is hidden behind the surface of phenomena, and only later sees it, realizing how he was mistaken, which is embodied in the symbol of points.

The author develops the same theme, but in other tragic symbols, in the story "The Well and the Pendulum", depicting the hero imprisoned by the Spanish Inquisition in a cell devoid of light, with a well in the middle, where, according to the plan of the inquisitors, he was supposed to fall and perish. To avoid this, the hero seeks to understand the shape of the chamber and begins to examine it, groping along the walls with great difficulty, now and then falling from fatigue and losing consciousness. But he never gets a true idea of its form, and only a ray of light from the hatch that opened for a moment in the ceiling gives him the opportunity to understand it.

In the same groping way, in the darkness of delusions, the thinker advances in search of truth, until, finally, a ray of its light flashes, illuminating the darkness surrounding him.[1] Here it is easy to see an analogy with the insight stage in G. Wallace's model of the creative process, according to which it includes such stages as preparation (collection of information necessary for research); incubation (the formation of an idea, its "bearing" at the level of the unconscious, as well as consciousness); insight (insight) - a sudden finding of the desired solution; verification of the obtained research results [3]. But what is represented in this model in terms of scientific discourse, here we see in symbolic images that convey such nuances of the creative process that scientific categories cannot express.

It is not for nothing that the authors of philosophical works, in order to more vividly express their thought, expressed in scientific categories, resort to the help of artistic imagery. So, in the treatise of Descartes "Reasoning about the method..." [2, p. 128] and in "Creative evolution" by Bergson [1, p.312], where he characterizes the emergence of intelligence in the evolution of living beings, we see the same image as in the story of E. Poe: groping in the dark as a symbol of the search for truth.

If the images that form the plot in a work of art are used in a symbolic function, then we must talk about ***the expansion of their sematic field***, in this case, in the direction of shifting their semantic emphasis and the emergence of new meanings, namely, phenomenological ones. At the same

[1]We devote a lot of space to the analysis of Poe's work in our works, including articles and monographs. See article: Chernitskaya L.A. Semiotics of myth in the stories of Edgar Allan Poe [8, p. 32-35].

time, imagery can represent any life situation, which we see in these two stories by E. Poe: what is depicted in them, at first glance, has nothing in common, however, the semantics of these images in both cases relates to one semantic category - ***the phenomenology of creative cognition***, which unites them into one artistic whole.

When using symbolic figurativeness, the situationality of the plot is significant as a means of conveying the information contained in it, according to the author's intention: any changes in the plot of a work will also entail changes in the meaning of this artistic whole, and therefore the discourse and type of invariance[2] that arise in this case must be defined as ***symbolic-phenomenological***. In the poetics of Poe, Joyce, T.S. Eliot, Chekhov, they are clearly expressed, differing in this from the phenomenological discourse of Flaubert, Marcel Proust, Nathalie Sarraute, where stylistic means predominate, which does not exclude the use of symbolic imagery, but to a lesser extent.

Knowledge of the semantics of symbolic images that analyze the phenomenology of creativity is necessary in order not to take the events depicted in the work, no matter how entertaining and plausible they may seem at first glance, for its true meaning. In this case, all its significance disappears, and from an outstanding creation, as it really can be, it turns into nothing more than some banal situation, a special case that does not have any universal sound. But it is precisely this that is inherent in all the great achievements of the human spirit, without which they would not be such.

Recognition of the semantics of symbols to determine the meaning of a work is as necessary as knowledge of the semantics of lexical units to understand the meaning of a textual whole. The lexemes in the language system have their analogue in the artistic system in the form of imagological lexemes as figurative elements, on the basis of which imagosemantic statements are formed. So, Chekhov's play "The Seagull", if we consider it from the point of view of its *artistic grammar*[3], is nothing more than a sequence of similar statements, each of which has its own symbolic meaning, and the meaning of the whole play arising from this will be far from that everyday situation which is shown in it.

[2]The category of invariance implies the presence in an artistic system of a number of stable artistic elements endowed with fundamental values for this system. This is the basis on which the whole system is built and which is developed in variants of these invariants. The categories of invariant and variant in the system as a whole are widely covered in our works: [7, p. 11-42].

[3]We introduced the term "artistic grammar" in our monograph: Chernitskaya L.A. The poetics of the novels of Nathalie Sarraute [5, p. 4]. This concept refers to the analysis of an art form in terms of its structure, semantics, symbolism, as well as all other aspects of the art system.

Analyzing its structure in terms of the category of invariance, it is easy to see that the plot of the play is based on the invariant of unhappy love. If we see here only the chain of events that tells about it, then the entire artistic value of this play would be canceled, and we would have only a cheap melodrama in front of us. But if we consider these episodes from the point of view of the semantics of the symbolic-phenomenological discourse, where each of them acts as a certain imago-semantic statement, then we will see a true, implicit, plot, namely, a philosophical-aesthetic content relating to the existence of a creative spirit: how he is born, lives, and dies if he is unable to resist the obstacles that prevent him from developing.

Thus, his birth is depicted in the first scene with an unsuccessful production of a play composed by Treplev, while his suicide in the final scene symbolizes the death of the creative spirit, which he personifies. Between his birth and death, there is a struggle for his ***creative*** survival, which is narrated by the symbolism of the love relationship between Treplev and Nina, where Nina is a symbol of life, and Treplev is a symbol of the creator. And just as Treplev passionately loves Nina, striving to win her heart, so the true creator passionately loves life, striving to comprehend its essence and embody it in his creations. But if this fails, they are dead, like their author as a creative individual, which symbolizes the death of Treplev due to unhappy love for Nina[4].

The symbolic-phenomenological discourse with the semantics of the analysis of the creative process is the property of not only literary and stage figurativeness, but, going beyond them, is also used in other arts. Such, for example, is the visual kinetic imagery used in cinema. Shakhnazarov's film "Winter Evening in Gagra" has the same epistemological theme as Chekhov's play "The Seagull": the stages of the life of the creative spirit, passing through the periods of its emergence, flourishing and extinction.

In the film "Winter Evening in Gagra" the author likens them to similar periods in human life. The creative spirit appears here in the form of the talent of the film's hero Alexei Beglov, who, having become famous in his youth as a first-class tap dancer, loses his outstanding abilities in old age. His name, which at one time shone as an unsurpassed master of the step, is forgotten to such an extent that Beglov himself is considered dead, despite the fact that he is alive. However, his creative spirit died, and with it his creativity, which for the creator is his life. Beglov continues to live as a physical entity, but as a creator he is not, which symbolizes his real death at the end of the film. Such images depict the separation of the physical essence from the creative one, which, despite all the differences in their

[4]Chernitskaya L.A. The semantic structure of Chekhov's play "The Seagull" [7, p.271].

nature, are identical in their life stages, thereby proving the idea of the very existence of such a phenomenon as the life of the creative spirit[5].

To show how it originates in the soul of the creator, an image is created that is synonymous with the unsuccessful production of Treplev's play, acting in the form of an unsuccessful attempt to master the art of tap dance by Arkady Grachev, a young man who suddenly lights up with the idea of learning to perform tap dance, despite his poor sense of rhythm and undergone operations in associated with leg fractures. However, he is firmly confident in achieving his goal, and therefore asks Beglov to be his teacher. But the training does not bring any results, and Arkady refuses what he so passionately aspired to so recently. Such was his unsuccessful debut on the creative path he had chosen, synonymous with the same debut of Treplev.

But the synonymy that arises between the plots of Chekhov's play and Shakhnazarov's film does not end there. Their characters eventually achieve the level of excellence they aspire to, but the imagery that embodies their long-awaited success is not identical in form. Chekhov uses a descriptive form of discourse in the form of statements by characters, from which it is clear that Treplev became a famous playwright; Shakhnazarov, on the other hand, uses a symbolic form, which we see in the final scene of the film, where Arkady, after the death of Beglov, decides to try his hand at the art of tap dancing again and begins, at first very timidly, to beat him. Gradually, the tap beats become more confident and stronger, their pace accelerates more and more, and at their peak they reach dizzying speed.

This is a symbol of reaching heights in creative activity, its flourishing, revealing all its possibilities. But the paradigm of life is relentless in its movement, and the heyday cannot last forever, which in the symbolism of this scene is expressed in the gradual decrease in the speed of the step tempo and the weakening of the strength of its beats: they become slower and quieter until they completely disappear. At the same time, the figure of Arkady is present only at the beginning of the scene, and then disappears, and only the beats of the tap dance remain as a symbol of the universality of the phenomenology of the life of the creative spirit, which is inherent in any true creator as its bearer, regardless of his specific personality and type of his creative activity.

So, we see that the symbols of artistic imagery from various types of arts: literature, dramaturgy, cinematography act as a means of analyzing

[5]In the statements of K. Jung concerning the psychology of creativity, one can find an analogy with our category of the life of the creative spirit. He believed that in the soul of the creator, a creative idea develops like a living being, which forms an "autonomous complex" independent of its consciousness, leading its own mental life. [9, p. 29].

the phenomenology of the creative spirit, revealing the phenomenology of creative cognition as a cognitive process inherent in evolution regarding individual creative development. If we consider it in terms of structural-semiotic analysis, we can see that, despite the difference in the types of artistic discourse, their symbolic images have a single semantic structure, consisting of three evolutionary stages: beginning, flourishing and extinction. The forms of expression of this evolution vary from one type of art to another, as well as within each of them, but its structure, as their synonymological invariant, remains unchanged everywhere. Each of the forms develops the semantics of this invariant, introducing new meanings into it, revealing various aspects of the phenomenology of the creative spirit, thanks to which the process of its cognition is carried out.

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# ORGANIZATION AS A SOCIAL MANAGEMENT SYSTEM AND A STUDY OBJECT IN SOCIOLOGICAL DISCOURSE

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**Abstract**. The article presents the author's approach to the organization as a social system study and the object of research in sociological discourse. Social organization as a system is considered from the standpoint of a systematic approach that allows to identify specifically human, objective and universal characteristics of the object. As an analysis of the organization, the concept of the phenomenon of sociality is used which determines the type of organization people and social relations. The organization is considered as a structural element of social reality that unites people for joint activities to achieve goals. At the same time the organization goals are not considered as aggregated preferences of its members.

**Keywords**: social management, social system, sociological discourse, sociality, subject of management, object of management, external influencing environment.

Society is formed by a multitude of organizations with which all aspects of human existence are connected. Many organizations functioning in modern society are socially oriented systems in which the main element is a person. The system of this type is based on the dominant combination of public, collective and personal interests which have a significant impact on its functioning and sustainable development. As a result of purposeful management the whole complex of system elements can form a viable organization.

In management theory the concepts of "organization" and "system" have similar content, while an organization is defined as an adaptable social system that strives to act intelligently in its environment specific conditions [5].

At the same time the success of an attempt to present a specific activity in the form of a system will largely be determined by how accurately it will be possible to establish the interrelationships and interactions of this system all elements.

All processes or phenomena in the organization should be studied in relation to the external influencing environment. In other words, the representation of an organization as a subject of research in sociological discourse requires that "this object of cognition be considered as a system functioning in the environment and interacting with other systems" [11].

Taking into account the fact that we are talking about the study of human realities and communities, as noted by I.E. Steinberg et al., "a methodological approach is required that gives an idea of both specifically human and objective and universal characteristics of the object. Different slices of reality, as well as different generalizing categories create the need and enable such a multi-faceted and combined sociological research object " [8, c. 17].

Social organization as an object of sociological research is characterized by two features: 1) complexity of elemental, parametric and functional structures; 2) active interaction with the external influencing environment.

It is known that any human activity presupposes the need for an organization involving the division and cooperation of labor as well as the management of labor activity by changing or preserving social conditions. The theoretical foundations for this problem development were laid in the papers of E. Durkheim, M. Weber, T. Veblen, F.W. Taylor, etc.

Based on the provisions of the research of these authors it is possible to present the phenomenon of organization in the form of a system using as an analysis tool the concept of the phenomenon of sociality "as a form of perception and evaluation of social being that determines the nature of social interaction of subjects. The consequence of sociality development is precisely this or that type of people's activities organization and social relations arising in the process of exchanging its results, as well as a certain organizational order that sets the rules of these relations" [9, c. 150].

In the broad sense of the word, by a social system we mean an association of individuals formed by them to realize their interests and common goals through social relations. At the same time interest is understood as "the real reason for the social actors activities aimed at meeting certain needs" [7, c. 216]. In the process of implemented activity stable connections are formed between individuals and groups as elements of a social organization which are defined as social relations.

In a general sociological sense social relations are relations between social actors about equality, social justice in the distribution of social benefits, conditions for personal development and satisfaction of various needs.

The processes that take place in the social system are implemented through management, that is, influencing it in order to maintain it in a given

state or transfer it to a new set (desired) state. The system in which the control function is implemented is determined by the control system.

The definition of "organization" concept is based on the understanding of organization as internal orderliness, consistency of interaction and interrelationships of a certain set of relatively autonomous elements representing a single whole existing within certain boundaries.

We consider an organization as a social system, first of all, as a social reality structural element and a certain integral education the main elements of which are people, their social relations and interactions. In other words, an organization is an association of people who jointly carry out activities to achieve a specific goal and act on the basis of established norms, procedures and rules.

In addition to the general properties of the systems, the organization as a social system has some additional features, including: hierarchy of statuses, the presence of self-management mechanisms in the system, subjects and objects of management self-awareness, value system, formal and informal relations [18, c. 340]. All this allows us to consider the organization from several socially significant subject positions in the sociological discourse context.

A social organization as a complex system can be represented as an integrity formed by an ordered set of elements that meet the requirements of the objective function. As A.B. Kurlov rightly notes, "the objective function, or "functional imperative", is a generalized form of interrelated local functions set of an object and contains requirements the fulfillment of which is necessary for the system development in a certain direction. It is natural that these requirements are set by the environment external to the object while its development occurs in the form of adaptation to changing external conditions" [9, c. 86].

The goal of a social organization is not imposed from the outside; it is determined by social harmony, internal order and a balanced combination of the subjects and objects of this organization goals and needs as a single functional whole which is "in the process of constant changes, in setting goals and achieving them. The goal is usually a different state of systems living organism and (or) its individual elements and qualities" [19, c. 96].

A. Adler noted that organizations focus on an artificially created permanent goal of development and excellence, on "a goal that has no basis in reality, in other words, on fiction" [1, c. 65], "but this fictitious goal gives a person a "soul plan", a life plan as an attempt to achieve it, which in real human activity always takes a concrete form" [2, c. 12-13]. This is what makes social systems, the elements of which are people, fundamentally

different from different nature systems. This makes it possible to define a social system as a set of individuals interacting with each other and the external influencing environment according to the laws that ensure the goals development achievement and the organization sustainable functioning.

We proceed from the fundamental position of D.A. Novikov's approach which states that "managerial activity is fundamentally subjective: in the same conditions, with the same information, people, even with the same education and similar professional experience, can make significantly different managerial decisions" [12, c. 51].

Within this approach framework, 2 types of goals are distinguished: forced and subjective. The first group assumes passive or active, but in both cases forced goal formation based on needs, problems, threats and the struggle of interests. The second group of goals presupposes subjective goal-setting, "since it comes from the individual, from the individual creativity of himself, his business" [16, c. 16].

According to A.I. Prigozhin, forced goals prevail over subjective ones due to the fact that "subjective goals are possible only in the most subtle and complex goal-setting, which is available only to a minority of managers and people in general" [16, c. 16].

At the same time it is important to note that, according to A.E. Petrosyan, "the goals of the organization are not a reformulation of their owners goals, ... it is wrong to consider these goals as aggregated preferences of its members (employees)" [14, c. 66].

We believe it is fundamentally important to expand the understanding of an organization goals as a social system based on the premise that organizations themselves do not have goals, goal-setting, as a function, is inherent only to people, therefore "... agreement is achieved in the the participants negotiations", and "the company goals are actually the result of negotiations about the goals of its individual participants" [3, c. 77].

Social management in an organization can be represented as a certain type of interaction that develops between two subjects, one of which is in the position of the subject of management in this interaction, and the second is in the position of the object of management.

Social management is a "consciously constructed and directed sociocultural mechanism for regulating relations between participants in joint activities, combining their interests, organization and self-organization, formal and informal norms, achieving productive goals and sustainability of social ties" [20, c. 45].

From the ontological approach standpoint the organization as a system of social management is based on the managerial relationship between

the management subject and object of within the management process.

The social management object, being by its nature an active element of the management process, can, to a certain extent, influence the subject of management, thereby determining the content of managerial influence and the limits of the management subject activity. This circumstance provides the basis for the conclusion that the management activities effectiveness depends on the balance of the management subject activity measure and its compliance with the object capabilities. The main purpose of regulatory actions in a social organization is to coordinate the subjects interests in the process of social interaction in order to achieve social relations harmonization.

Within the framework of subject-object interaction a management mechanism is formed and transformed based on the principles of effective social development taking into account the interests of both the individual and the collective, focused on achieving the goal determined by the management subject, through planned and organized the object activities managed by him.

The organization social reproduction is a constant process of optimal forms searching and selecting, social forms of interaction between people, that is, forms of labor division. At the same time, the organization, according to A.B. Kurlov, is "not only divided, but also united labor, not only labor isolated from public labor, but also labor introduced into public labor" [9, c. 152]. On the same occasion, M.Y. Osipov notes that "organization is the only possible means of resolving the contradiction between the labor division, its isolation and the labor unification by its community" [13, c. 127].

Thus, the interpretation of the social management mechanism on the ontological approach basis, according to O.A. Belenkova and E.V. Vezhnina, "allows us to substantiate its system-structural nature, including elements of the management system itself, considered in the its functioning aspect " [4, c. 50].

This idea of social management is based on the theoretical approach of M. Weber to the interpretation of social action as such an action "which, in accordance with its meaning, assumed by the acting individual or acting individuals, comes into relation with the behavior of other persons, and which in its course is oriented towards it" [21, S. 1].

Such an interpretation postulates the exceptional importance, according to M. Weber, of understanding the nature of social management of an organization from the sociological science standpoint, "which understands social action by interpreting it and thereby seeks to explain it causally in its course and its consequences" [21, S. 1]. At the same time it is impos-

sible not to agree with the position of A.V. Tikhonov who rightly notes that "the fact that a managerial action is recognized as social in nature does not mean that any social action can be managerial" [20, c. 44-45]. In this regard it is fundamentally important, from our point of view, to expand the traditional understanding of the social management process only as the impact of the subject on the object.

In general, the organizations social management has a number of characteristics by which it can be differentiated from other types of management:

- the specifics of the object of management: a person as one of the most complex objects of management by virtue of having consciousness, will, abilities to develop and evaluate the social context;
- the presence of participants will unity in joint activities to achieve a certain goal through voluntary consent or subordination of the object will to the subject will;
- relative autonomy of management objects, their ability to choose a behavior model depending on the situation social context;
- the management conscious nature, the ideality of the goal, the rationality of an organizational structure building;
- consistency is a social organizations objective property as complex management objects.

Understanding the organization as a social education has conceptual significance. Activity within the organization is specific precisely because the artificial, constructed in it can acquire a natural character, becoming a "second nature" that humanity has put between itself and the environment [10, c. 594]. The organizations themselves form a special "third nature", distinguished by social relations and occupying a specific place in them" [15, c. 23] representing objective, but immaterialized objects, a "sensually supersensible thing" (K. Marx) objectified in social relations.

The organizational ties and norms objectification is not objective, but "quasi-material" [6] in the sense that they exist outside of consciousness although they originate from it. The elements of the organization manifest themselves only through the behavior of people and social relations, while forming a "special, non-individual reality that does not depend on specific people" [15, c. 21].

Note A.I. Prigozhin's significant from a theoretical and methodological point of view remark that the organization does not belong entirely to either the basis or the superstructure having a duality in the content of social relations in them [15, c. 21]. At the same time we proceed from the fundamental position of M. Weber's approach which interprets social attitude as "the

behavior of many directed at each other and oriented accordingly. Consequently the social attitude consists entirely and exclusively in the chance that in a given (meaningful) way they act socially, completely independent of what this chance is based on" [17, c. 386].

Thus, the organization as a socially oriented system, representing a consciously coordinated social education with certain boundaries, functions on a relatively constant basis to achieve a common goal.

The study of an organization as a social management system from the standpoint of sociological science involves the identification of its components and the principles of the mechanism that connects them ensuring system integrity.

Based on the presented points of view, it is possible to state the relevance of the transition to the idea of a social organization that adequately reflects its nature and essence. Within the framework of the subject field of sociological science, it is possible to focus research strategies on the study of social organization as a phenomenon of natural or natural-artificial origin, to determine the resources necessary for its effective functioning as well as their support mechanisms that exist due to the existing models naturalness.

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# EGOCENTRISM AS A CONFLICT FACTOR OF A TEENAGER

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**Abstract.** The article is devoted to the problem of increasing conflict resistance and reducing the egocentrism of adolescents by methods of psychological correction. The authors consider egocentrism as a personal state of a teenager, which acts as the foundation of the position of distancing oneself from society and building up communicative and intrapersonal conflicts that impede favorable relationships and effective social connections.

**Keywords**: intrapersonal conflict, egocentrism, adolescent crisis.

The modern community lives in a tense social, economic, environmental and epidemiological environment. The problem of concern for the survival and improvement of humanity is very urgent. The problem of the personal development of young people is also very urgent. It is alarming due to the loss of a sense of responsibility by the younger generation, manifestations of selfishness combined with unbridled needs and infantilism, which indicates a deformation of the motivational-need sphere of the individual, which determines the content of the conflict of generations.

Poring at the problem of intergenerational conflicts, we take into account that the age characteristics of adolescents are determined, on the one hand, by the deep psychological content of the main personal characteristics, and, on the other hand, by qualitative differences in the processes of personal formation. Adolescents tend to have many expectations and aspirations in connection with the prospect of changing their social status, they are looking to the future, constructing a temporary development perspective. However, this situation is aggravated by the ever-increasing demands of society, preventing them from differentiating themselves and

self-identity. The contradictions between the desire of adolescents to realize their abilities, self-affirmation and the position of the child provokes protest behavior.

And very often, external conflictness acts as a source of formation of intrapersonal conflictness, as the inability of a teenager to constructively resolve a conflict or avoid it, makes a teenager a victim of pedagogical influence in the broad sense of the word. An intrapersonal (psychological) conflict is defined as a conflict of a person's self-consciousness. Domestic scientists define psychological conflict as:

- the impossibility of implementing plans and programs, the gap in life, the inability to perform one's vital functions until the life crisis is resolved (A.V. Vishnevskaya);

- the assigned attitude towards a person “of other people, his/her awareness by others, as the attitude of the person himself/herself to his/her features, traits, properties, his/her awareness of his/her place in the system of numerous social connections and relations, knowledge (or idea) of the significance of his/her “self” (the core of self-consciousness) for people and for oneself and the experience of this knowledge” [4, p. 150];

- negative experience, "caused by the protracted struggle of the structures of the inner world of the individual, reflecting conflicting connections with the social environment and delaying decision making" [1, C. 294];

- “the clash of two conflicting tendencies in the human psyche; as a rule, as a result of this collision, one of the tendencies becomes less conscious of mine than the other. The conflict itself can be realized to a greater or lesser extent” [2, p.50].

L.S. Vygotsky identified three problems of the age crisis in the first decades of the formation of domestic psychology: the positive content of the negative phase; isolation of the main neoplasm in the mind of the child; social situation of development. Considered together, they allow us to consider the adolescent crisis from two positions either as a turning point, including a number of sudden changes that affect behavior, way of thinking, or as a series of psychological disorders accompanied by anxiety, depression, maladjustment, conflict.

Conflicts are an integral part of social life. There are allocated social, pedagogical and psychological aspects of its study, which are dialectically interconnected. In functional terms, all social conflicts are inherent in inconsistency, destructive conflicts contribute to the destruction of the personality and social system, have negative consequences for the personality of a teenager, increase his/her anxiety, aggressiveness, suppress and lead the conflict into the inner plan, cause egocentric tendencies. Indicators of

intrapersonal conflict are:

- isolation, capriciousness, secrecy, deceit (V. N. Myasishchev);
- indecision, instability of behavior, inability to achieve goals, frustrated behavior (L. I. Bozhovich);
- dependence, reduced responsibility and initiative, anxiety, withdrawal into oneself, narrowing the circle of social contacts (D.V. Greshnev).

The problem of adolescent egocentrism as a mental position in the knowledge of oneself and the world around was first described by J. Piaget. In addition to the *egocentrism of thinking*, there is *personal egocentrism*, which is a fixed attitude of a person on his/her thoughts, feelings, actions, goals, qualities of character and temperament, etc., *egocentrism of the moral sphere*, indicating the inability of the individual to perceive moral actions and deeds of other people and their own ones.

A teenager's egocentrism manifests itself "in spontaneous speech, inability to separate oneself from the world, inability to establish causal relationships when analyzing one's own behavior and actions performed without taking into account the anticipation of the upcoming consequences and the reaction of others, which is the result of a violation of the socialization process and education of those in need of psychological correction. The conflict of an egocentric personality is manifested in the fact that it absolutizes its own mental, spiritual organization and considers it identical to the spiritual organization of other persons, which often does not allow taking into account their interests, demonstrating disregard for the values of others" [3, p. 267]. Egocentrism manifests itself in relation to educational activity, in speech (*egotism* and retroflection), and its *semantic* level is closely related to the level of claims, self-esteem of the individual, a person's attitude towards himself/herself and other people, the values of life (M.Sh. Magomed -Eminov).

Nevertheless, despite the negative aspects of egocentrism, D. Elkind singles out a sign of meaningfulness in adolescent egocentrism, as a result of self-consciousness discovering the fact of its own uniqueness, the result of self-discovery, the formation of self-identity (J. Marcia, E. Erickson). İn his opinion, it fundamentally distinguishes the ego-centrism of a teenager from the ego-centrism of a child. The author considered adolescent egocentrism as the inability of the subject to distinguish: the subjective from the objective; temporary from permanent; unique from universal. And therefore, it significantly manifests the emotional component, the adolescent's experience of his own personality (personal myth), which gives rise to a special form of *affective-personal egocentrism* [7].

J. Piaget noted that the roots of egocentrism lie in the child's misunderstanding that other opposing points of view are possible, that the psychological organization of other people is not identical to his own. Therefore, overcoming egocentrism is based on the consistent development of the ability to decenter, overcome the position of a subjective observer and the transition to the position of an objective observer. A teenager, on the contrary, realizes that there are other opinions and positions, other views, that all people are different, but the desire for self-assertion of "self", a defensive or accusatory position does not allow him/her to overcome egocentrism and, moreover, form it. That is why, in science, the concept of *teenage egocentrism* is used as a personal state of age.

Based on the analysis of the literature on the research problem, a number of conclusions were drawn:

- firstly, egocentrism, as an intellectual and social position, as a property of a teenager's personality, can serve as the basis for the formation of a special position that contributes to estrangement from society, and an increase in external conflict;

- secondly, distancing, opposing oneself to others, leads to the destruction of the social ties of a teenager, gives rise to a sense of exclusivity, leads to loneliness, injuring his/her personality, leading the conflict to the inner plane;

- thirdly, an egocentric teenager has problems with making independent decisions when resolving a conflict and, as a result, slows down in personal development.

The study was conducted by us in a group of teenagers attending the club, the sample was 42 people, including 16 boys and 26 girls aged 12 to 15 years.

The research methods were: theoretical and methodological analysis of sources on the research problem, observation, conversation, survey, methods of processing and interpreting data.

Psychodiagnostics was carried out using a number of methods: diagnostics of personal egocentrism; determining the level of conflict tolerance; diagnostics of the interactive orientation of the personality (N.E. Shchurkova in the modification of N.P. Fetiskin).

The theoretical and methodological basis of the study was the main provisions of the theory of personality and the subject (A.V. Brushlinsky, A.N. Leontiev, B.F. Lomov, etc.); subjective-activity approach (K.A. Abulkhanova-Slavskaya, L.I. Bozhovich and others); system approach; the position of the individual as a subject of activity and a multifunctional system, the highest value and goal in itself of development.

The results obtained in the process of studying the egocentric orientation of the personality showed that 43% of adolescents have an index of egocentrism corresponding to the average level (18), a high index of egocentrism and an index that has a value close to high are equally expressed in 28.5% (12 adolescents in each value), a low level in the sample was not detected.

The average level of conflict resistance was found in 23.8% (10 people), low - 33.3% (14 people), very low - 19.1% (8), 10 people conflict resistance is close to a low level (23.8%).

The ascertaining experiment showed that adolescents are predominantly characterized by an increased level of egocentrism and an underestimated level of conflict tolerance. In addition, respondents with an egocentrism index equal to or close to a high level correspond to a low or close to low level of conflict tolerance.

As the observation showed, egocentrics are characterized by a number of behavioral features: a neutral or indifferent attitude towards peers; weak social and psychological activity; low need for self-affirmation, which may further lead to a delay in personal development. With a high level of conflict, adolescents are characterized by: a tendency to dominate, self-righteousness, commanding tone in communication, disregard for the opinion of comrades, the desire to subordinate them to their will.

The predominance of a high level of egocentrism and a low level of conflict resistance in the group of adolescents studied by us required psycho-corrective influence. Since the group is a single social organism, all members of the group (heterogeneous group) were subjected to corrective action.

A psycho-corrective program “Say YES to tolerance” was developed, aimed at the formation of:

- the *psychological readiness* of adolescents to change their ideas about their own place in society and the system of social relations; willingness to accept others for who they are; develop empathy, form a humane attitude towards people;

- the *cognitive readiness* of adolescents to expand the system of knowledge about the world around them, about themselves, their place and role in social reality, in the process of interaction with different people or groups;

- the *behavioral readiness* of adolescents to get involved in the process of learning constructive ways out of conflict situations; ways to express their feelings and experiences without conflict and violence; formation of social susceptibility, social imagination, trust; formation of the ability to listen and understand other people, strengthen social ties.

The program includes three blocks: “Tolerance and conflict as a personal problem”, “Being tolerant. Self-knowledge”, “Tolerance to otherness. Tolerant communication”. Methods of work: communication skills training, personal and behavioral training, discussion, brainstorming, lecture, conversation, role-playing games, etc.

At the end of the correctional work, we faced the task of determining how effective it was. The ascertaining section was carried out using the same methods as the control section.

The questionnaire for diagnosing personal egocentrism showed that in 38 people the level of egocentrism corresponds to a low level (90.4%), and only in four adolescents it is equal to the average level (9.6%).

According to the level of conflict tolerance, the data were distributed as follows: 20 adolescents showed a high level of conflict tolerance (47.6%), 18 people had an average value of the indicator (42.9%), and only four respondents retained a low level of conflict tolerance (9.5%).

The interactive orientation of the personality on the scales was distributed as follows: 20 adolescents (47.6%) are *focused on interaction with other people*, which is manifested in the need to maintain constructive relationships with group members, empathy and interest in joint activities; 12 adolescents (28.6%) are *marginally oriented*, which is expressed in a tendency to obey circumstances, in impulsive behavior. This group of adolescents is characterized by manifestations of infantilism, uncontrollability of actions, imitation; 4 respondents (9.5%) are focused on selfish interests. In interaction with other people, they pursue the goal of satisfying personal needs and claims; 6 people (14.3%) have an *indefinite orientation*, equally expressed in the orientation towards cooperation and marginal orientation.

Carrying out a comparative analysis of the results of diagnosing before and after the conducting of behavior correction, one can note a change in the level of the egocentric orientation of the individual towards a decrease and an increase in the level of conflict resistance.

Based on the results, the sample can be conditionally divided into three groups:

- a group with a "conflict-free" model of behavior (47.6% of adolescents have a low level of egocentrism and a high level of conflict resistance);
- a group of "situationally" conflict adolescents (42.9% of adolescents have a low level of egocentrism and an average level of conflict resistance);
- "conflict" group (9.5% have minor changes in the level of egocentrism (medium), and the level of conflict resistance corresponds to a low level).

We have received results that testify to the positive dynamics of each of the studied indicators. The results are presented in Figures 1-6, which provide an indication of the effectiveness of the program. Figures 1 and 2 show that only in 4 adolescents the level of egocentrism and conflict resistance remained almost unchanged before and after the correctional program. For all other respondents, the level of egocentrism has significantly decreased, and the level of conflict resistance has increased.

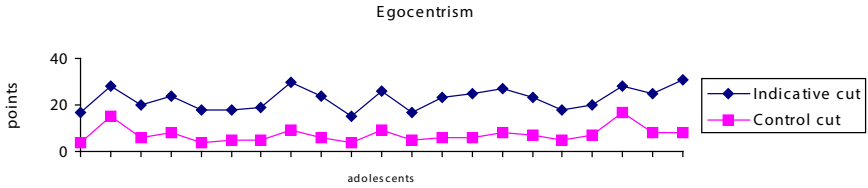


**Figure 1. Dynamics of the level of adolescent egocentrism**

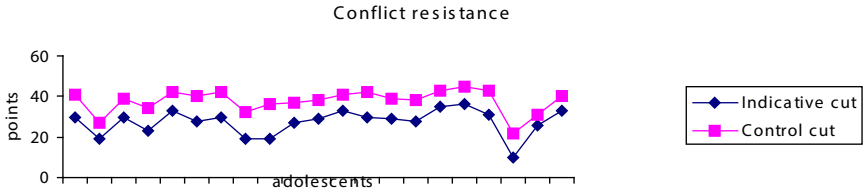


**Figure 2. Dynamics of conflict tolerance in adolescents**

A comparative analysis of the dynamics of the studied indicators in the subgroups of boys and girls is shown in Figures 3-6.

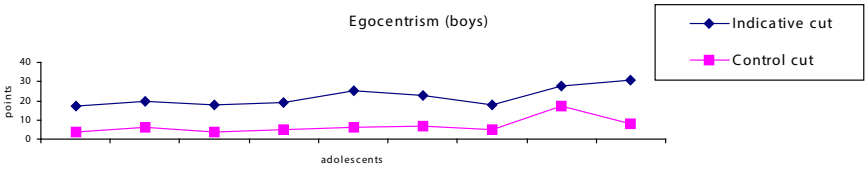


**Figure 3. Dynamics of the level of egocentrism of adolescent boys**

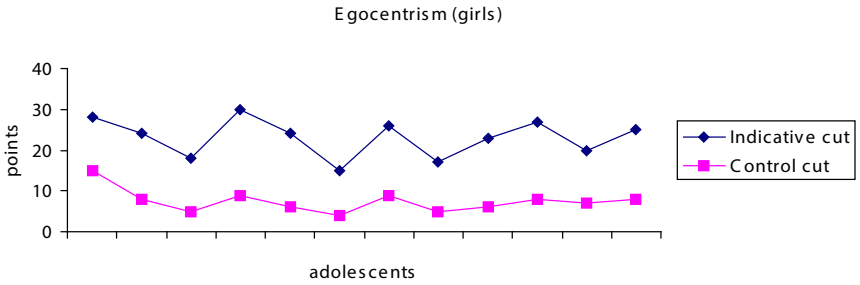


**Figure 4. Dynamics of the level of egocentrism of adolescent girls**

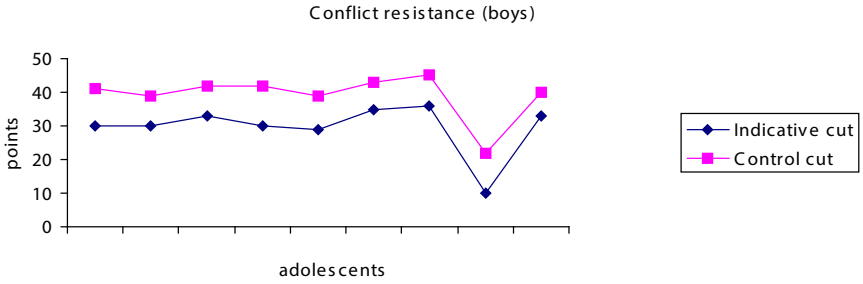


**Figure 5. Dynamics of conflict resistance of adolescent boys**

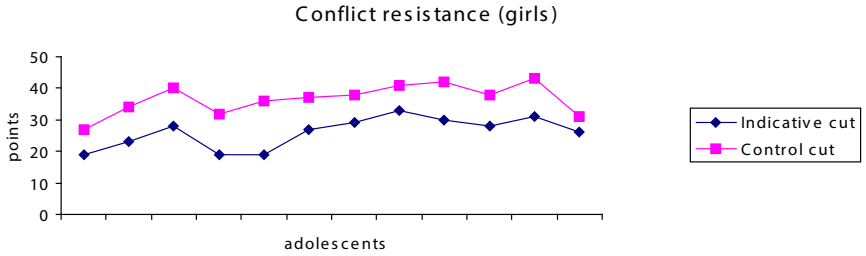


**Figure 6. Dynamics of conflict resistance of adolescent girls**

As a result of the study, we came to the following conclusions:

- in adolescence, the level of egocentrism is slightly higher in boys than in girls. In part, this difference can be explained by the greater desire of boys for self-assertion in early adolescence and their lower ability to decenter;

- the hypothesis was confirmed that a high level of personal egocentrism is a prerequisite for external and internal conflicts of the personality;

- Psychocorrection of teenagers' egocentrism, as determinants of conflict behavior, gives positive results, which reduces the likelihood of conflict behavior in teenagers.

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# AGE FEATURES OF INTENSIVE CARE FOR BURN TOXEMIA OF MODERATE SEVERITY IN CHILDREN

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**Abstract.** In infants, a relatively smaller area of burn injury 3B degree 0.3% with the same area as in older children burn area 2-3A degree (40%) caused a stressful, inflammatory reaction of the body as in the area of deep 3B degree (6.6% ) in children older than 7.1 years. A distinctive feature of intensive care in older children is a relatively more pronounced intensive therapy with painkillers and anti-inflammatory drugs, more intensive detoxification therapy, the need to administer 69.1±27 ml/day of albumin, amino acids, calories (as part of additional parenteral nutrition), cytoflavin due to a larger area of deep damage of 3 B degree in the older age group.

**Keywords:** intensive care, moderate burn toxemia, children.

**Relevance**

Due to the insufficient knowledge of the age-related characteristics of intensive care in the dynamics of burn toxemia of moderate severity in children [1-3], we tried, based on the results of monitoring hemodynamics and respiration, to assess the effect of treatment on the studied parameters of this category of patients.

**Purpose of the work**

To study and evaluate the age-specific features of intensive care for burn toxemia of moderate severity in children.

**Material and research methods**

This paper presents an attempt to give an objective assessment of the effect of the volume of intensive care in children on hemodynamic parameters depending on age. The severity of the burn was assessed by calculating the surface area of the damaged skin and using the Frank index. The severity of damage to the skin surface was assessed by the area of the burn 2-3A degree, 3B degree, the severity of the condition was assessed by IF (tab. 1). The studies were carried out with 100% physiological need provided by enteral administration throughout the entire period of

the study of burn toxemia. Intensive therapy from the moment of admission was aimed at removing from burn shock, adequate pain relief, timely correction of deviations in homeostasis parameters under the control of clinical, functional and biochemical parameters and intravenous administration of crystalloids, volemic and other solutions under the control of hemodynamics, diuresis volume. At the age of up to 7 years, the calculations were carried out according to the following formulas: SV=PBP*50/MBP, TPVR=SBP*5/CO*5 l/min. din. s. $cm^{-5}$, GAT=PBP*HR/4000 units At the age of over 7 years, the calculations were carried out according to the following formulas: SV=PBP*100/MBP, TPVR=SBP*5/CO*5 l/min. dyn.s.$cm^{-5}$, GAT=PBP*HR/3000 units.

**Results and discussion**

The monitoring data of the studied indicators of children with burn injury, who were in the ICU for less than 10 days, were studied.

**Table 1.**
**Characteristics of patients by age**

| Groups | Age | Number of patients | 2-3 A degree burn area,% | 3 B degree,% | IF, units | n/d ICU |
|---|---|---|---|---|---|---|
| 1 | 19.3±6.8 months | 15 | 32.7±9.8 | 0.3±0.1 | 33.4±10.1 | 6.8±1.8 |
| 2 | 4.7±0.8 years | 9 | 37.3±14.7 | 3.1±0.4* | 42.5±15.7 | 8.1±1.3 |
| 3 | 11.4±3.2 years | 12 | 41±11 | 6.6±0.9* | 57±11 | 7.3±1.1 |

As shown in table 1, survey data were studied in infancy (19.3 ± 6.8 months) up to 3 years in 15 patients, in the pre-preschool group (4.7 ± 0.8 years) 9 patients, at school age (11.4±3.2 years) 12 patients. There were no significant differences in the area of burns of 2-3A degrees, but a significantly significant difference was found between groups in the area of burns of 3B degrees. Thus, a 3B degree burn in group 2 was 3.1 ± 0.4% (increasing fold at the age of 3.1-7 years), in group 3 6.6 ± 0.9% (twenty times more than in infancy) ($p<0.05$, respectively). The absence of differences between the groups in the duration of intensive care, as well as the identified slight trend towards an increase in the severity of the condition according to IF, apparently, are due to age-related anatomical and physiological features of the stressful, systemic inflammatory response to burn injury. The results obtained confirm the idea of increased vulnerability of

body systems as age decreases, especially in infants, when the relatively minimal area of a 3 B degree burn injury in infants caused the same severe stress, inflammatory reaction in severity with a 20 times larger area of deep skin surface damage in children older than 7.1 years.

**Table 2.**
**Dynamics of blood pressure during toxemia**

| Days/ groups | SBP, mmHg | | | DBP, mmHg | | | PBP, mmHg | | | MBP, mmHg | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 100.2±5 | 99.9±4.2 | 112±3* | 56.9±3 | 58.7±3.8 | 63±2* | 43.3±4 | 4.1±2.7 | 48.5±2.5 | 78±4.1 | 79±4 | 87.4±2.5* |
| 2 | 100.3±4 | 104.0±1.3 | 116±2* | 59.1±4 | 59.0±1.2 | 65±1* | 41.2±3 | 44.9±1.3 | 50.2±1.6* | 79±4 | 81±1 | 90.9±1.4* |
| 3 | 100±8.4 | 103.4±1.1 | 115±1* | 57±3.8 | 61.0±0.9 | 65±1* | 42.9±6.3 | 42.5±1 | 50.3±1.3 | 78±6 | 82±0.8 | 90.5±1.5* |
| 4 | 99.7±6.5 | 103.3±1.3 | 115±2* | 58.2±2.9 | 61.3±1.7 | 66±1* | 41.5±4.9 | 42±1.3 | 48.0±1.8 | 78±4 | 82±1.4 | 90.7±1.0* |
| 5 | 102.3±5.1 | 104.9±1.3 | 113±2* | 59.1±3.5 | 61.4±1.3 | 64±1* | 43.2±3.5 | 43.4±1.6 | 49.8±2.6 | 81±4 | 83±1 | 87.9±1.8 |
| 6 | 103.1±5.3 | 106.3±1.4 | 114±1* | 58.1±2.7 | 63.5±1.4 | 65±1* | 45.0±4.7 | 42.8±1.7 | 48.8±1.7 | 80±3 | 84±1.2 | 89.5±1.0* |
| 7 | 104.5±4.3 | 106.8±1.4 | 114±2* | 60.4±2.2 | 61.8±1.6 | 66±2* | 44.1±4.5 | 45±2 | 48.2±1.8 | 82±3 | 84±1.2 | 83.7±3.6 |
| 8 | 105.5±5.4 | 107.1±2.3 | 122±3* | 60.5±2.1 | 61.1±1.7 | 65±2.3 | 45.0±4.0 | 46±2.5 | 57.5±4.8* | 83±4 | 84±1.5 | 78.3±1.5 |
| 9 | 106.6±1.5 | 106.4±1.5 | 126±5* | 57.8±1.1 | 64.2±1.6 | 70±2* | 48.8±0.8 | 42.2±1.8 | 56.1±5.3* | 82±1 | 85±1.4 | 69.0±2.8* |

Analysis of intergroup differences revealed a significant difference between the indicators of SBP, DBP, PBP, MBP in groups 1 and 3 (tab. 2).

**Table 3.**
**Changes in central and peripheral hemodynamics in age groups**

| Days | SV in 1 group | | | CO in 1 group | | | TPVR | | | MVP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 55.3±4.4 | 38.0±4.5* | 44.1±2.4* | 7.4±0.9 | 5.2±0.9 | 4.2±0.3 | 707±69 | 757±107 | 980±35 | 134±11 | 117±6 | 121±4 |
| 2 | 51.9±5.8 | 39.0±1.4 | 41.89±1.7 | 6.8±1.1 | 5.1±0.2 | 4.2±0.2 | 775±121 | 753±23 | 1029±28 | 131±9 | 116±2 | 125±2 |
| 3 | 52.6±4.1 | 35.6±1.2 | 42.91±0.8 | 7.2±0.7 | 4.6±0.2 | 4.1±0.1 | 715±78 | 830±31 | 993±42 | 136±11 | 112±2 | 125±2 |
| 4 | 52.5±4.2 | 33.7±1.1 | 41.4±1.5 | 7.3±0.7 | 4.5±0.2 | 3.9±0.2 | 703±60 | 838±49 | 1011±45 | 139±12 | 114±2 | 127±4 |
| 5 | 53.7±4.4 | 34.2±1.4 | 43.1±1.9 | 7.4±0.5 | 4.5±0.2 | 4±0.2 | 723±60 | 822±32 | 961±29 | 142±8 | 116±2 | 126±3 |
| 6 | 55.8±4.3 | 32.5±1.1 | 44.0±1.3 | 7.8±0.6 | 4.5±0.2 | 4.4±0.2 | 711±108 | 831±35 | 970±45 | 143±9 | 122±3 | 128±2 |
| 7 | 53.7±4.5 | 32.2±2 | 44.2±2.7 | 7.6±0.8 | 4.6±0.3 | 3.8±0.3 | 724±71 | 794±40 | 942±41 | 147±10 | 119±5 | 134±3 |
| 8 | 54.3±3.6 | 34.1±2.5 | 47.8±5.7 | 7.6±0.6 | 4.8±0.3 | 3.4±0.4 | 712±49 | 771±37 | 889±50 | 147±9 | 124±5 | 143±6 |
| 9 | 59.4±1.4 | 32.2±1.9 | 47.6±6 | 8.3±0.3 | 5.0±0.5 | | 661±22 | 825±47 | 871±72 | 147±2 | 124±2 | 173±10 |

During the period of toxemia, there were no significant differences in SV, CO, TPVR, MVP (tab. 3).

**Table 4.**
**Dynamics of autonomic regulation, respiration and heart rate during toxemia depending on age**

| Days | GAT, units | | | BR per minute | | | HR per minute | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 1.4±0.2 | 1.49±0.13 | 1.55±0.08 | 30±1 | 28.1±1.4 | 21.3±0.8 | 133±7 | 132±7 | 106±3 |
| 2 | 1.4±0.2 | 1.66±0.06 | 1.58±0.05 | 30±2 | 27.8±0.4 | 21.2±0.3 | 131±8 | 129±2 | 107±2 |
| 3 | 1.5±0.2 | 1.52±0.05 | 1.58±0.04 | 30±1 | 26.2±0.5 | 21.1±0.2 | 136±5 | 124±3 | 107±2 |
| 4 | 1.5±0.2 | 1.53±0.05 | 1.56±0.07 | 30±2 | 26.2±0.4 | 22.1±0.4 | 139±5 | 126±2 | 110±2 |
| 5 | 1.5±0.1 | 1.56±0.05 | 1.58±0.06 | 30±2 | 25.0±0.3 | 22.3±0.3 | 138±4 | 126±2 | 111±2 |
| 6 | 1.6±0.2 | 1.58±0.06 | 1.61±0.05 | 30±3 | 26.6±0.4 | 22.3±0.2 | 140±4 | 132±2 | 112±2 |
| 7 | 1.6±0.2 | 1.68±0.08 | 1.58±0.07 | 29±2 | 24.9±0.5 | 23.0±0.7 | 141±4 | 130±2 | 117±2 |
| 8 | 1.6±0.2 | 1.75±0.10 | 1.84±0.13 | 29±2 | 26.5±0.4 | 22.1±0.9 | 139±2.1 | 133±4 | 117±4 |
| 9 | 1.7±0.3 | 1.62±0.08 | 2.15±0.25 | 28±1 | 25.6±0.7 | 23.8±0.7 | 139±2 | 133±4 | 130±5 |

In all age groups, during the period of toxemia, a hypersympathotonic orientation of the function of the autonomic nervous system was noted by 50-60%. Increased respiration and HR of a predominantly compensatory nature (tab. 4) prevailed in group 1, corresponding to the anatomical and functional features of the stress response in infants.

**Table 5.**
**Age features of infusion therapy**

| Days | Kilocalories | | | Amino acids per ml | | | Protein solutions, ml | | | Volume of daily infusion, ml | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 108.6±38 | 107.5±32 | 293±122 | 0 | 0 | 70.8±18 | 17.3±3 | 0 | 25.4±6. | 880±270 | 1387.5 ±296.9 | 2657 ±862 |
| 2 | 117.9±47 | 160.0±17 | 280±150 | 97.1±7.1 | 108.9 ±145.2 | 129±150 | 0 | 0 | 69.2±9.2 | 846±195 | 1478.3 ±290.7 | 2813 ±886 |
| 3 | 131.4±50 | 140.0±44 | 233±92 | 104.6±76. | 213.3 ±100.7 | 258±184 | 42.5±8 | 79.4±53 | 150±133 | 873±245 | 1626.7 ±334.4 | 2487 ±755 |
| 4 | 138.3±54 | 151.1±43 | 196±108 | 150.8±7.2 | 285.6 ±55.3 | 357±141 | 0 | 100.0±46 | 40±16 | 859±208 | 1274.0 ±166 | 2267 ±629 |
| 5 | 141.8±64 | 153.3±50 | 261±99 | 168.6±66 | 272.2 ±63.5 | 313±169 | 26.4±8 | 62.8±69 | 96±15 | 893±238 | 1460.6 ±204 | 2203 ±609 |
| 6 | 135.6±56 | 168.6±86 | 210±75 | 181.1±54. | 178.6 ±132.7 | 381±98 | 32.8±4 | 35.0±50 | 66±6 | 868±213 | 1315.0 ±281 | 2260 ±577 |
| 7 | 187.5±87 | 156.7±82 | 148±19 | 173.8±70. | 208.3 ±125.0 | 355±134 | 13.6±3 | 15.8±26 | 40±6 | 863.8±170 | 1206.7 ±293 | 2070 ±544 |
| 8 | 177.1±88 | 184±86 | 160±20 | 155±68 | 300±80 | 466±44.4 | 17.9±3 | 0 | 66.7±8.9 | 818.6±180 | 1268 ±255.6 | 2506 ±471 |
| 9 | 106.7±35 | 226.7±115 | | 203.3±31. | 333.3 ±111.1 | | 0 | 63.3±42 | | 878.3±278 | 1381.7 ±342 | |

**Table 6.**
**Age features of intensive care in children with burn toxemia of moderate severity**

| Days | multiplicity of anesthesia | | | anti-inflammatory | | | heparin | | | antibiotics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 4.6±1.7 | 6.5±2.1 | 8.3±2.0 | 4.7±1.6 | 6.6±2.5 | 9.7±2.4 | 2.7±0.8 | 1.9±0.9 | 3.1±0.8 | 2.1±0.5 | 1.8±0.6 | 2.3±0.9 |
| 2 | 4.2±1.3 | 8.2±3.0 | 7.5±2.9 | 4.7±1.7 | 7.9±3.7 | 7.1±2.4 | 3.4±1.0 | 3.6±0.7 | 4.0±0.3 | 2.0±0.3 | 3.2±1.0 | 2.9±0.8 |
| 3 | 5.1±1.5 | 7.7±1.8 | 7.8±3.1 | 4.9±1.3 | 6.9±2.3 | 7.4±2.1 | 3.7±0.6 | 3.1±1.2 | 3.9±0.3 | 2.6±0.9 | 3.7±0.9 | 2.8±1.0 |
| 4 | 5.6±1.9 | 7.3±1.9 | 7.6±1.9 | 5.3±1.3 | 6.1±3.0 | 7.4±2.5 | 3.5±0.8 | 2.9±1.3 | 3.5±1.0 | 2.8±0.8 | 3.8±0.9 | 2.8±1.0 |
| 5 | 5.4±2. | 6.4±2.3 | 8.1±3.2 | 5.7±1.6 | 6.0±2.2 | 7.5±2.1 | 3.3±0.9 | 3.1±1.4 | 3.8±0.4 | 2.9±0.8 | 3.4±1.1 | 3.0±1.3 |
| 6 | 5.3±1. | 7.1±2.1 | 8.1±2.1 | 5.2±1.8 | 6.0±2.9 | 7.8±2.1 | 3.3±0.9 | 2.3±1.3 | 3.9±0.2 | 3.3±0.7 | 4.3±0.6 | 3.4±1.4 |
| 7 | 5.1±1. | 5.8±2.2 | 6.6±1.9 | 5.0±1.3 | 3.8±1.9 | 7±1.6 | 3.6±0.6 | 2.3±1.7 | 3.2±0.9 | 2.9±1.4 | 3.8±0.9 | 2.8±1.3 |
| 8 | 5.3±1.3 | 4.4±1.12 | 9.3±4.4 | 4.7±1.7 | 3.8±1.52 | 8.3±1.1 | 3.4±0.5 | 3±1.2 | 4.0±1.0 | 3.1±0.7 | 3.8±1.0 | 3.3±0.9 |
| 9 | 4.3±1.8 | 5.3±0.9 | | 4.7±1.8 | 3.3±0.9 | | 4.0±0.1 | 3.0±2.0 | | 3.0±1 | 4.7±1.8 | |

**Table 7.**
**Age features of vasoactive and metabolic therapy in children with burn toxemia of moderate severity**

| Days | vasodilators | | | dopamine | | | cytoflavin | | | vitamin C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 2.1±0.6 | 2.4±1.5 | 3.3±1.0 | 0.2±0.1 | 0.4±0.2 | 0.3±0.1 | 0 | 0 | 0 | 1.5±0.6 | 1.1±0.7 | 1.2±0.7 |
| 2 | 2.4±1.4 | 3.8±1.4 | 3.2±1.2 | 0.2±0.1 | 0.4±0.2 | 0.5±0.1 | 1.6±2.1 | 1.7±2.6 | 1.7±0.8 | 2.4±0.6 | 2.3±1.0 | 2.0±0.7 |
| 3 | 2.8±1.1 | 3.9±1.5 | 3.0±1.3 | 0.3±0.1 | 0.3±0.1 | 0.5±0.2 | 2.1±0.8 | 2.8±1.7 | 4.2±1.6 | 2.4±1.1 | 2.6±0.7 | 2.4±1 |
| 4 | 2.7±1.6 | 3.8±1.2 | 3.2±1.0 | 0.2±0.1 | 0.2±0.1 | 0.4±0.1 | 1.5±0.9 | 2.2±1.0 | 4.5±1.5 | 2.3±0.7 | 2.3±0.7 | 2.3±1.0 |
| 5 | 2.8±1.8 | 4.0±1.3 | 3.1±1.4 | 0.2±0.1 | 0.4±0.1 | 0.3±0.1 | 1.1±01 | 2.2±1.0 | 5.5±1.0 | 2.4±0.8 | 2.7±0.7 | 2.8±1.4 |
| 6 | 3.6±1.5 | 4.4±1.2 | 3.5±1.1 | 0.2±0.1 | 0.6±0.1 | 0.3±0.1 | 0.8±0.3 | 2.1±1.1 | 6.9±1.9 | 2.0±0.4 | 2.1±1.0 | 3.5±1.1 |
| 7 | 3.4±1.1 | 3.8±1.2 | 2.8±0.6 | 0.4±0.1 | 0.3±0.1 | 0 | 0.6±0.1 | 0 | 2±0.3 | 1.8±0.8 | 2.0±1.0 | 2.2±0.8 |
| 8 | 3.1±1.0 | 4.2±1.12 | 3.3±1.8 | 0.3±0.1 | 0.4±0.1 | 0 | 0 | 0 | 3.3±0.4 | 1.9±0.5 | 1.6±0.48 | 2.3±1.8 |
| 9 | 3.3±0.9 | 4.3±1.8 | | 0.7±0.3 | 0.3±0.1 | | 0 | 0 | | 1.3±0.4 | 2.0±0.7 | |

As shown in Table 8, the hallmarks of age were the daily volume of infusion therapy, which in group 1 was 864 ± 15 ml per day, in group 2 - 500 ml/day more and in group 3 - 1600 ml more than in infancy. The revealed differences are due not only to age-related features, but also to a relatively more severe injury from a 3B degree burn, a 73% ($p<0.05$) greater IF value than in group 1. It is a more severe burn that can explain the significantly greater frequency of administration of painkillers in group 2 by 32% ($p<0.05$), in group 3 by 61% ($p<0.05$) (tab. 6). A more extensive anti-inflammatory therapy in group 3 by 61% ($p<0.05$) serves as confirmation. Draws attention to almost the same amount of antibiotic therapy, the introduction of vasodilators, dopamine, heparin, metabolic therapy (tab. 6.7). Thus, a distinctive feature of intensive care in older children was a

relatively more pronounced intensive therapy with painkillers and anti-inflammatory drugs, more intensive detoxification therapy (parenteral administration 2107±207 ml per day) (fig. 3), the need to administer 69.1±27 ml/days of albumin 10-20% solutions (fig. 2), amino acids (fig. 1), calories (as part of additional parenteral nutrition), cytoflavin (fig. 7) due to the larger area of deep damage of 3 B degree in older age groups (tab. 5, 8).

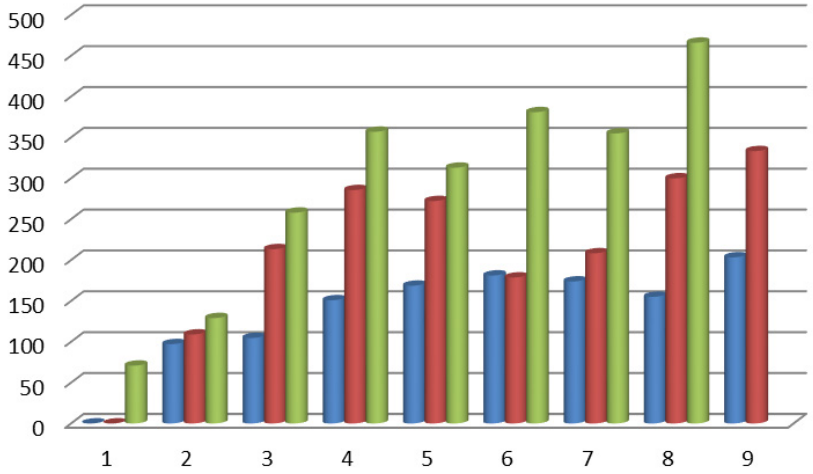


**Figure 1. Administered amino acids in ml/day**

**Table 8.**
**Mean rates of intensive care during the period of acute toxemia depending on age**

| Groups | kilocalories | amino acids | protein solutions | intravenous infusion, ml/day | anesthesia | anti-inflammatory | heparin | AB | vasodilators | dopamine | cytoflavin | vitamins |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 138±20 | 137±46 | 16.7±11 | 864±15 | 4.9±0.4 | 4.9±0.3 | 3.4±0.2 | 2.7±0.3 | 2.9±0.4 | 0.3±0.1 | 0.8±0.6 | 2±0.3 |
| 2 | 160±21 | 211±77 | 39.5±32 | 1377±99* | 6.5±0.9* | 5.6±1.3 | 2.8±0.4 | 3.6±0.5 | 3.8±0.4 | 0.3±0.1 | 1.2±1.1 | 2.0±0.4 |
| 3 | 222±44* | 291±104* | 69.1±27* | 2407 ±207* | 7.9±0.5* | 7.7±0.6* | 3.6±0.3 | 2.9±0.2 | 3.1±0.2 | 0.2±0.1 | 3.5±1.8* | 2.3±0.4 |

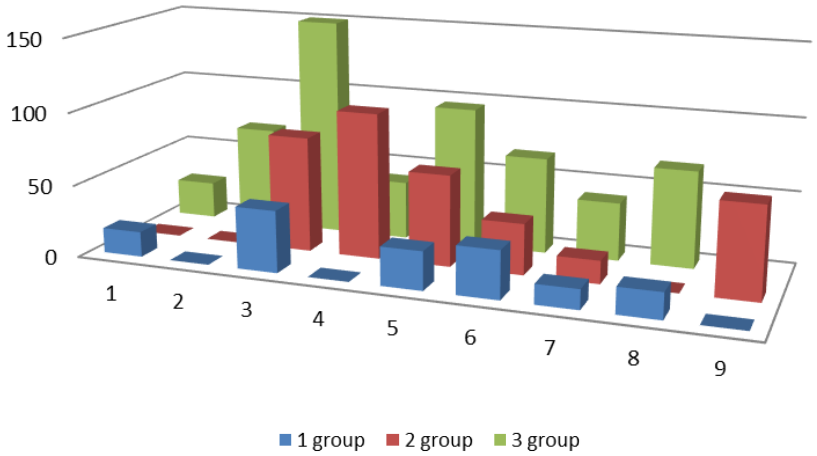


**Figure 2. Protein solutions in ml/day**

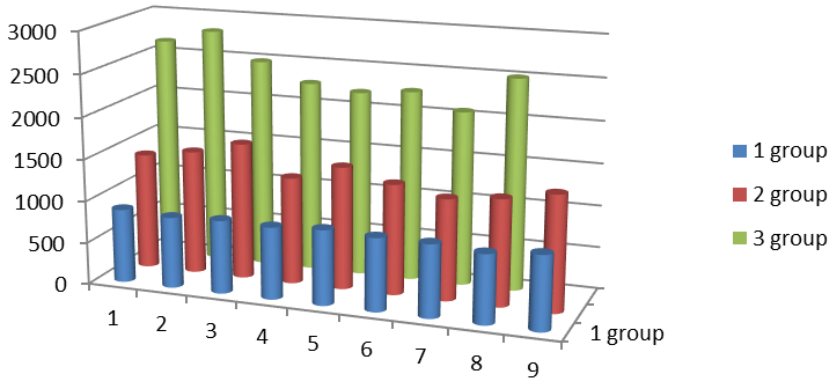


**Figure 3. Volume of intravenous infusion, ml/day**

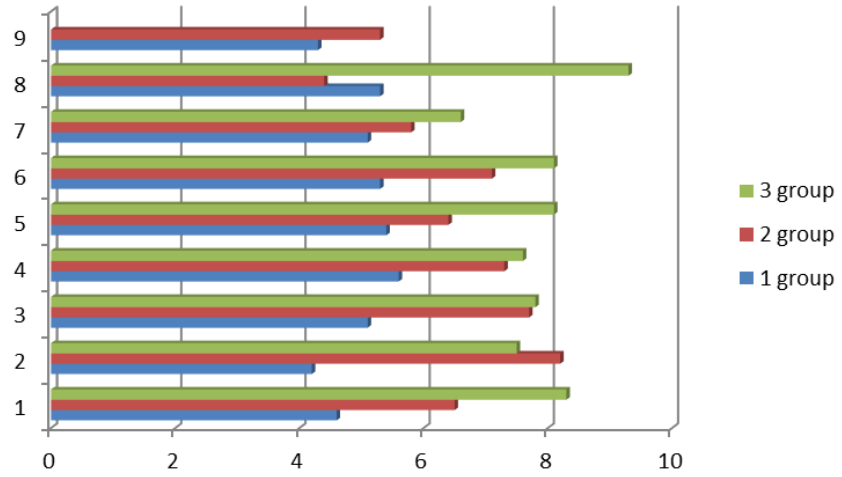


**Figure 4. Multiplicity of anesthesia**

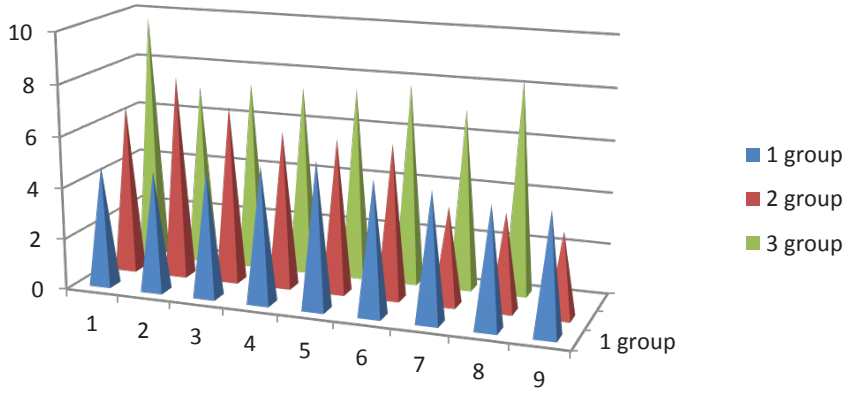


**Figure 5. Anti-inflammatory**

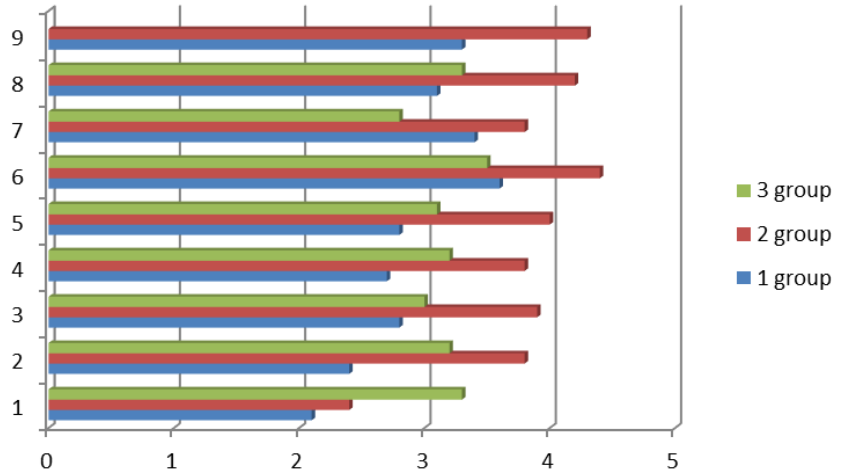


**Figure 6. The frequency of administration of vasodilators**

Slightly more vasodilators were administered to patients aged 3.1-7 years and less than in other groups, vasodilators were used in infancy. The revealed trend, apparently, can be explained by the anatomical and physiological features of the circulatory system in preschool children. The period of intensive growth and complication of the reactions of cardiovascular regulation probably explains the more pronounced tendency to vasospasm at this age (fig. 6).

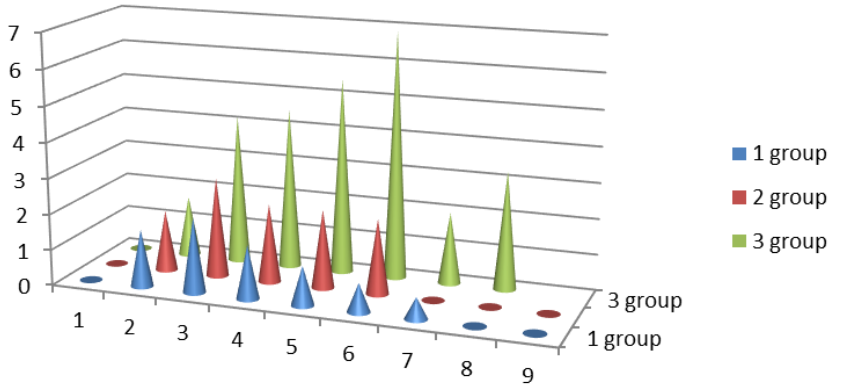


**Figure 7. Cytoflavin in ml/day**

**Conclusion**

The relatively smaller area of 3 B degree burn injury of 0.3% in infants with the same area of 2-3A degree burns (40%) as in older children caused the same severe stress, an inflammatory reaction as with a 20 times larger area of deep 3B degree of damage to the skin surface in children older than 7.1 years. A distinctive feature of intensive care in older children is a relatively more pronounced intensive therapy with painkillers and anti-inflammatory drugs, more intensive detoxification therapy, the need to administer 69.1±27 ml/day of albumin, more amino acids, calories (as part of additional parenteral nutrition), cytoflavin due to a larger area of deep damage of 3 B degree in older age groups.

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# INTENSIVE CARE FOR BURN TOXEMIA IN CHILDREN WITH VERY SEVERE BURN INJURY

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**Abstract.** At the age of up to 3 years, the need for intensive care with a burn area of 2-3A degree is 24.8±7.4%, 3B degree - 9±2.8%, the need for intensive care was 12.8±1.3 days, as in older groups with a burn area of 2-3A degree 47.9±17.1% and 55.1±14.4%. The trend towards an increase in the amount of administered proteins is due to the comparatively larger area of the skin surface affected by a 3B burn (18.1±12.2%) in group 2 than in groups 1 and 3. An increase in the administration of painkillers on days 5-7 was associated with both the peak of the systemic inflammatory reaction and delayed necrectomy. According to the number of types of solutions, the amount of glucose administered, the frequency of administration of therapeutic doses of painkillers, anti-inflammatory drugs, AB, heparin, vitamin C, cytoflavin, vasodilators, dopamine, the number of protein media, no age differences were found.

**Keywords:** intensive care, burn toxemia in children, severe burn.

## Relevance

The authors showed that the period of toxemia (the first 14 days after a burn injury) is characterized by a high risk of developing MODS (in the first 4 and 7-13 days of illness) in children. Maintaining a polyuria regimen with adequate replacement of electrolytes and energy substrates makes it

possible to exclude more radical, but more traumatic for young children, detoxification methods (hemosorption, plasmapheresis, etc.). With the ineffectiveness of infusion therapy, vasopressors (Norepinephrine) are used. In severe burns (more than 30% of the body surface), an additional 4% sodium bicarbonate solution is prescribed until an alkaline urine reaction is achieved. Albumin infusion is prescribed when the level of serum albumin drops below 20-25 g/l. The approximate volume of the transfused liquid is 20-60% of the volume of the first day. The next day - according to the general principles of infusion therapy. It is necessary to carry out early nutrition, if possible, through the mouth. The appointment of broad-spectrum antibiotics (preferably non-nephrotoxic) is indicated: in URT burns; in conducting ALV; during surgical interventions; in case of purulent complications. The inclusion of colloidal solutions in the composition of infusion therapy already on the first day. It has been shown that the inclusion of vitamin C in the therapy can reduce vascular permeability and the need for infusion by approximately 30-45%. Vitamin C is administered at a rate of 66 mg/kg/h continuously during the first day [1-3]. Due to the lack of information on daily monitoring of the volume of intensive care, we tried to study and evaluate the age-related characteristics of the treatment of burn toxemia in children with the duration of intensive care in the ICU from 11 to 20 days.

**Purpose of the work**

To study and evaluate the age characteristics of intensive care for burn toxemia in children with very severe burn injury.

**Material and research methods**

The clinical material is presented by the data of daily monitoring of the volume of intensive care in 21 children admitted to the Republican scientific center for emergency medical aid (RSCEMA) due to thermal burns in three age groups: at the age of up to 3 years (6) the average area of burns 2-3A degree 24.8±7.4%, 3B degree 9±2.8%, IF. 48.4±11.28 units, pre-school age (group 2-8) burn area 2-3A degree 47.9±17.1%, 3B degree 9±2.8%, IF. 48.4±11.28 units; of school age (3rd group of 7 children) 2-3A degree 55.1±14.4%, 3B degree 4.8±3.5%, IF 86.3±15.7 C.U. The duration of intensive care in ICU conditions in group 1 was 12.8±1.3 days, in group 2 - 13.1±1.9, in group 3 -12.7±1.1 days (tab. 1). The studies were carried out with the provision of 100% physiological need by enteral administration throughout the entire period of study of the studied indicators of burn toxemia.

**Results and discussion**

**Table 1.**
**Characteristics of patients**

| Groups by age | Number of patients | Age | Height, cm | Weight, kg | 2-3 A degree burn area,% | 3 B degree, % | IF, units | Days in hospital | Days in the ICU |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9 | 14.2 ±4.6 months | 79.7 ±5.7 | 10.1 ±1.9 | 24.8 ±7.4 | 9±2.8 | 48.4 ±11.28 | 41.6 ±10.2 | 12.8 ±1.3 |
| 2 | 8 | 4.0±0.1 years | 103.5 ±8.3 | 16.6 ±2.4 | 47.9 ±17.1 | 18.1 ±12.2 | 85.1 ±28.7 | 49.9 ±16.9 | 13.1 ±1.9 |
| 3 | 7 | 15±2 years | - | - | 55.1 ±14.4* | 4.8±3.5 | 86.3 ±15.7* | 38±12 | 12.7 ±1.1 |

*-significant relative to the indicator in group 1

According to the data presented in table 1, attention is drawn to the fact that, with a two times smaller burn area in infancy (group 1), there was a need for intensive care for 12.8±1.3 days, as in older groups with a burn area of 47.9±17.1% and 55.1±14.4% (tab. 1). The treatment was evaluated taking into account the number of calories (glucose), the volume of parenteral fluid administration, the number of types of solutions, the frequency of administration of therapeutic doses of painkillers, including sedatives, anti-inflammatory drugs, antibiotics (A/B), heparin, amino acids per ml/day, fat emulsions, vitamin C frequency of administration, cytoflavin ml/day, vasodilators, frequency of administration, dopamine, proteins ml/day (tab. 2).

Age-related significant differences were found in the daily volume of intravenous infusion. Thus, intravenous administration in group 2 was 70%, in group 3 194% more than in group 1 ($p<0.05$, respectively). The amount of amino acids administered in group 2 was 91% more, in group 3 - 276% more than in the first ($p<0.05$). According to the number of types of solutions, the amount of glucose administered, the frequency of administration of therapeutic doses of painkillers, anti-inflammatory drugs, AB, heparin, vitamin C, cytoflavin, vasodilators, dopamine, the number of protein media, no age differences were found. Apparently, the trend towards an increase in the amount of administered proteins in group 2 relative to that in patients in group 3 is due to the comparatively larger area of the skin surface affected by a 3B burn 18.1±12.2% in group 2 than in groups 1 and 3. That

is, burn damage of the 3B degree caused more pronounced losses of the protein part of the blood, which required immediate replenishment of the deficiency, correction of hypoproteinemia. At the same time, it seems expedient to increase the administration of Cytoflavin, vitamin C in the 2nd group of children (tab. 2).

**Table 2.**
**Intensive care volume**

| Drugs | Group 1 | Group 2 | Group 3 |
|---|---|---|---|
| **Kilocalories (glucose)** | 169.1±39.1 | 140.4±16.8 | 215.4±29.5 |
| Volume of parenteral administration | 802.1±76.5 | 1364.4±230.6* | 2359.2±413.8* |
| Number of types of solutions | 4.0±0.4 | 4.6±0.3 | 5.0±0.4 |
| Anesthesia | 7.7±1.0 | 8.0±0.5 | 9.6±1.4 |
| Anti-inflammatory | 6.5±0.6 | 7.5±0.7 | 8.2±0.9 |
| A/B | 3.3±0.8 | 2.7±0.5 | 2.6±0.6 |
| Heparin, multiplicity of administration | 3.5±0.5 | 3.5±0.5 | 3.7±0.4 |
| Amino acids in ml/day | 124.3±39.0 | 236.7±42.3* | 467.3±117.1* |
| Fat emulsion, ml/day | 0.0 | 4.8±7.6 | 8.2±13.4 |
| Vitamin C multiplicity | 2.1±0.4 | 2.1±0.3 | 2.8±0.7 |
| Cytoflavin ml/day | 2.1±1.4 | 0.8±0.7 | 7.5±3.9* |
| Vasodilators | 3.5±0.5 | 4.7±0.7 | 3.5±1.0 |
| Dopamine | 0.2±0.2 | 0.5±0.2 | 0.3±0.3 |
| Proteins, ml/day | 12.0±12.0 | 56.8±29.7 | 29.4±22.2 |

*-the difference is significant relative to the indicator in group 1

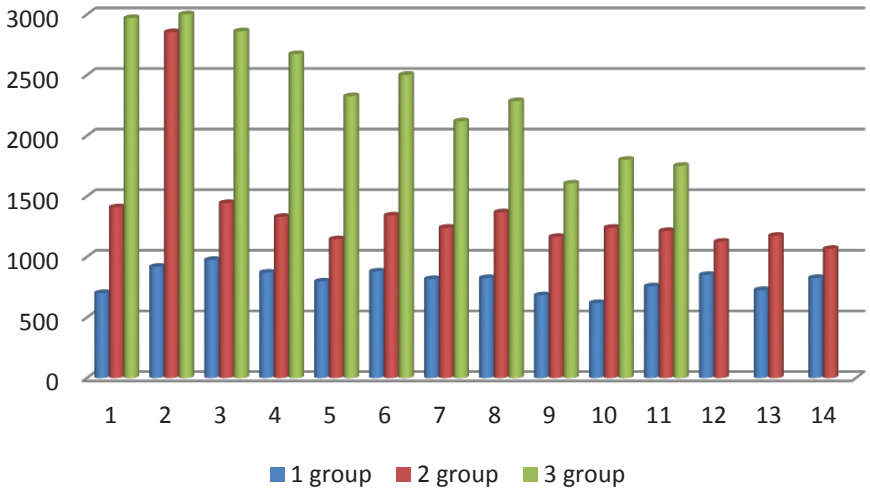


**Figure 1. Parenteral infusion therapy in ml/day**

As shown in fig. 1, the largest volume of infusion therapy in the first three days was gradually reduced to 1500 ml/day on day 11 in children of the 3rd group. Only in the 2nd group on the 2nd day was 2800 ml, in the following days decreasing to 1200 ml/day. In group 1, the volume of intravenous administration did not exceed 800 ml/day throughout the entire period of toxemia.

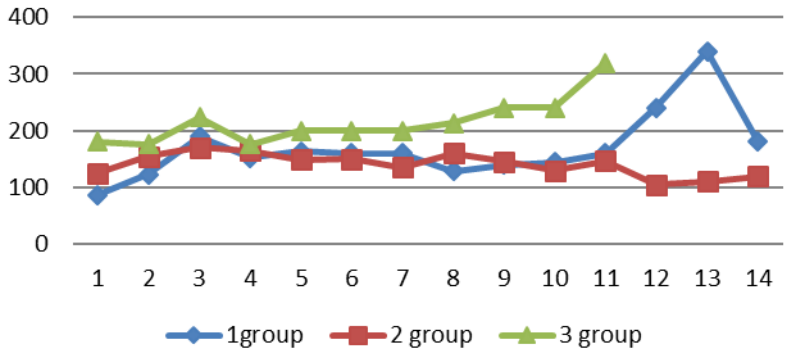


**Figure 2 . Kilocalories/day**

Despite the trend towards a decrease in the volume of parenteral administration in groups 3 and 1, at the beginning of the second week of toxemia, there was a tendency to increase the parenteral calorie intake (fig. 2).

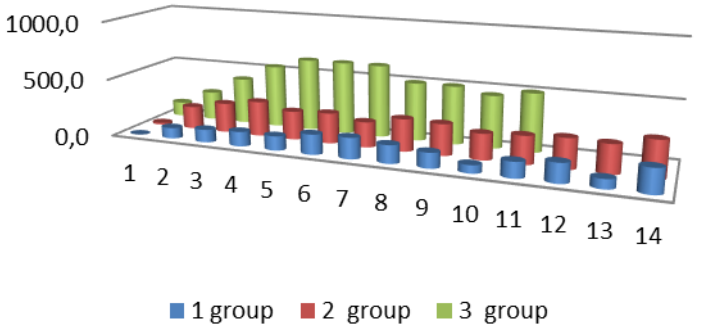


**Figure 3. Amino acids in ml/day**

Starting from the second day after the injury, children of groups 1 and 2 received a limited amount of amino acid solutions, in group 1 about 100 ml, in group 2 - an average of 236.7±42.3 ml/day, in group 3 - 467.3±117.1 ml/day. There was a tendency to increase the volume of amino acid administration on days 5-8 in the 3rd group of children (fig. 3).

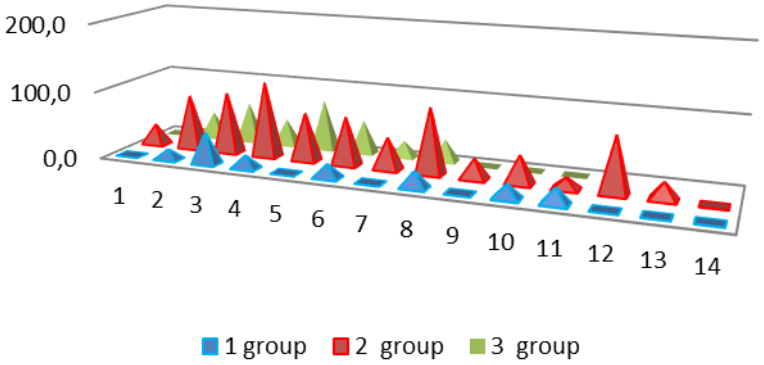


**Figure 4. Proteins in ml/day**

The amount of parenterally administered proteins in group 2 was slightly higher than in group 3 on days 2-8 (fig. 4).

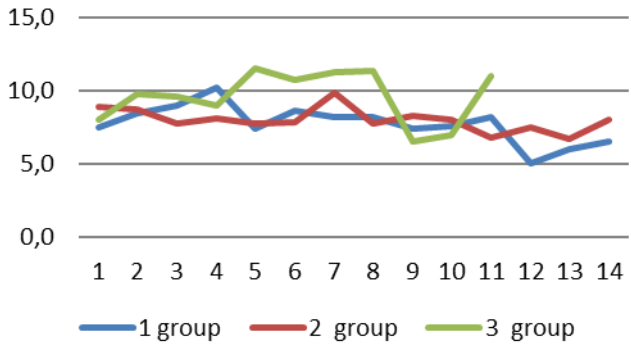


**Figure 5. Frequency rate of anesthesia per day**

In the older group 3, the highest frequency of administration of painkillers was on days 5-8, in group 2 on day 7, in group 1 on day 4 (fig. 5). An increase in the administration of painkillers was associated with both the peak of the systemic inflammatory response and delayed necrectomy.

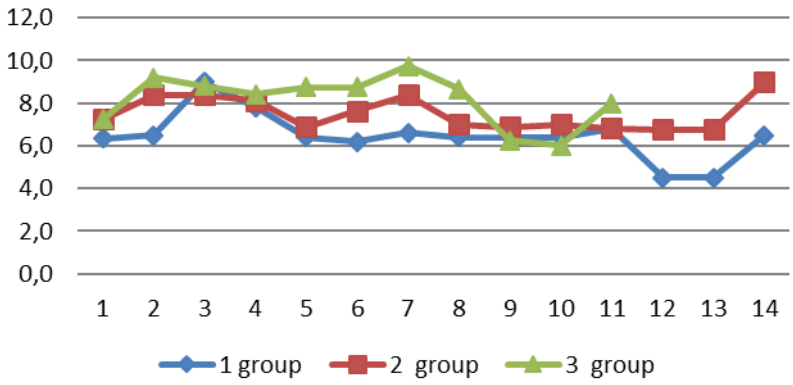


**Figure 6. Anti-inflammatory**

Relatively constant during the first two weeks of toxemia was the frequency of administration of anti-inflammatory drugs, no age differences

were found (fig. 6), a tendency to decrease was noted in group 1 of children.

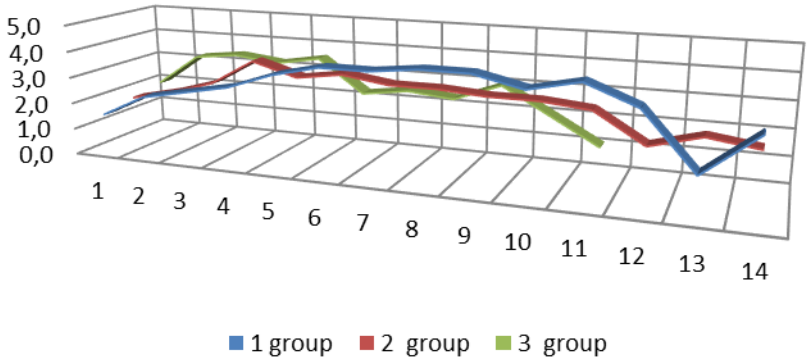


**Figure 7. A/B, frequency of administration per day**

No significant age differences were found in the dynamics of the administration of antibacterial drugs (fig. 7).

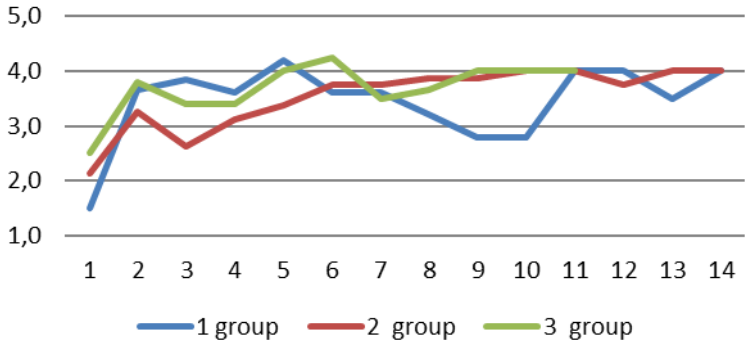


**Figure 8. Heparin, frequency of administration**

All patients received anticoagulant therapy stable in terms of frequency of administration (fig. 8).

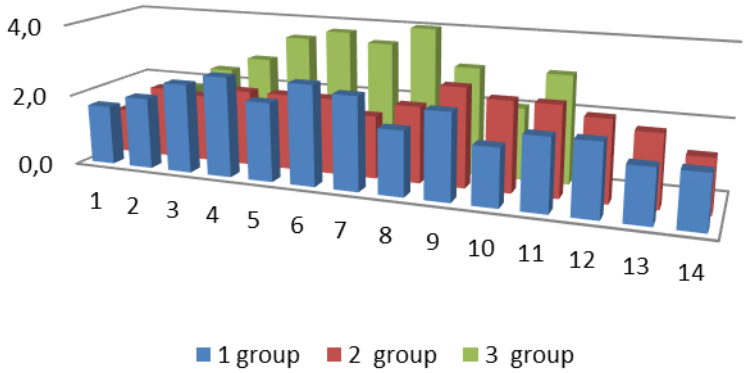


**Figure 9. Vitamin C, frequency of administration per day**

The tendency to increase the frequency of vitamin C administration in group 3 on days 6-8, while in children of groups 1 and 2, the volumes of vitamin therapy did not differ (fig. 9).

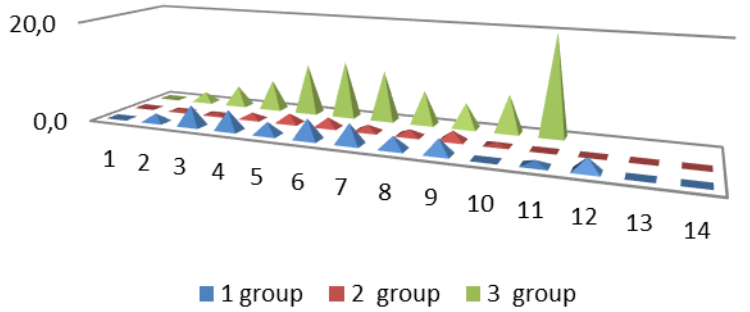


**Figure 10. Cytoflavin, ml/day**

The insufficiently adequate use of Cytoflavin in all burned patients, especially in children under 7 years of age, draws attention (fig. 10).

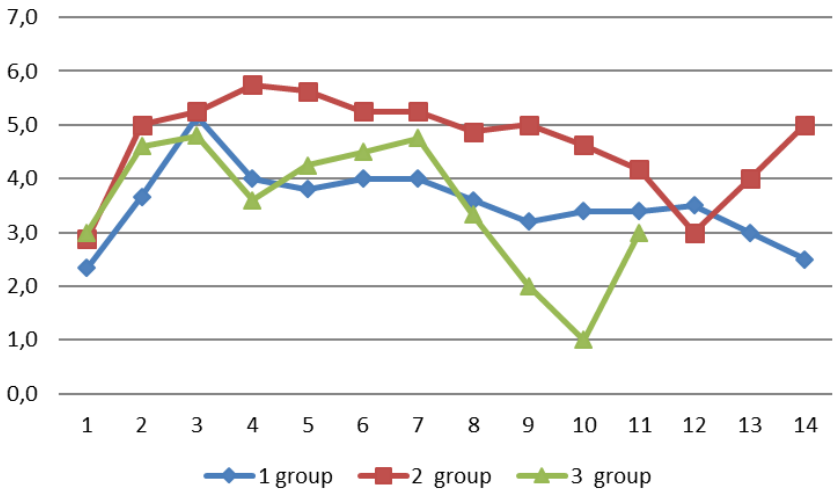


**Figure 11. Vasodilators, multiplicity of administration**

During the first two weeks of toxemia, all burned patients received moderate vasodilatory therapy (fig. 11).

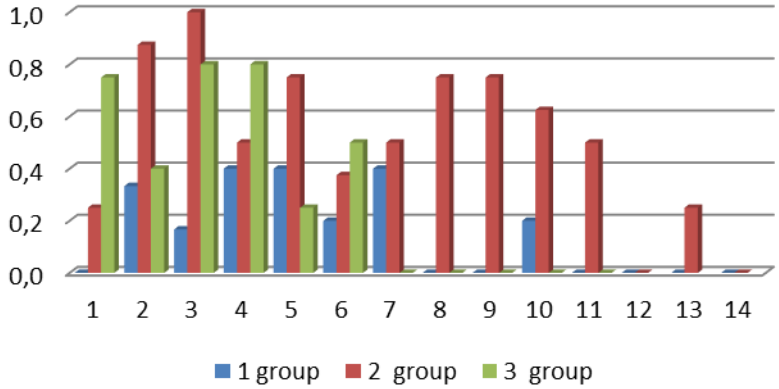


**Figure 12. Dopamine, frequency of administration per day**

The greatest need for vasopressor, cordiotonic support was needed by children of the 2nd group due to the largest area of a 3 B degree burn, which amounted to 18.1±12.2% (fig. 12).

**Conclusion**

At the age of up to 3 years, the need for intensive care with a burn area of 2-3A degree is 24.8±7.4%, 3B degree - 9±2.8%, the need for intensive care was 12.8±1.3 days, as in older groups with a burn area of 2-3A degree 47.9±17.1% and 55.1±14.4 %. The trend towards an increase in the amount of administered proteins is due to the comparatively larger area of the skin surface affected by a 3B burn 18.1±12.2% in group 2 than in groups 1 and 3. An increase in the administration of painkillers on days 5-7 was associated with both the peak of the systemic inflammatory reaction and delayed necrectomy. According to the number of types of solutions, the amount of glucose administered, the frequency of administration of therapeutic doses of painkillers, anti-inflammatory drugs, AB, heparin, vitamin C, cytoflavin, vasodilators, dopamine, the number of protein media, no age differences were found.

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# EPIGENETIC MARKERS IN PSYCHIATRY: POSSIBLE PRACTICAL APPLICATIONS IN THE NEAR FUTURE

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**Summary.** Mental disorders are clinically heterogeneous chronic diseases resulting from complex interactions between genotype variants and environmental factors. Epigenetic processes, such as DNA methylation and post-translational histone modification, determine the interpretation by the body at the cellular and tissue levels of various environmental factors. Given that epigenetic modifications are environmentally sensitive, stable and reversible, epigenetic research in psychiatry may be a promising approach to better understanding and treating mental illness. This review discusses the clinical opportunities and challenges posed by epigenetic research in psychiatry. Using individual examples, the main conclusions are drawn that confirm the role of adverse life events, alone or in combination with genetic risk, in the epigenetic programming of neuropsychiatric systems. Further epigenetic studies show encouraging results in the use of methylation changes as diagnostic markers of disease manifestations and provide predictive tools for assessing progression and response to treatment. The potential for the use of targeted epigenetic

pharmacotherapy, combined with psychosocial methods, in the context of the personalized medicine of the future in psychiatry is discussed next. It concludes with a discussion of methodological limitations that can make it difficult to interpret epigenetic data in psychiatry. They mainly arise due to the heterogeneity of individuals, both at the level of the whole organism and at the level of tissues, and require new strategies to better assess the biological significance of epigenetic data and their translational use in psychiatry. Overall, we believe that epigenetics can provide new insights and a more comprehensive understanding of the etiology and pathogenesis of mental illness, and should ultimately improve the nosology, treatment and prevention of mental disorders.

**Keywords:** biological psychiatry, biomarkers, epigenetics, pharmacotherapy, psychosocial therapy.

**Introduction**

Mental illnesses are multifactorial disorders resulting from a complex interaction between genetic and non-genetic environmental factors that lead to a wide range of diseases ranging from neuroendocrine and neuroinflammatory processes to structural and functional abnormalities of neurotransmission in certain areas of the brain [1]. Because of these heterogeneous causes, clinicians face daily nosological and therapeutic problems associated with the diagnosis and treatment of psychiatric patients, not least the inconsistent efficacy and serious side effects of antipsychotic drugs. Given the multifactorial nature of mental disorders, clinical heterogeneity (etiological and symptomatic), as well as the degree of effectiveness of various therapeutic agents (pharmacological, psychosocial, etc.), personalized approaches are required for the most adequate management of patients with mental disorders.

Data from family studies confirm that the development of severe mental illnesses such as schizophrenia (SCZ), bipolar disorder (BD) or unipolar major depressive disorder (MDD) are caused by the joint inheritance of susceptibility genes with an assessment of the role of hereditary factors in the etiology of SCZ and BD in the range of 70- 80% [2] and depression - from 48 to 75% [3]. However, most of these data are insufficient to determine the relative roles of genes and environmental factors in early development, which may lead to a reassessment of the role of heredity in the etiology of the disease. Genome-wide association studies (GWAS) conducted in large case-control cohorts have identified specific single nucleotide polymorphisms (SNPs) associated with psychiatric phenotypes at the population level, most of which are common to these diseases [4]. These

studies confirm a polygenic model with many common variants, each of which, however, individually has a very modest effect. This suggests that only a limited part of the etiology of the disease can be explained genetic causes compared, for example, with the degree of heritability in twins [4]. A significant gap in structural heritability for some severe diseases such as SCZ and BD indicates a "hidden" heritability that may be partly driven by non-genetic factors such as gene-environment interactions. Extensive epidemiological studies have identified a large number of influencing environmental factors in the perinatal period, childhood and adult stages of human life [5]. Additional environmental parameters such as natural and social environment, life difficulties, duration of exposure, and time frame (single or chronic) of both adverse and favorable factors likely explain the interpersonal heterogeneity of life paths. Notably, individual sensitivity to environmental factors may, at least in part, be influenced by genetic factors, whereby genotypes may exacerbate or mitigate the effects of environmental susceptibility [6]. In general, the model of synergy between genetics and environmental risk factors places a seemingly static genetics in a dynamic context where predisposing variants do not appear to constitute a constant degree of susceptibility to psychiatric disorders under a variety of circumstances. Understanding the relative contribution and potential interaction of genetic and environmental factors in the phenotypic expression of the disease appears to be critical for better understanding and treatment of psychiatric disorders.

**Possible use of epigenetic modifications as biomarkers**

Despite progress in identifying the molecular mechanisms underlying the psychiatric disorder, valid biomarkers are still lacking for both disease phenotyping and treatment response. It is important to note that some epigenetic changes may be stable over time and be detectable in a patient's blood and/or brain decades after psychological trauma. This stability has been confirmed, for example, in humans who were exposed to war-related adverse environments as early as embryonic development and showed persistent changes in DNA methylation even in the absence of ongoing adverse exposure, as they can be detected decades later when compared with controls [7].

The sensitivity and stability of epigenetic marks make them promising candidates for reliable biomarkers. Undoubtedly, the correlation of some changes in DNA methylation between postmortem brain cells and peripheral blood supports the use of DNA methylation as additional biological information that improves diagnosis and prognosis. New studies have shown encouraging results regarding the use of methylation changes as

diagnostic tools for the behavioral and clinical accuracy of patient phenotyping. A long-term study has shown an association between SP6 gene DNA methylation, amygdala-to-hippocampus volume ratio, and psychopathology, supporting the role of DNA methylation as a long-term epigenetic predictor. Moreover, blood methylation levels of 5-HTT and/or the BDNF gene have been proposed as promising biomarkers for predicting response to pharmacological or psychotherapeutic treatment in patients with MDD, BD, BPD, PTSD, SCZ and ADHD. In addition to these genes, recent studies have reported a four-locus model involving the CYP3A4 gene that significantly elucidates the response to risperidone treatment in patients with SCZ [8]. Finally, detection of a DNA methylation marker in blood or saliva has been shown to correct the suicide prediction model [9]. Several novel approaches based on multiplex DNA methylation profiling [9], methylation quantitation [10], and droplet digital PCR analysis open up new possibilities for early, specific, and quantification of phenotype-related DNA methylation marks. in combination with other biomarkers.

**Epigenetic pharmacotherapy**

The plastic nature of epigenetic marks makes it possible to modulate and possibly correct epigenetic changes using classical pharmacology. The epigenetic mechanism involves many DNA/histone modifiers and epigenetic medicine is generally divided into two main categories: DNA methyltransferase (DNMT) inhibitors that act on DNA methylation (such as 5-aza-2'deoxycytidine or decitabine) and histone deacetylase inhibitors (HDAC), such as valproic acid (VPA) or trichostatin A, targeting PTMG. Although the efficacy of DNMT inhibitors has been recognized in oncology, their therapeutic potential in the treatment of psychiatric disorders is still at the preclinical stage.

The action of these substances depends on DNA replication during cell division and can cause neurotoxic effects [11], which limits their potential use in non-malignant brain diseases. In contrast, the HDAC inhibitor VPA has long been used in the treatment of bipolar disorder and epilepsy as an anticonvulsant and mood stabilizer. Animal models typically use HDAC. It has been reported that inhibitors can enhance synaptic plasticity, reduce cognitive and neurological defects, and, importantly, can mimic the effect of an antidepressant or eliminate the memory of unpleasant events in models of depression and post-traumatic stress disorder [12]. In addition, in a rodent model of schizophrenia, VPA was found to have a beneficial effect, alone or in combination with an antipsychotic drug, through an effect on DNA methylation. However, the use of non-specific epigenetic modifiers, such as DNMT or HDAC inhibitors, can create limitations for clinical

purposes, such global epigenetic manipulations have a wide impact on the epigenome (regulating several genes) with possible side effects (for example, teratogenicity). One approach to overcome the global effect of DNMT and HDAC inhibitors would be to use targeted epigenetic strategies that focus exclusively on correcting putative pathogenic marks and leaving homeostatic "beneficial" marks intact. Among the available epigenome editing tools in animal experiments, the developed CRISPR/Cas9 genome editing system appears to be a promising strategy for targeted epigenetic therapy. Recent studies have shown the potential of using the CRISPR/Cas9 approach to induce long-term changes in DNA methylation or PTMG [13] in vitro and in vivo in rodents. Of particular interest is the use of CRISPR/Cas9 in cultured mouse neurons. It was shown that the epimodifier complex specifically demethylates the BDNF gene, activating its expression for a long time [14]. The attractiveness of targeted epigenetic therapy with this method would therefore rely on its long-term, albeit reversible, action, thus possibly obviating the need for its continuous or intermittent use to treat patients. Another challenge to overcome the residual side effects of epigenetic therapy is the tissue specificity of the therapeutic effect. In this regard, new approaches to the use of natural or synthetic carrier nanoparticles provide useful tools for the specific delivery of an epimodifier to the central nervous system (CNS).

Thus, although very preliminary, these promising data allow targeted editing of the epigenome, and tissue-specific nanomedicine provides a new basis for the personalized epigenetic medicine of the future.

**Current challenges in epigenetic research and future prospects**

Although epigenetic evidence in psychiatry is constantly growing, its interpretation remains challenging due to methodological and biological limitations. Since epigenetic processes are sensitive to external influences and represent a molecular substrate of cellular and tissue specificity, some heterogeneous factors can distort the correct interpretation of epigenetic data. At the individual level, heterogeneity in cohort characteristics such as age, gender, ethnicity or smoking can significantly affect epigenetic outcomes, as evidenced by the effect of early age adverse exposures on methylome [15]. Additionally, variability in other parameters associated with heterogeneity in symptoms and treatment is likely to influence the epigenome and therefore may explain the various signals found in epigenetic studies. Thus, the use of large and homogeneous samples, cohort and experimental models further guarantee successful data interpretation. An additional limitation for epigenetic research in psychiatry is associated with tissue heterogeneity and poor accessibility of the target tissue [16].

Epigenetic studies focusing on post-mortem brain tissue are limited by the most stable and reliable epigenetic mark in such tissue, i.e. DNA, thus limiting the full understanding of in situ genome activity. It is important that different epigenetic profiles are revealed in different regions of the brain [17], cells of different types [18], and even in neuronal subtypes [19]. Thus, DNA methylation changes found in brain biopsies of psychiatric patients may reflect differences in cell composition between patients and controls rather than pathophysiological changes. This is supported by variations in DNA methylation changes between neurons and glial cells in patients with depression [20], which further emphasizes the need to understand heterogeneity in epigenetic analysis. To solve this problem, one approach is based on an analytical strategy for correcting cell composition data using reference [21] or non-reference algorithms [22]. Alternatively, an ideal way to reduce cellular heterogeneity is to isolate specific cell types, using, for example, antibody-based sorting of neuronal or glial nuclei prior to DNA methylation analysis [20].

**Biological significance**

The biological significance of epigenetics in complex human diseases such as psychiatric disorders is complicated by the difficulty in inferring a causal relationship between epigenetic marks and neuropsychiatric processes. Further work is needed to determine the nature of genetic-epigenetic interactions in environmental sensitivity and psychiatric risk in a context-dependent manner. Indeed, epigenetic changes may act: (i) in an additive manner, (ii) in synergy, or (iii) as a mediator of genetic risk. To solve this problem, analytical methods, such as causal testing [23], Mendelian randomization [10], or methodological approaches, such as the use of longitudinal cohorts [24], will greatly help in deciphering the epigenetic contribution to the disease. Finally, the use of adequate experimental models in rodents or in vitro systems, such as human patient-derived inducible pluripotent cells [25], in combination with epigenome editing, this approach may open new avenues to elucidate the biological significance of epigenetic changes.

**Conclusion**

Epigenetic research shows promising results at several levels of care for psychiatric patients. First, they have a high potential for understanding phenotypic heterogeneity when exposed to environmental or genetic variation and provide additional information about the putative mechanisms underlying mental illness. Moreover, epigenetic studies may provide reliable biomarkers to improve patient stratification beyond phenotypic expression,

better understanding and prediction of treatment response, and overall prognosis. Finally, long-term results include the use of targeted epigenetic treatments as a therapeutic tool in future personalized medicine. In general, epigenetic research supports the nomothetic strategy of a biopsychosocial approach in psychiatry, where psychosocial therapy is combined with pharmacological treatment and will jointly promote epigenetic reprogramming, helping to alleviate symptoms and, ultimately, recovery. To this end, elucidating the complexity of mental illness requires additional efforts to overcome the problems associated with epigenetic research in general and in psychiatry in particular, and to elucidate the nature of the complex interactions between human life experience, genetic risk, and epigenetic processes. Future research in epigenetics is important for how to further integrate encouraging scientific findings into clinical practice.

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# EVALUATION OF THE EFFECTIVENESS OF THE USE OF AUXILIARY TECHNIQUES IN THE DIAGNOSIS OF TRICHOMONAS INFECTION

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**Annotation.** Currently, the number of patients with unsatisfactory results of treatment for chlamydial, urea- and mycoplasmal infections is increasing. The ineffectiveness of the treatment of urogenital infections is often associated with intratrichomonas persistence.

**The purpose of the work:** to find out the feasibility of increasing the volume of examination of patients to exclude Trichomonas infection.

**Materials and methods:** a survey was carried out for urogenital infections with a set of measures and material sampling from the urethra, cervical canal, posterior vaginal fornix for microscopy and inoculation on nutrient media used to diagnose trichomoniasis. To improve the quality of diagnosis of trichomonas infection, methods were used aimed at releasing glands, lacunae, ducts and other anatomical formations of the genitourinary tract from Trichomonas with their release into the lumen of the urethra, vagina.

**Results:** after a complex of effects on the genitourinary system and the body of the examined person, trichomonads were detected in 33 out of 58 patients.

**Conclusions:** auxiliary methods increase the efficiency of diagnosis and treatment of patients with chlamydia, urea- and mycoplasmosis against the background of latent, asymptomatic, torpid forms of the course of trichomoniasis.

**Keywords:** chronic recurrent trichomoniasis, endoscopic technologies, treatment efficiency.

The study of urogenital trichomoniasis is given great attention all over the world. This is due to the wide spread of Trichomonas infection and the high frequency of recurrent and asymptomatic forms. This fact makes it possible to attribute trichomoniasis to uncontrolled infections, accompanied by frequent and serious complications of the reproductive system, as well as difficulties in the etiological identification of latent forms [1].

The integrity of the epithelial cover of the mucous membrane, the quantitative and qualitative indicators of mucus produced by the glands of the urethra affect the course of the inflammatory process in the urethra associated with trichomonas infection. The inflammatory process caused by damage to the mucous membrane of the urethra and associated with trichomonas infection is complicated by secondary infection with concomitant microflora. The inflammatory reaction of the mucous membrane of the urethra is characterized by an increase in the permeability of its walls for leukocytes, as well as other cellular and non-cellular components of the immune system. They, together with various microorganisms, cells of the epithelium involved in the pathological process and mucus, are involved in the formation of various secretions, which can be purulent, mucopurulent and mucous.

The activity and level of the inflammatory response of the urethral mucosa is determined by the degree of virulence of Trichomonas infection. In addition, the inflammatory process can be aggravated by opportunistic microflora or even by the urethra's own normal biota, which can often be the cause of the chronically recurrent course of the trichomonas process. The causative agent of infection is attached to the mucous membrane of the organs of the reproductive system, and then deepens under it, where the local inflammatory reaction begins. The presence of concomitant microflora enhances the inflammatory process, which is accompanied by exudative-proliferative lesions of the epithelial cover of the mucous membrane. This leads to the destruction of epithelial cells under the influence of Trichomonas. The inflammatory reaction is facilitated by tissue loosening by proteolytic enzymes of Trichomonas, which contributes to the introduction of various metabolic products into the intercellular space. Later, proliferative and dystrophic pathological processes occur in the stratified squamous epithelium [2,3].

Currently, there is a growing number of patients applying to the staff of the department due to dissatisfaction with the results of treatment for chlamydial, urea- and mycoplasma infections based on positive results of enzyme immunoassay, diagnostics carried out by polymerase chain reaction, direct immunofluorescence, cultural method, and an inflamma-

tory clinic. the process of the genitourinary system (urethritis, prostatitis, vaginitis and others). In addition, extracts from medical records of patients from medical institutions of the republic provide the following information: microscopy of the contents of the urethra, cervical canal, posterior vaginal fornix was performed once - Trichomonas, gonococci, mobiluncus, "key cells", yeast cells were not detected, the number of leukocytes in within the normal range or slightly increased. After the treatment (one, two or more courses of antibiotic therapy in combination with immunomodulators, vitamins, enzymes), the test results for the underlying disease remained positive in all patients, the clinical manifestations of inflammation persisted in the majority. The results of microscopy of the material taken from the urethra, cervical canal, posterior vaginal fornix after treatment had no significant changes.

It is known that one of the reasons for the unsatisfactory results of the treatment of urogenital infections is their intratrichomonas persistence and the creation of an additional reservoir of infection with all the ensuing consequences.

**The purpose of the work:** to find out the feasibility of increasing the volume of examination of patients (more than one sampling of material) to exclude Trichomonas infection.

**Materials and methods**

At a consultative appointment with 58 patients (35 men, 23 women), after collecting an anamnesis and examination, we took material for microscopy of stained and native preparations, inoculation on nutrient media used to diagnose trichomoniasis. In the results, Trichomonas were not found. Further, it was proposed to examine for urogenital infections with a set of measures and sampling from the urethra (6-8 hours after urination), the cervical canal, the posterior fornix of the vagina after 24-48-72 hours for microscopy of a stained or native preparation and seeding on nutrient media used to diagnose trichomoniasis. To improve the quality of diagnosis of trichomonas infection, they resorted to measures aimed at releasing the glands, lacunae, ducts and other anatomical formations of the genitourinary tract from Trichomonas with their release into the lumen of the urethra, vagina. These "activities" described earlier in the literature were: massage of the urethra on the bougie, urethroscopy, massage of the prostate gland, seminal vesicles and bulbourethral glands in men, injection of a 0.5-2% solution of pilocarpine hydrochloride into the urethra for 5-15 minutes according to Peruts-Metalnikov, 0.5-1% solution of silver nitrate for 2 minutes, lubrication with Lugol's solution or 3% solution of silver nitrate of the cervical canal, intramuscular injection of 5-10 μg of pyrogenal.

The described measures of influence on the genitourinary apparatus and the organism as a whole were carried out in various combinations depending on the condition of the patients, their age, sex and the mechanism of action of the procedure.

**Results**

Microscopy and cultural diagnostics revealed trichomonas (with an increased number of leukocytes in 19 preparations) in 24 people out of 58 examined. Similar diagnostic measures were repeated in 34 patients after 3-4 weeks, in which Trichomonas was found in another 9. That is, after a complex of effects on the genitourinary system and the body of the examined, followed by microscopy of the material (three-fold sampling after 24-48-72 hours) and sowing on appropriate nutrient media, Trichomonas were detected in 33 out of 58 patients who received one or more courses of antibiotic therapy for chlamydia in the absence of Trichomonas in the results of microscopy performed before and after antibiotic therapy, as well as before the diagnostic complex.

**Conclusions**

Thus, a single sampling of material to exclude trichomonas infection is not enough, and the well-known, but rarely used recently, measures with three sampling of material in patients with sexually transmitted infections improve the quality of the examination, which becomes significant in the treatment of about chlamydia, urea- and mycoplasmosis against the background of latent, asymptomatic, torpid forms of the course of trichomoniasis.

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# PECULIARITIES OF POST-INFECTIOUS ASTHENIA TREATMENT IN COVID-19 PATIENTS

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**Abstract.**

**Aim of the study.** To study the efficacy and safety of hydroxyethylammonium methylphenoxyacetate (trekrezan) in COVID-19 patients with post-infectious asthenia at the outpatient stage.

**Materials and methods**. The study included n=80 people. The patients were randomized into two groups: main (n=40, mean age 52.14±6.23 years) and control (n=40, mean age 51.62±6.17 years). In the main group, patients received hydroxyethylammonium methylphenoxyacetate (trekresan). The duration of therapy was 8 days. Patients in the control group did not receive the drug.

Both groups were tested using the Asthenic State Scale (ASS), the level of anxiety and depression was determined (Hospital Anxiety and Depression Scale (HADS)) and the subjective characteristics of sleep were scored at baseline and after the study

**Results.** In 57 (71.25%) patients included in the study, there were manifestations of moderate asthenia. In the main group of patients, on the background of trekrezan therapy, a distinct positive trend was registered: a decrease in the number of patients with severe asthenia from 8 (20%) to 0 (0%), a decrease in patients with moderate asthenia from 28 (70%) to 0 (0%). While in the control group, no such results were observed.

**Conclusions**. Moderate asthenia predominates in COVID-19 patients at the outpatient stage,. During therapy with trekrezan, there is a significant decrease in the manifestations of asthenia, an improvement in the emotional background and quality of sleep compared to the control group.

**Keywords:** COVID-19, post-infectious asthenia, hydroxyethylammonium methylphenoxyacetate (trekresan)

**Background**

Coronavirus disease 2019 (COVID-19), the condition caused by the SARS-CoV-2 coronavirus, was originally characterized as a time-limited disease [1-3]. For the first time, post-COVID-19 syndrome was described in the spring of 2020, when patients, several weeks after an acute infection, developed a number of various symptoms [4,5]. Patients who have had COVID-19 are in danger of developing post-infectious asthenia. The frequency of post-infectious asthenia according to the literature ranges from 17.5% to significantly higher rates (72%) in hospitalized COVID-19 patients[6,7]. As millions of people around the world continue to become infected with SARS-CoV-2, the public health implications of COVID-19 and the need to identify measures to prevent or treat it are clear.

**Aim of the study**

To study the efficacy and safety of hydroxyethylammonium methylphenoxyacetate (trekrezan) in COVID-19 patients with post-infectious asthenia at the outpatient stage.

**Materials and methods**

The study included 80 people. The inclusion criteria for the study were: age over 18; COVID-19 within one month before the beginning of the study treated at the outpatient stage. Exclusion criteria from the study were: respiratory and heart failure, significant cardiovascular diseases, arrhythmias, severe behavioral and emotional disorders, the use of psychoactive substances, antidepressants. The patients included in the study were randomized into two groups: main (n=40, mean age 52.14±6.23 years) and control (n=40, mean age 51.62±6.17 years). Both groups were comparable in terms of gender, age, duration and severity of COVID-19 manifestations. Patients of the main group received hydroxyethylammonium methylphenoxyacetate (trekrezan) according to the following scheme: on the first day (3 pills - 600 mg). For the next 7 days, 1 pill (200 mg) per day. The drug therapy lasted 8 days. Patients in the control group did not receive hydroxyethylammonium methylphenoxyacetate (trekresan) therapy.

When included in the study, all patients underwent: a clinical blood test; blood chemistry.

Asthenic state scale was used for testing in the main and control groups at baseline and after the study. This L.D. Malkova scale was adapted by T.G. Chertovaya based on the MMPI - Minnesota Multiphasic Personality Inventory [8].

The level of anxiety and depression was determined with the use of Hospital Anxiety and Depression Scale (HADS). Subjective characteristics of sleep were scored [9].

The survey results were processed using the computer program Statistica 6.0. To compare samples that meet the normal distribution criteria, Student's t-test for independent or dependent samples and analysis of variance (ANOVA) were used. The indicators are presented as the arithmetic mean and standard deviation (M±SD). When systematizing and statistically processing the data, the differences were considered significant at a significance level of $p<0.05$.

**Results**

Patients of the main and control groups did not significantly differ in gender, age, blood pressure, body mass index. There was also no significant difference in both groups in terms of creatinine, C-reactive protein, and ferritin levels.

Patients complained about such symptoms as: fatigue 72 (90%), poor sleep 60 (75%), irritability 45 (56.25%). Almost 1/3 of patients had anxiety and depression.

When testing for asthenia in the main and control groups, patients with moderate asthenia predominated - 57 (71.25%). 15 (18.75%) patients included in the study suffered from severe asthenia, and 8 (10%) had mild asthenia.

In the main group of patients, on the background of trekrezan therapy, there was a clear positive trend: a decrease in the number of patients with severe asthenia from 8 (20%) to 0 (0%), a decrease in patients with moderate asthenia from 28 (70%) to 0 (0%) . While in the control group, no such results were noted: after 8 days of observation, 2 (5%) patients out of 40 had signs of severe asthenia, and 16 (40%) out of 40 patients had manifestations of moderate asthenia.

There was a decrease in the level of anxiety (9.48±0.46 and 7.29±0.28 points, $p<0.05$; 9.42±0.43 and 8.91 ±0.36 points, respectively, $p>0.05$), improvement in sleep parameters (19.42±0.64 and 21.39±0.75 points $p<0.05$; 19.15±0.58 and 19, 53±0.67 points, respectively, $p>0.05$) in the main group of patients, 8 days after the start of trekrezan therapy.

All patients successfully completed the study. The drug was well tolerated. There were no side effects.

**Discussion**

A number of long-term effects after COVID-19 have significant clinical implications in both the short- and medium-term follow-up [10,11]. Previous studies have shown that asthenia occurs in 40% of patients 2 months

after undergoing COVID-19 [12, 13].

In our study, in COVID-19 patients, the vast majority suffered from moderate asthenia (71.25%). 15 (18.75%) patients had manifestations of severe asthenia. Thus, 90% of patients had significant manifestations of post-infectious asthenia. It should be noted that these were not elderly patients, since the average age of participants was about 50 years.

It is known that trekrezan is a highly effective pharmacological drug with adaptogenic and immunostimulatory effects, which have been proven in numerous studies. The drug stimulates cellular immunity, proliferation of mononuclear cells, acting at different stages of the formation of lymphocytes, activates humoral immunity [14,15]. Actively stimulates interferon genesis, has an anti-inflammatory effect [16,17].

With post-infectious asthenia, there is a violation of the use of energy resources, the development of hypoxia, acidosis, and as a result, the destabilization of the energy produce and distribution in the cell. The resulting imbalance of redox processes in mitochondria leads to the free radicals formation, which contribute to the disruption of microcirculation, endothelial dysfunction, and lead to the progression of apoptosis [18]. A number of studies have shown that trekrezan improves the energy status of the body by optimizing the processes of energy production and reducing energy costs, and has an anti-asthenic effect [19,20].

In our study, we obtained data on the high efficacy and safety of the drug in patients who underwent COVID-19. In 80% of patients of the main group, there were no manifestations of post-infectious asthenia after the course of therapy.

Trekrezan has an adaptogenic effect [20]. Apparently, the improvement of the emotional background and the quality of sleep in patients included in the study is associated with the adaptogenic effect of the drug.

**Conclusions**

1. Moderate asthenia prevails in COVID-19 patients at the outpatient stage.

2. During therapy with trekrezan, there is a significant decrease in the manifestations of asthenia, an improvement in the emotional background and quality of sleep compared to the control group.

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# THE MAIN FACTORS AND DIRECTIONS OF TOURISM DEVELOPMENT IN THE REGIONS OF PACIFIC RUSSIA

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**Abstract.** The assessment of factors contributing to the development of recreational industry as an additional specialization of Pacific Russia is given. The Far East is not only the most remote territory of Russia, but also one of the unique places where rare natural and historical, cultural resources are concentrated. The region has a rich tourist potential, and this allows not only to develop the recreational industry of specialization, but also to provide a higher level of quality of tourist services. In the development of the macroregion, tourism is defined as a promising direction of possible future specialization of the regional economy that meets the requirements of modern world standards. The ratio of incoming and outgoing flows is compared. Incoming flows of tourists to the region are associated with the natural prerequisites for the development of cognitive and ecological trends. In this regard, circumpolar tours and the Antarctic direction are promising. The unclaimed potential of the diverse natural, cultural, balneological and historical resources of the region makes it possible to develop all areas of tourism from ecological, rural, recreational to cultural and educational types.

**Keywords:** Pacific Russia, tourism potential, tourist flows, prospects of regional tourism.

**Introduction**

Since the 1990s, tourism has been actively developing in the region. The liberalization of foreign economic relations stimulated the development of international tourism – both outbound and inbound. By now, tourism is turning into an economically important type of activity and in the conditions of the emerging diversification of the economy of the regions of Pacific Russia, the tourist and recreational complex is considered as one of its promising sectors. The relevance of the study is to ensure the sustainable functioning of domestic and international relations, the importance of which is increasing and gaining significant importance. Based on information and analytical data, strategic priorities for the development of the regional economy in the segment of the tourism industry, the development of domestic and inbound tourism are considered.

**Results and discussion**

Studies by a number of authors [1,2,4,5] allow us to note that the territory of the Far East as a whole has significant natural and historical and cultural recreational potential, but it has not yet been possible to create a modern tourism industry here. The prospects for the development of the tourist and recreational complex of Pacific Ocean Russia are determined by a number of long-term factors.

- The unique geographical position of the region and a specific geopolitical location: the contact zone of the Far Eastern region in the Eurasia–Pacific Ocean geosystem.

- Proximity to successfully developing countries: China, the DPRK, Mongolia, the Republic of Korea, Japan, etc.; a multi-million population with an increasing standard of living and potential opportunities for organizing inbound tourism.

- Large geographical, ecological, cultural-historical, ethnic and socio-economic differentiation of the space of the Far Eastern region with diverse ecosystems in meridional and latitudinal differences. In general, the tourist and recreational complex of Pacific Russia has a very significant and very diverse natural development potential and at the same time a low level of its use.

The fact that Russia, according to climatic conditions, is one of the "northern" countries of the world with the cold pole of the northern hemisphere located within the Far Eastern macroregion, largely determines the geographical orientation of tourist flows and, accordingly, the export of capital from here to hot countries, to warm seas throughout the year. But the geographical factor does not justify the current situation at all [3].

The current state of the tourist and recreational complex of the region, the direction of tourist flows can be judged according to Table 1.

**Table 1.**
**The number of Russian tourists served by travel agencies (thousand people)**

| | The number of Russian tourists sent by travel companies | | | | | |
|---|---|---|---|---|---|---|
| | on tours in Russia | | | to foreign tours | | |
| | 2016 | 2018 | 2019 | 2016 | 2018 | 2019 |
| Far Eastern Federal District | 77.5 | 97.8 | 70.4 | 394.5 | 484.6 | 475.2 |
| Republic of Buryatia | 19.8 | 7.8 | 7.3 | 8.0 | 8.9 | 9.2 |
| Republic of Sakha (Yakutia) | 10.4 | 11.2 | 11.4 | 8.2 | 3.0 | 15.8 |
| Trans - Baikal Territory | 6.3 | 6.5 | 1.5 | 105.6 | 166.3 | 107.9 |
| Kamchatka Krai | 11.8 | 7.1 | 6.6 | 4.6 | 13.9 | 13.9 |
| Primorsky Krai | 7.3 | 47.5 | 22.3 | 90.4 | 134.8 | 163.6 |
| Khabarovsk Territory | 16.8 | 12.1 | 15.8 | 128.3 | 84.6 | 88.4 |
| Amur region | 2.7 | 2.3 | 2.3 | 27.1 | 39.2 | 40.1 |
| Magadan region | 0.8 | 0.5 | 0.4 | 2.4 | 4.6 | 5.7 |
| Sakhalin Region | 1.2 | 2.6 | 2.5 | 7.1 | 15.9 | 27.4 |
| Jewish Autonomous Region | 0.3 | 0.2 | 0.2 | 12.9 | 3.5 | 3.2 |
| Chukotka Autonomous Okrug | 0.1 | 0.0 | 0.0 | - | 0.0 | 0.0 |

***Source:*** *On the activities of tourist organizations..., 2020*

The current ratio of outbound tourism, on the one hand, and inbound and domestic tourism, on the other, indicates that the tourism sector of the region's economy today, although it provides certain social services to the local population, but to a greater extent "works" for the export of capital from the country and less for its own economy. Thus, in the subjects of Pacific Russia, the total revenue from tourism today is only about 1% of the gross regional product (GRP). According to many experts, the unique resources and opportunities of various types of tourism in the Far East are used by no more than 5-10%. Chinese tourists, when traveling in Russia, try to use their guides and Chinese buses in short tours. As well as the organization of air transportation, on long trips by their own airlines. Thus, the financial benefits go to China, and not to the Russian side. There is a competent return of the exported finances to their country.

Is there an opportunity to increase income from tourism. To do this, it is worth recalling that the new is the well-forgotten old. In the middle

of the last century, there was a practice of organizing cruises "from winter to summer" on Soviet passenger ships, which were very popular with the population. Similar tours were also developed for foreign tourists. The competitive advantage in this case was free medical care on a cruise liner. Vouchers for such cruises were reserved for many months in advance. At the same time, financial resources remained in Russia. Another even more popular and highly profitable type of sea tours is cruises to Antarctica and to the North Pole on icebreakers re-equipped for tourists. The primacy of the development of this direction (travel to high latitudes) belonged to the Russian maritime departments, but over time, the initiators of such tours were pushed away from receiving income. Currently, Russian vessels of the scientific fleet are sometimes used for these purposes, to combine types of activities and additional compensation for expenses for scientific research in the Arctic.

There is a situation when outbound tourism of the Far East has a pronounced regional character, despite the fact that 99% of Russian departures are directed to the Asia-Pacific countries. Analyzing the state of the "international" direction of tourism development in the regions of Pacific Russia, it should be noted that among the geographical directions of outbound tourism, relatively cheap China dominates.

Due to the liquidation of enterprises that provide the production of industrial and household goods for the population, Far Easterners have formed a special recreational specialization for travel purposes - from the need to organize car purchases in Japan to light industry goods in China. The growth of incomes of the population contributes to an increase in the number of people wishing to go on vacation outside the country, which contributes to the export of capital from the region, with a decrease in domestic demand for recreational services. The main purpose of visits to China is changing today: shopping tours are increasingly being replaced by cultural, educational and business trips, as well as trips to famous resorts in China for therapeutic and recreational purposes. The share of the Republic of Korea, Japan, Thailand, and other coastal countries of Southeast Asia is also significant in outbound tourism. For tourists from the Far Eastern regions, the seaside towns and resorts of China, Thailand, Turkey, Japan or the Hawaiian Islands of the USA, less often Egypt, have become the most priority holiday destinations. Even Europe, rich in cultural heritage, attracts Far Easterners much less.

Youth cognitive and educational tourism acquires a special dynamism. As one of the possible options for the development of social tourism, the medical direction is presented. The flows of medical tourism of the Far

East are one-sided, associated with the receipt of high-tech medical services in Japan, the Republic of Korea, Singapore. The clinics in China are most in demand, although there are their own private ones, which, unfortunately, are poorly aimed at providing commercial services to tourists from the countries of the former Soviet Union. There has been an incoming flow of tourists with medical purposes, consisting of former compatriots who settled in developed countries.

The current ratio of outbound tourism, on the one hand, and inbound and domestic tourism, on the other, indicates that the tourism sector of the region's economy today, although it provides certain social services to the local population, but to a greater extent "works" for the export of capital from the country and less for its own economy. Domestic tourists cannot take full advantage of recreational resources. This is due to the high prices for transport services, spa treatment, sightseeing services.

The priority expenses of the population are housing and communal services, treatment and education. Far Easterners are beginning to refuse services, specialized tour companies and travel independently. And the number of external and internal tourists who independently carry out their holidays to the territory does not decrease. Domestic tourism is developing mainly due to amateur beach tourism and seasonal hunting and fishing.

Despite the fact that the Far East is of great interest to foreign tourists, the main performance indicators of travel agencies in this segment are deteriorating. Regional sanatorium-resort centers that provide health and treatment of the population are in great demand. The unclaimed potential of the most diverse natural, cultural, balneological and historical resources of the territory, contributing to the development of all areas of tourism from ecological, rural, recreational to cultural and educational [1].

In the development trends of inbound tourism, the greatest interest in visiting the region, especially the southern part, is shown by residents of the Asia-Pacific countries, including the Republic of Korea, Japan. Among them, tourists from China make up three-quarters of the total international inbound flow. One of such centers, which will contribute to the attractiveness of tourism in the future, is the opening of an Integrated Entertainment Zone of Primorye, the TigredeCristal Casino. About 30% of them are foreign tourists from Asian countries - China and the Republic of Korea [4].

The problem of the development of the recreational industry is the presence of barriers to travel, ensuring the safety of tourists. First of all, this is the fragmentation of programs among the subjects of the federation in terms of the interconnectedness of tourist flows. Travel companies function independently, with the exception of transport support for trips. It is

necessary to simplify the visa regime, reduce taxes, There is no interest in changing the pricing policy of air carriers, except for increasing the cost of services, developing new aviation destinations. The limiting factors are advertising security and the language barrier. Those who know Chinese leave by invitation to work in China. APEC is 40% of the world's tourist flow. According to experts, tourist services are transformed most quickly in crisis conditions, as an example, it should be mentioned in the situation with a pandemic.

**Conclusion**

The tourist and recreational complex should receive a significant impetus for development in all subjects of Pacific Russia. To do this, they also have a significant natural tourist and recreational potential, and the originality, exoticism and uniqueness of this potential, including historical and ethnographic features, is very important for this sphere. The Republic of Sakha (Yakutia), Sakhalin Island and the Kuril Islands, Kamchatka are attractive to tourists, the Arctic north and the Northern Sea Route are occasionally used, with recreational resources of the world level.

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# TRENDS IN NATURAL POPULATION MOVEMENTS IN THE SOUTH OF THE RUSSIAN FAR EAST[1]

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**Abstract.** The paper considers the features of reproduction processes in the priority geostrategic subject of the Far Eastern Federal District on the example of Primorsky Krai for the period from 2011 to 2020. There is a negative demographic dynamic (natural decline, migration outflow), which contributes to the ongoing process of reducing the number of resident population and deteriorating the quality of the demographic potential. This is one of the important tasks that the federal and regional authorities have been trying to solve for decades, but the region continues to suffer significant population losses. Although the economy of the southern regions, unlike other Far Eastern territories, is more diversified. In the context of a continuing decline in the birth rate against the background of an increase in the death rate of the population due to the spread of a new coronavirus infection, an ongoing migration outflow that deforms the demographic structure of the population, increasing depopulation, one cannot count on population growth. The results of the study can be used to substantiate the demographic policy of the southern subject, which should have its own specific algorithm for solving demographic problems.

**Keywords:** population, depopulation, age structure, population aging, birth rate, mortality, Primorsky Krai.

[1] *The results of the study presented in the article were obtained within the state assignment of Ministry of Science and Higher Education of the Russian Federation/(Russia) (theme «Geographical and geopolitical factors in inertia features, dynamics and development of different rank territorial structures of economy and settlement of the population of Pacific Russia» N AAAA—A-16-116110810013-5.*

**Introduction**

The priority development of the Russian Far Eastern territory, which is distinguished by the peculiarities of its economic-geographical, transport-geographical position and strategic geopolitical significance, is a priority direction of state policy at the present stage. The solution of ambitious tasks for the accelerated development of this territory, including in its most geographically and economically favorable southern regions, including Primorsky Krai, faces restrictions that have become the most important factor affecting economic growth [1,3,4,8 ]. These constraints include demographic resources.

In modern social and economic conditions, the key demographic problems in Primorsky Krai are: a steady excess of the number of deaths over the number of births, an increase in the natural population decline; migration outflow as a factor in population decline; reduction in the proportion of women of reproductive age in the population both in general in the region, and separately in urban and rural areas; negative dynamics of the total fertility rate; aging age structure; slow growth in life expectancy.

**The purpose of the study** is to identify the features of reproduction processes in the Primorsky Krai, the specifics of the factors influencing the formation of the demographic potential, which will make it possible to more fully take into account the features of the social and demographic component in regional projects and more accurately prioritize their development.

**Materials and methods**

The official data contained in the information and statistical materials prepared by the Federal State Statistics Service (Rosstat) for the period 2011–2020 were used as an information base. Comparative-geographical, statistical research methods were used.

**Results and discussion**

The current demographic situation in the Primorsky Krai was formed under the influence of both all-Russian and specific regional social and economic, as well as demographic processes that took place in previous decades. In 2020, the permanent population of Primorsky Krai was 1877.8 thousand people, having decreased by 18.1 thousand people in 2019, which was a record reduction for the period under review (since 2011 by 72.7 thousand people). The urban population of the region for 2019 decreased by 13.4 thousand people (since 2011 by 35.3 thousand people), the rural population decreased by 4.7 thousand people (since 2011 by 37.4 thousand people). In addition to Primorsky Krai, other southern regions also suffered significant losses (Khabarovsk Krai, Amur Oblast, Jewish Autonomous Oblast). Although their economy is more differentiated, it was these

territories that experienced the largest decline in employment in labor-intensive manufacturing industries [4]. Primorsky Krai also differs from other Far Eastern regions in the nature of its economy and has significant prospects for development. The predominance of the port economy, processing industry and trade already in modern conditions opens up great opportunities for the implementation of major projects and sustainable infrastructure and logistics ties with the leading countries of the Asia-Pacific region.

The current level of population decline in the last decade did not affect the position of Primorsky Krai, which continues to rank first in terms of population in the Far Eastern Federal District (the share in the total population of the Far Eastern Federal District is 23.1%). The decline in the population is negatively affected by the persistence of a high natural decline in the population (Table 1) and migration outflow, especially of young working age. In 2020, the natural population decline in Primorsky Krai amounted to 11.1 thousand people and increased by 2.7 times compared to 2011. A feature of 2020 is an increase in natural decline due to a decrease in the birth rate and an increased number of deaths. Thus, the ratio of the number of deaths to births in the region increased and amounted to 1.6 (in 2011 - 1.2). In the southern subjects of the Far Eastern Federal District, this indicator ranges from 1.5 in the Jewish Autonomous Region and Khabarovsk Krai to 1.6 in Primorsky Krai and Amur Oblast. Positive natural growth (with declining growth rates) remains in the Republic of Buryatia, the Republic of Sakha (Yakutia), and the Chukotka Autonomous Okrug.

In recent years, the demographic situation in Primorsky Krai has been deteriorating. Despite measures to support the family, the birth rate has continued to decline since 2015 due to a decrease in the total number of women of reproductive age. Over the past decade, the number of women of childbearing age has decreased by 12.4% and in 2020 amounted to 433 thousand people, the share in the total number of women decreased from 50.5% in 2011 to 42.7% in 2020. The largest decline in the number of women over the past decade occurred in the age group of 20-24 years - 1.9 times.

**Table 1.**
**Dynamics of natural population decline in Primorsky Krai for the period 2011-2020, people [2,5,7]**

| Years | People | | | Per 1000 people of population | | | Total fertility rate |
|---|---|---|---|---|---|---|---|
| | born | died | natural decline | born | died | natural decline | |
| 2011 | 23377 | 27522 | -4145 | 12,0 | 14,1 | -2,1 | 1,532 |
| 2012 | 24627 | 26743 | -2116 | 12,6 | 13,7 | -1,1 | 1,647 |
| 2013 | 24614 | 26222 | -1608 | 12,7 | 13,5 | -0,8 | 1,685 |
| 2014 | 24693 | 25953 | -1260 | 12,8 | 13,4 | -0,6 | 1,732 |
| 2015 | 24494 | 26003 | -1509 | 12,7 | 13,5 | -0,8 | 1,761 |
| 2016 | 23553 | 26236 | -2683 | 12,2 | 13,6 | -1,4 | 1,736 |
| 2017 | 20973 | 25461 | -4488 | 10,9 | 13,3 | -2,4 | 1,597 |
| 2018 | 19995 | 25660 | -5665 | 10,5 | 13,4 | -2,9 | 1,577 |
| 2019 | 18235 | 25764 | 7529 | 9,6 | 13,6 | -4,0 | 1,488 |
| 2020 | 17975 | 29073 | -11098 | 9,5 | 15,4 | -5,9 | 1,518 |
| 2025 | 14624 | 24738 | -10114 | 8.0 | 13.5 | -5.5 | 1.399 |
| 2030 | 14273 | 23192 | -8919 | 8.0 | 13.0 | -5.0 | 1.486 |
| 2035 | 15014 | 21409 | -6395 | 8.6 | 12.3 | -3.7 | 1.568 |

In 2020, the birth rate in Primorsky Krai (9.5 ‰) was lower than the Russian (9.8 ‰) and Far Eastern levels (11.1 ‰), while in 2011 its value was 12,0 ‰. As before, the birth rate in the region remains insufficient even for the simple reproduction of generations. There is no upward trend in the dynamics of this indicator, and the observed increase in the number of births from 2007 to 2014 is largely due to the contribution of women aged 20–29 years, that is, numerous cohorts of the 1980s births. In 2011, the share of those born to mothers in the age group of 20-29 years was 61%, in 2020 - 44.1%.

In 2020, the total fertility rate in Primorsky Krai was 1.52 children per woman of reproductive age, which is 0.8% lower than in 2011 (1.532) and 1.3% higher than the national average. The growth of the indicator was noted in all (except for the Jewish Autonomous Region) Far Eastern regions. At this level of the indicator, the number of births will annually decrease due to the unfavorable age structure of the population as a result of a decrease in the number of women of reproductive age.

In the same period, there is an increase in mortality until 2020, so the

natural population decline began to increase rapidly. The mortality rate was 15.4 ‰ (15.0 ‰ in urban areas, 17.0 ‰ in rural areas). The mortality rate in rural areas is higher, as a result of the high proportion of older ages among rural residents. In 2020, there was a sharp increase in mortality associated with the spread of a new coronavirus infection. According to the results of this year, the natural decline returned to the level of 2005.

Over the past decade, there has been a decrease in the number of deaths in all age groups, with the exception of the group of 60 years and older, where there is an increase in the number of deaths by 3%. The number of dead men in 2020 was 8.8% higher than the number of dead women and amounted to 15.1 thousand people (22.0% in 2011), and in recent years there has been a steady trend towards a reduction in the gap between male and female mortality.

It is assumed that the mortality rate in Primorsky Krai in 2035 will be 12.3 ‰ (15.4 ‰ in 2020), while the birth rate will be 8.6 ‰, against 9.5 ‰ in 2020, therefore, if the natural decline in 2020 was 5.9 ‰, then in 2035 it will be 3.7 ‰, despite the fact that the total birth rate is expected to increase to 1.568 against 1.518 in 2020. A high mortality rate, together with an insufficient birth rate, determines the continued depopulation in Primorsky Krai.

Against the backdrop of an increase in the number of deaths, a decrease in infant mortality is noted. For the period 2011-2020, the reduction was 45.4%. However, this indicator in the region remains high: out of 1000 births, 5.3 children under 1 year old died (in the Russian Federation 4.5, among the Far Eastern regions the highest indicator in the Chukotka Autonomous Okrug - 14.7, the lowest - in the Magadan Oblast - 3,1).

A consequence of the reduction in the birth rate is a change in the qualitative composition of the population. First of all, due to the aging of the age structure, that is, an increase in the proportion of people of retirement age (22.0 % in 2011, 24.4 % in 2020 - this is the highest figure among all subjects of Far Eastern) (Table 2). At the same time, it should be noted that the aging of the population in the region is determined by a long-term trend of declining birth rates. For the period 2011-2020 the number and proportion of the population younger and older than working age increased.

**Table 2.**

**Population of Primorsky Krai by main age groups [6, 7]**

| Years | Age groups | | | | | |
|---|---|---|---|---|---|---|
| | younger than able-bodied | | in able-bodied | | older than able-bodied | |
| | Thous. peop. | % | Thous. peop. | % | Thous. peop. | % |
| 2011 | 304,4 | 15,6 | 1216,5 | 62,4 | 429,6 | 22,0 |
| 2015 | 331,8 | 17,2 | 1135,4 | 58,9 | 461,8 | 23,9 |
| 2020 | 337,0 | 17,9 | 1083,5 | 57,7 | 457,3 | 24,4 |
| 2025 | 308,6 | 17,0 | 1104,3 | 60,7 | 405,1 | 22,3 |
| 2030 | 264,2 | 15,0 | 1117,5 | 63,2 | 38503 | 21,8 |
| 2035 | 243,6 | 14,0 | 1102,3 | 63,5 | 390,5 | 22,5 |

These age structures over the past decade, as well as in the future until 2035, will be regressive, that is, the proportion of people of retirement age will exceed the proportion of children and adolescents under the age of 16. Another consequence of the low birth rate was the entry of Primorsky Krai in 2005 into a long period of decline in the working-age population. The situation is also complicated by a significant migration outflow of the population of this age group. Thus, from 2011 to 2020, 582.3 thousand people of working age left the Primorsky Krai (75.9% of the total number of those who left the territory of the region over the past decade).

It should be noted that the number of the able-bodied population over the past decade has been declining at a rate exceeding the decrease in its total number: with a decrease in the population by 3.7%, the able-bodied population decreased by 10.9%.

With the growth of the population over working age, with a decrease in the working-age population, the indicator of the demographic burden for the population as a whole increase from 724 (urban - 700, rural - 811) in 2019 to 733 (urban - 709, rural - 819) in 2020

In 2020, the average age of the population in Primorsky Krai was 40.2 years, an increase of 1.4 years compared to 2011. But as a result of high mortality and lower survival of men, their average age in 2020 was 5.3 years lower than that of women (37.5 and 42.8 years, respectively).

The indicator of life expectancy over the past decade has increased by 3.5% and in 2020 reached the age of 69.6 years (70.1 in urban areas, 67.5 in rural areas). At the same time, the difference in the value of the indicator for women and men decreased: in 2011, the difference was 11.4 years, in 2020 - 10.1 years (Table 3).

**Table 3.**
**Life expectancy at birth (years) in Primorsky Krai**

| Years | 2011 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| All population | 67,17 | 69,21 | 69,55 | 71,70 | 72,46 | 73,13 |
| Men | 61,65 | 64,04 | 64,59 | 69,10 | 71,45 | 73,58 |
| Women | 73,07 | 74,58 | 74,73 | 78,17 | 79,88 | 81,43 |

According to the average variant of the forecast of Rosstat [6], the population of Primorsky Krai will continue to decrease continuously and will amount to 1736.4 thousand people in 2035, having decreased by 141.4 thousand people compared to 2020. Such long-term changes pose a threat both to the demographic and labor potential, and to the social and economic development and future of not only Primorsky Krai, but the entire Far Eastern Federal District. The negative consequences of demographic processes, unless cardinal measures are taken in social and economic policy, will hinder the ambitious plans for the further development of Primorsky Krai.

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# THE USE OF SEMIOTIC MODELS IN THE PLANNING OF MAJOR REPAIRS OF ELECTRICAL NETWORKS

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**Abstract.** A methodology for planning work on the overhaul of electrical network equipment is proposed, based on the development of simulation models and the use of semiotic modeling for their descriptive presentation and the possibility of comprehensively taking into account the factors affecting the model.

**Keywords.** Overhaul, semiotic modeling, planning.

Timely carrying out in the required amount of work on the overhaul of electrical networks is an integral part of the process of their efficient operation. Given the significant length and branching of rural electrical networks, a large percentage of depreciation of the main equipment, limited labor and material resources, it is obvious that the issues of effective planning of measures to maintain these networks in working condition are very relevant.

The methodological approach currently applied to the planning of operational activities considers annual schedules as a deterministic system, which is built in accordance with some rigid scheme, fixed at the stage of building a calendar schedule and, thus, not subject to changes due to the action of random factors. However, this approach does not always correspond to the real conditions that exist in the maintenance of electric grid facilities, since it does not take into account the possibility of moving the personnel of the operating teams to perform other unplanned work aris-

ing under the influence of unknown circumstances. At the same time, taking into account random factors will significantly complicate the calendar schedule. Thus, the situation with work planning that has developed in electric grid organizations indicates that schedules for preventive work are developed without taking into account random factors due to their complexity and labor intensity.

Building a scheduled work schedule is a process of formalizing the process of the upcoming maintenance of power grid equipment, which is initially mainly described in natural language. Using a semiotic language, this description can be represented in symbolic form, which is a fairly simple and very convenient way. The main advantage of this approach lies in its constructiveness, since each of the introduced concepts, relations and names has a specific content that reflects the described object.

The proposed approach to planning work on the overhaul of electrical network equipment is based on the development of simulation models, taking into account the possibility of using their preliminary descriptive representation, the stage-by-stage development of the schedule and the possibility of comprehensively taking into account the factors affecting the model.

Let's represent the graph construction model in the form of two models - $A_1$ and $A_2$. Model $A_1$ is used to describe the structure of a serviced object, simulate the process of servicing power grid equipment and the structure of the table to be filled.

The configuration of the electric grid area depends on the number and composition of the electric grid facilities that were taken into account during the design and construction (overhead power lines, transformer and distribution substations, sectioning points). Each of these objects is characterized by a set of equipment, the complexity of their maintenance and a schedule that determines the sequence of work at each of the objects. The dynamic element of the system is the repair teams with the appropriate machines and mechanisms to carry out work at these facilities.

Formally, the system for carrying out operational measures for the maintenance of power grid equipment can be considered as a discrete situational network, the source R of which characterizes the arrival of the team at the facility, and the sink S characterizes the departure of the team from the serviced facility (figure 1). At the same time, during the functioning of the system under study, the dynamic element moves from the object to the service object.

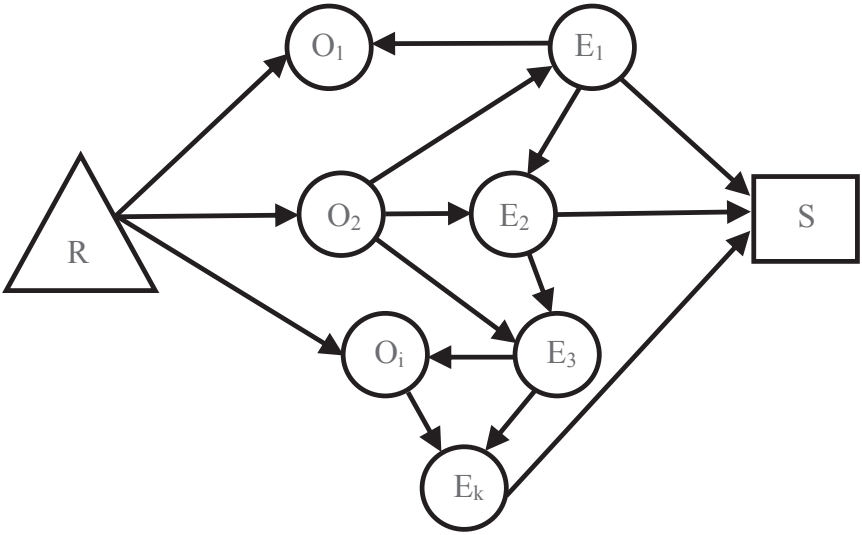


**Figure 1. Discrete situational network for maintenance of power grid equipment**

Discrete situational network converters include objects on which dynamic elements are delayed for a certain number of time cycles or their characteristics change. In this case, the delays in the converters are determined by the amount of labor costs used and the planned scope of work. Depending on the cycle of functioning of a discrete situational network, converters can be passive (in this case, the resource is not used at this facility in the form of equipment) and active. In active transducers, the amount of resource varies. Resource transitions from object to object, as well as leaving objects, are carried out only as a result of allowed transitions.

On the other hand, as an object of the problematic environment, one should also consider the initial information, after the introduction, which the computer receives a calendar schedule of planned work. The distribution of resources is carried out by weeks in accordance with the specified norm for one service team and the strength of the teams.

Model $A_2$ contains information about the distribution of labor costs by weeks of the table and taking into account the occurrence of possible situations on a discrete graph.

It is known that semiotic modeling is based on a special language for describing these models. In this case, a special dictionary of binary relations is compiled, including:

• basic concepts, which we denote by $a_i$, i = 1, 2, ..., n. They are determined by the problematic environment under consideration and are associated with its description. When studying the maintenance of electrical networks, the basic concepts should be considered: the object of the electrical network, electrical network equipment, labor intensity, frequency, etc.;

• basic relations through $r_j$, j = 1, 2, ..., n, which characterize the relations between basic concepts. The expediency of using this approach follows from the theory of complex systems, according to which, to describe a system, it is not enough to indicate the composition of its elements, but it is also necessary to reflect the situation associated with the relationship of elements with each other. These relationships are universal;

• names that characterize the names of objects used in natural language (we will designate them $b_k$, k = 1, 2, ..., n).

For this category of concepts, a special basic relation $r_0$ – "have a name".

The grammar of binary relations allows you to build syntactically correct phrases of the following form:

$A = a_i$ – any basic concept;

$A = (a_i r_j a_k)$ – two basic concepts united by a relation;

$A = (A_i r_j A_k)$ – two syntactically correct phrases united by a basic relation;

$A = (A_i r_j b_k)$ – the expression "$A_j$ has the name $b_k$".

This is enough to build the correct structures. This is important when using computer technologies, since a computer is not a person and is not able to immediately evaluate the construction of irregular structures.

The correlation rules of the $A_{2\_}$ model are the conditions for establishing situational relationships between the introduced concepts (object, power grid product, labor intensity, etc.). These rules include both rules of a universal type, for example, to combine into one class concepts that have a general knowledge of a certain attribute, and rules that reflect the specifics of planning and performing work on the maintenance of equipment. The latter serve to describe the way the object interacts with the personnel of the teams performing the work, and take into account limitations, for example, the possibility of changing the frequency of major repairs by a certain amount from the standard terms. In addition, a number of other restrictions are taken into account, such as: the team allocated for the event cannot be removed from it until the end of work, or another restriction - no more than one work can be carried out at the facility at an arbitrarily chosen point in time.

Using the correlation rules, we will write down the most frequently used phrases when plotting a graph:

1. Object O has the name i $A_1 = (Or_0i)$.

2. Object i contains power grid products j $A_2 = (ir_1j)$.

3. Electrical grid equipment j undergoing maintenance or overhaul $A_3 = (jr_0q)$.

4. The frequency of the event is N months $A_4 = (Pr_3N)$.

5. The table consists of s weeks, and so on.

The construction of a calendar schedule for carrying out operational activities is characterized by the creation of certain situations. In this case, the names of the basic concepts may change, for example, maintenance, medium repair, overhaul, which will lead to a change in the set of basic concepts.

We will start developing the model with the simplest phrases, which will later be included in the description of the situation:

$A_1 = (Or_0i)$ – object O named i;

$A_2 = (ir_1PGP)$ – i-th object contains power grid products;

$A_3 = (PGPr_0j)$ – power grid product has the name j;

$A_4 = (jr_2P)$ – electrical network product is subject to operational measures;

$A_5 = (Pr_0q_2)$ – operational measure is a major overhaul;

$A_6 = (q_2r_3T)$ – overhaul has labor input T;

$A_7 = (Tr_4m)$ – labor intensity T is m man-hour;

$A_8 = (mr_5s)$ – m man-hours put in s-th cell;

$A_9 = (sr_6Tb)$ – cell s belongs to table Tb;

$A_9 = (Tb\ r_1S)$ – table Tb contains S weeks;

$A_{10} = (Tr_7Tb)$ – complexity of the overhaul for J products distributed over the cells of the table;

$A_{11} = (Tbr_0G)$ – the completed table has the name graph of planned work.

Using the correlation rule, we obtain the analytical record of the micromodel in the following form:

$$((Or_0i)r_1(PGPr_0j))\wedge((jr_2P)(Pr_0q_2))\wedge((q_2r_3T)(Tr_4m))\wedge(((mr_5s)(sr_6Tb)\ (Tbr_1S)))\ \wedge\ ((Tr_7Tb)\ (Tb\ r_0G)).$$

A graph representation of the microsituation is shown in figure 2.

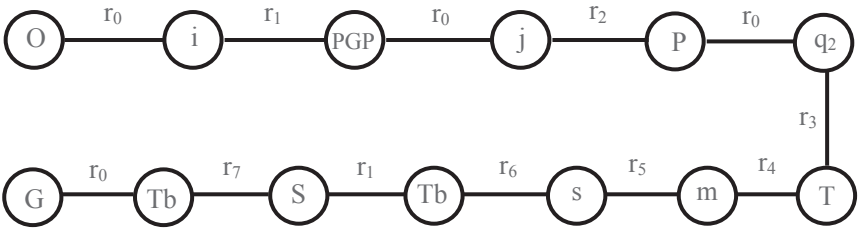


**Figure 2. Graph representation of the micro-situation of planning work on the overhaul of power grid equipment**

The use of semiotic models makes it possible to quite simply and very conveniently present the process of planning work on the overhaul of power grid equipment. The developed methodological approach can be used as the basis for drawing up algorithms for planning the overhaul of electrical networks.

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# SYSTEM MANIPULATOR FOR COLLECTING SPACE DEBRIS AROUND THE PLANET EARTH

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**Abstract.** The article is devoted to a system manipulator for collecting space debris around the planet Earth. Space debris, consisting of fragments of satellites, spent nuclear reactors or individual radioactive elements located around the near-Earth space in the form of radionuclides, is deposited on the surface of the planet, bringing great negative changes to the ecology of our planet. The precipitated radionuclides on the surface of our planet begin to penetrate into living organisms of plants, animals or humans and form viruses of various etiologies in them. Moreover, the viruses of some living organisms, combining with the viruses of other living organisms, create resistant strains that are difficult to predict and change the ecosystem of our planet. The system manipulator can collect space debris to start the fight for the cleanliness of near-Earth space and improve the ecology of our planet.

**Keywords:** system manipulator, space debris collection, radionuclides, ecology of our planet, outer space.

Mankind has been interested in stars, outer space and near-Earth space since ancient times. Being on a fertile land, people were accustomed to the fact that they are supposedly the creators and masters of our nature, who can freely interfere with the laws of our universe. However, many people forget that the totality of all forms of matter in terrestrial and outer space is subject to laws that have been developed for many millions of years, and before interfering in one or another area of science and technology, it is necessary to think carefully about the consequences of making certain decisions. Now the human race is reaping the fruits of its dominion over the forces of nature, which has fully thanked and will still thank the imaginary creators and rulers over our nature in the form of pandemics and other cataclysms.

It should be emphasized that fragments of space debris rotating around

our planet and not emitting radionuclides from various materials pose a danger only to the safe operation of satellites and space stations. The main danger is borne by objects emitting radionuclides from various materials unnatural for nature, which are a source of increased radiation, which were made on earth during complex technical processes using a split atom, where these objects must be caught in the expanses of outer space and disposed of.

Natural radionuclides that have a source of ionizing radiation and contain radioactive material are formed from cosmic rays of galactic origin and come to planet Earth from the depths of the Universe, as well as during flares on the Sun. All radionuclides deposited on the surface of planet Earth are groups of atoms that have the property of radioactivity, with a certain mass number, atomic number and energy status of the nucleus. Cosmic radiation consists of particles captured by the Earth's magnetic field, galactic cosmic radiation and corpuscular radiation from the Sun. It consists of electrons and protons, as well as the nuclei of some light elements. Natural radionuclides generated by cosmic radiation components are formed as a result of numerous and ongoing nuclear reactions with high-energy photons, ions and elementary particles (primarily neutrons).

Cosmogenic radionuclides constantly arise in the stratosphere and upper troposphere (and partly in the lithosphere) due to the reactions of primary and secondary cosmic radiation (protons and neutrons) with the nuclei of stable atoms present in the air (nitrogen, oxygen, argon, etc.). Their maximum concentrations are reached at an altitude of 15 km. The rate of formation of radionuclides grows exponentially up to a certain height, and then drops sharply due to the rarefaction of the atmosphere and the escape of neutrons from its upper layers into outer space. On average -70% of cosmogenic radionuclides are formed in the stratosphere and 30% - in the troposphere.

In natural conditions, at the beginning of the formation of the planet Earth, radionuclides were the founders and participants in all chemical and biological processes occurring in living cells and were the initiators of interaction on all domains of the ecosystem of the planet Earth.

We know that radionuclides, which have a source of ionizing radiation, contain radioactive material that penetrates into a living cell, changes its chemical and biological properties and makes it pathogenic. Such living pathogenic cells are considered to be viruses that infect and change the entire organism, giving it new or altered exceptional properties.

It should be emphasized that knowing the mechanism of the emergence, spread and interaction of viruses that are an integral part of the

ecosystem of the planet Earth, you can take a fresh look at the diagnosis and treatment of affected organisms and correctly prevent the occurrence of any pandemics, but first you need to get rid of the causes that cause them. For these noble purposes, a system manipulator can serve to collect space debris standing from radionuclides of unnatural origin formed from many nuclear reactors that do not have proper protection that are located around the planet Earth.

The system manipulator, fig.1, consists of a rocket body 1 having a divider 2. Inside the rocket body 1 in compartment 3, propellers 5 are located on rotary devices 4. Inside compartment 6 and compartment 7, a set of rotating wave-like elastic metal plates bent into a spiral and connected with limiter. The system manipulator contains control sensors 8, an automatic control system 9 and a rotation mechanism 10. Control sensors 8 include a radioactivity sensor, a proximity and orientation sensor, a metal detector, an automatic approach orientation and control system 9 that control the entire technological process.

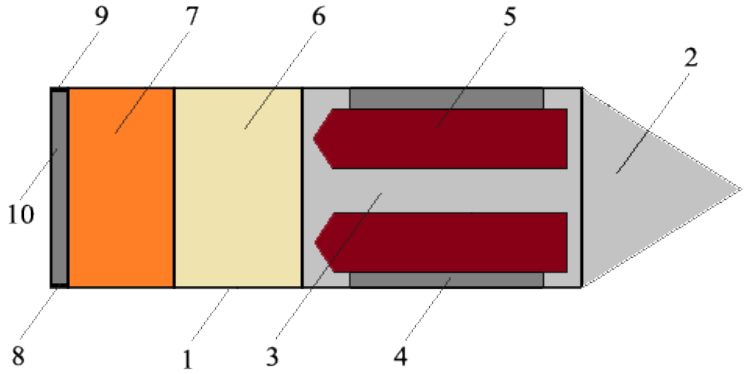


**Figure 1.**

The system manipulator works as follows

Entering outer space, Fig 2, the system manipulator 1 for collecting space debris is in the working position. With the help of rotary devices 4, the propellers 5 are installed in the working position. Further, an increased pressure is created inside the body 11, which removes the divider 2 from the rocket body 1 and straightens the container 12 for storing radioactive waste, and also removes from the compartment 6 and compartment 7 a lot of rotating wave-like elastic metal plates 13 bent into a spiral, which are connected with the limiter 14. After leaving the body, the metal plates

straighten and together with the limiter 14 form a catcher 15. One base of the many undulating spirals 13 is connected to the limiter 14, and the other base of the many undulating spirals is connected to the rotation mechanism 10 and the rocket body 1. After the sensor 8 detects a radioactive object in outer space, a signal is sent to the automatic approach and control system 9, which switches on a plurality of undulating spirals 13. Space radioactive debris emitting radionuclides, falling into the trap 15, with the help of a plurality of rotating wave-like elastic metal plates 13 bent into a spiral and move it through the inner part of the hollow body 11 of the rocket 1 into the container for storing space debris 12.

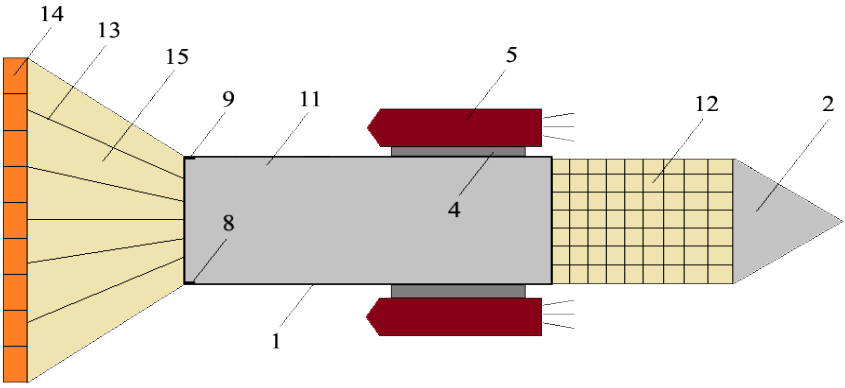


**Figure 2.**

Moreover, it is necessary to emphasize that radionuclides that are emitted from the surface of unnatural radioactive materials located in outer space pose a great danger to all mankind and the ecology of our planet. At the same time, you need to know that the number of radionuclides causing changes in living organisms is estimated at more than 2000 with unstable isotopes and about 270 species with stable isotopes. Depending on the amount of radionuclides that cause changes in living organisms, each type of radionuclide prefers to infiltrate and accumulate only in that living cell that perceives it as its own or cannot resist this pathogenic virus. For example, human lungs during the half-life of radionuclides prefer elements such as plutonium-238, plutonium-239 or uranium-233. The thyroid gland prefers iodine-125 during the half-life of radionuclides. Kidneys in the half-life of radionuclides prefer caesium-137 and so on ...

Among the many negative factors and processes that can affect the human body and its healthy functioning, the radiation field and the effect of ionizing substances on tissues and organs of the human body play an important role. Radiation exposure or contact with many radionuclides contained in the atmosphere of our planet, when in contact with human molecules and tissues, can lead to multiple biological and chemical mutations and cause dangerous diseases. It should be said that a person is constantly under conditions of radiation influence. However, if natural flows of ionizing substances do not have a negative impact and can rarely cause the development of any pandemics or other somatic ailments, then artificial contamination of man-made radionuclides with radionuclides is extremely dangerous and negative. In this case, with the appearance of uncontrolled radioactive radiation emanating from a large number of nuclear reactors of spacecraft, which are located in outer space around our planet, this process becomes irreversible.

In conclusion, we can say that it is very difficult to protect ourselves from uncontrolled radioactive radiation emanating from a large number of nuclear reactors of spacecraft located in outer space around our planet. However, it is even more difficult to make a universal vaccine against various types of pathogenic viruses, since they are accepted differently in different organisms. Pathogenicity is the ability of microorganisms (viruses, chlamydia, mycoplasmas, rickettsia, bacteria, fungi) to cause an infectious process, that is, to penetrate into the human or animal body, use it as an environment for their life and reproduction and cause pathological changes in organs and tissues. For example, this may depend not only on the type of a living organism, on the latitude where it is located, but also on the living conditions of these organisms, their image, behavior, nutrition, or interaction with other types of living beings.

In my opinion, our society needs to gradually get rid of uncontrolled radioactive radiation emanating from a large number of nuclear reactors of space satellites and vehicles that are located in outer space around our planet or switch to new safer technologies that do not create such problems for all mankind from which hard to get rid of. Such technologies already exist, but if this is a costly undertaking, then it is necessary for all countries using spacecraft to unify all alloys and materials used for nuclear reactors used in outer space.

At the same time, it is necessary to emphasize that all vehicles operating in outer space must be equipped with additional propellers and a movement mechanism so that after the guaranteed period of operation of nuclear reactors in outer space, these vehicles, by decision of the control center, could descend into low orbit for natural self-destruction.

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# NOTES

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