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SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

International Conference

Beijing, China 2018

上合组织国家的科学研究：协同和一体化
国际会议

参与者的英文报告

International Conference
“Scientific research of the SCO countries: synergy and integration”

Part 1: Participants’ reports in English

2018年12月12日 中国北京
December 12, 2018. Beijing, PRC

ISBN 978-5-905695-84-1

Materials of the International Conference
“Scientific research of the SCO countries: synergy and integration” - Reports in English. Part 2.

(December 12, 2018. Beijing, PRC)

ISBN 978-5-905695-84-1

这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examines tecnical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.

ISBN 978-5-905695-84-1

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Foreword

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

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

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

Fan Fukuan,
Chairman of the organizing committee of the conference
"Scientific research of the SCO countries: synergy and integration"
Full Professor, Doctor of Economic Sciences,
member of the Chinese Academy of Sciences

前言

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

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

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

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

交换方法分析人类经济活动
EXCHANGE APPROACH TO THE ANALYSIS OF HUMAN ECONOMIC ACTIVITY

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注解。科学知识体系中的“交换”概念具有广泛的解释，不仅可以看作是人类经济活动的一种功能，而且可以看作是一种独立的社会经济和社会政治现象和过程。 “交换”的概念具有科学依据，因此可作为研究和知识的手段和方法。交换的本质揭示了市场和竞争的概念。 “交换”的概念成为经济过程知识的方法论基础，交换方法是经济实体研究的手段和方法。在这方面，交流过程向人类活动的经济，社会，政治和社会领域的扩展变得重要。而且，在业务流程研究和业务实体行为原则的考虑中使用交换方法变得相关 – 等价交换，互利，公平，谨慎。

关键词：交换，交换方法，交换理论。

Annotation. *The concept of “exchange” in the system of scientific knowledge has its broad interpretation, and can be viewed not only as a function of human economic activity, but also as an independent socio-economic and socio-political phenomenon and process. The concept of "exchange" has a scientific basis, and therefore, acts as a means and method of research and knowledge. The essence of the exchange reveals the concepts of market and competition. The concept of “exchange” becomes the methodological basis for the knowledge of economic processes, and the exchange approach is a means and method of research of economic entities. In this connection, the spread of exchange processes to the economic, social, political and social sphere of human activity becomes significant. And also, it becomes relevant to use the exchange approach in the study of business processes and the consideration of the principles of behavior of business entities - the equivalent exchange, mutually beneficial, fair, prudent.*

Key words: *exchange, exchange approach, exchange theory.*

“Exchange” accompanies mankind from the beginning of its social formation and acts as a postulating concept of economic and social science. In the scientific literature, the essence of “exchange” is revealed by the concepts of market and competition, where the first concept reveals the essence of exchange as a mecha-

nism or subject-substantive basis of exchange processes, and the second concept as the environment or conditions of market processes, or the behavior of market participants.

In their theoretical studies, many researchers of economics turn not only to the economic aspects of human economic activity, but also to non-economic — social, political, and social — while remaining economists in their attitude to scientific knowledge. "R. Aaron called K. Marx "an economist seeking to be a sociologist. We adhere to the opposite point of view: this is a sociologist who tried to become a faithful economist. Trying to faithfully follow the canons of classical political economy, Marx constantly returns to the original non-economic issues, while remaining an intermediate, interdisciplinary figure" [1, p. 40].

At the same time, "exchange" as a socio-economic process, as a phenomenon, as a person's behavior, as a mechanism and condition of economic activity deserves separate scientific attention and is an independent theoretical and practical knowledge.

Examination of exchange processes through the prism of an economic approach or the concept of an economic person takes place within the framework of a classical economic school. Here the economy acts as a fundamental science. Further consideration of exchange processes (neoclassicism, etc.) makes the economic approach to the consideration of exchange applied, and competition is viewed from the standpoint of a social, political, institutional approach (neoclassicism, Keynesianism and institutionalism, neoinstitutionalism). Accordingly, the concepts of social, political and social behavior of a person are considered, which determines the applied nature of economics in the study of exchange processes. At the same time, the imperialist function of the classical economic school is not disputable. It gave birth to the concept of "free competition" and the concept of "competition" as a whole. Accordingly, the further *development* of the theory of exchange *must be sought* in *sociological, political, and social sciences*. The exchange theory itself takes on an interdisciplinary hue.

It is this formulation of the question regarding the consideration of the theory of exchange - the conceptual provisions of the theory of exchange, follows from considering the person, his place and role in the exchange processes and from considering the models of human behavior (economic model, social, political and public) as forming the basis of scientific teachings about "Exchange".

Human behavior, namely, motives, value orientations, attitudes, needs and interests, in their specific content serve as a postulate of the exchange theory on which it is built. "It also means that the existence of man as a homo economicus is a passing state. Today, man is crushed by need and enslaved by the division of labor. But his mission ("generic essence") is to be a holistic ("harmoniously developed") personality..." [1, p.44].

Man, as a concept and as an essence, lies at the basis of the analysis of the behavior of economic entities, such as "entrepreneur", "individual", "worker", "employer", on the results of which the exchange theory is built - the theory of the market and the theory of competition.

The link between economic and exchange processes is a person and his behavior in a specific dimensional and temporal space. Due to the fact that economic theory arose, as a product of scientific research, before the exchange theory, it is fair to consider exchange processes, relations, phenomena and relations as economic, i.e. occurring in the economic space with their subject and object of study. By the way, which (subject of study) is modified as time goes on, and with the development of economic thought. Classical ideas about exchange become the most understandable, as the first, because the first theoretical and economic knowledge was formed by the classics, and “exchange” is an integral part, a natural basis, forming and representing an economic space. And “economic man,” or rather his egoistic behavior, expressed in equivalent exchange, is the postulating basis of economic theory itself.

At the same time, economics has and considers various concepts of human behavior. At the same time, she notes that in modern society, more and more factors influence the economy, which by their nature are not economic, i.e. not associated with "equivalent exchange" and the rarity of goods. Consideration of social factors (factors of value and utility of the good), the political factor (factors of competitive advantage) and public factors (factors of competitiveness) becomes relevant. In this connection, there are broad interdisciplinary links between economic knowledge and social, political and public knowledge. Economic theory expands its subject matter and at the same time, realizing its imperialist principle, extends its influence to other spheres of human activity - the social, political and social sphere, thereby forming an economic approach to analyzing human activity in any sphere of its activity.

Similarly, the epistemological processes of economic theory, which shape economics, making it not just a theory (the foundation of knowledge), but also a tool (means and method) of knowledge through interdisciplinary connections (economic approach), it is necessary to trace the epistemological relationship between "economy" and "exchange ".

It can be noted here that, as a classical theory of economics, they postulate the concept of “exchange”, and an economic approach to the analysis of exchange is equally formed. Namely, under the exchange understand the equivalent relationship between producers and consumers (market exchange) about the production and consumption of limited resources (or products), as well as between buyers and sellers (competitive exchange) about the sale and purchase of rare goods.

Following the same logic about the expansion of the subject of study of eco-

nomic science, the exchange becomes the subject of social, political and social sciences with their specific subject of study. It follows that the exchange can be not only economic (equivalent), but also social, political, public (mutually beneficial, fair and prudent). Thus, the "exchange" together with economics was transferred to other spheres of human activity, and perhaps formed their beginning, thereby putting the development of interdisciplinary connections. At the same time, the application of the theory of exchange in other sciences makes it a means and method of knowledge that hypothetically forms the concept of the exchange approach (market or competitive approach) to the analysis of socio-economic and socio-political systems. Consequently, it is fair to speak about the science of exchange or the science of exchange, the postulating element of which is the person and his behavior in the dimensional or temporal space.

On the scientific nature of the exchange can talk on the other hand. Speaking as a postulate of economics, "exchange" is rightly viewed in the concept of independent knowledge, the postulating element of which is equally as in economics, is man. That is, "economy" and "exchange" seem to be independent knowledge. Moreover, within the framework of the classical economic school, the exchange is determined by equivalent relations and connections of the parties, the subject of which are limited resources. Here an economic approach to the analysis of exchange is formed. With the development of society, and with this development and with the expansion of the subject of human life (from the socio-economic aspects to the socio-political aspects), other multiple approaches to the analysis of exchange are formed. This is a social approach, where the value and usefulness of the good becomes the subject of exchange, and the exchange is characterized by the mutually beneficial relations and relations of the parties to the participants. This is a politicized approach, where the subject of exchange is the "value chain" of the business entity, and the exchange is characterized by fairness of the relations and relations of the parties to the participants. This is a social approach, where the subject of exchange is a complex of qualitative characteristics of a business entity, and the exchange is characterized by prudence in the relations and connections of the parties to the participants. Thus, the exchange involves the consideration of various approaches to their definition, and therefore has both interdisciplinary communication and the theory of knowledge itself (see Table 1).

Table 1. *Gnoseology of approaches to the analysis of socio-economic and socio-political aspects of human life*

Economic theory approach				
The approaches of economic theory	Classic approach	Neoclassical approach	Keynesian, monetary, institutional approaches	Neoinstitutional approach
Types of economies	Market economy	Associative Economics	Institutional economy	National economy
Human behavior model	Economic man	Social person	Political person	Public person
Subject of economics	Resource constraints	Satisfaction needs	Achieving goals or getting results	Establishment of norms, values, traditions and attitudes (culture)
Principles of human behavior	Liberalism	Democracy	Conservatism	Socialism
Behavior strategies	Individual freedom	Full Membership	Unity	General equality
Exchange approach				
Exchange approach	Economic approach	Social approach	Political approach	Social approach
Types of exchange	Free exchange (competition)	Perfect exchange (competition)	Regulated exchange (competition)	Civilized exchange (competition)
Human behavior model	Individually oriented behavior	Socially-oriented behavior	Institutional-oriented behavior	Nationally-oriented behavior
Exchange item	Rarity of goods	The value and usefulness of the good	Competitive advantages (subject value chain)	Competitiveness (complex characteristics of the object)
Principles of human behavior	Equivalence	Mutual benefits	Of justice	Prudence
Behavior strategies	Diversification	Cooperation	Consolidations	Globalization

That is, the concept of “exchange” permeates the entire sphere of human activity and, under certain historical conditions, could form the fundamental basis for the consideration of human activity. In this case, the economic basis of human activity, with its model of behavior - the “economic person”, could not have a dominant function. Social, political, and social principles for constructing and describing human life activity could come to the fore. Thus, the scientific nature of the concept of exchange has a solid basis, both independent knowledge and theory.

Also, the concept of "exchange" has its practical meaning and carries a certain functional load in the life of an individual and in the life of society as a whole. The categorical nature of "exchange," as a concept of economic, sociological, political, and social sciences, manifests itself and is revealed through consideration, comparison, and comparative analysis, with the economic aspect of human activity.

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在员工技能发展的基础上确保企业的竞争优势
ENSURING COMPETITIVE ADVANTAGES OF THE ENTERPRISE BASED ON THE DEVELOPMENT OF STAFF SKILLS

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注解。该研究旨在根据员工的关键能力确定企业人员的发展。描述了在人员能力发展的基础上确保企业竞争优势的程序。为了形成人员能力的形成和发展过程，提出了企业人员能力的等级模型。本文介绍了人员行为模式评估的一个例子。能力评估的结果清楚地表明了一个人必须具备的能力才能成功有效地履行职责并在专业领域取得成功。基于开发的能力模型评估员工能力，可以诊断员工发展的个人成分。根据基于能力模型的人员能力评估结果，公司管理层对人员个人能力的发展给出了明确的建议。

关键词：员工关键能力，企业竞争优势，人员发展，人员行为模式评估，能力模型，员工个人能力。

Annotation. *The study aims to determine the development of enterprise personnel based on the key abilities of its employees. The procedure for ensuring the competitive advantages of the enterprise on the basis of the development of personnel abilities is described. To formalize the process of formation and development of personnel abilities, a hierarchical model of abilities of the personnel of an enterprise has been proposed. The article presents an example of the evaluation of personnel behavior patterns. The results of the assessment of abilities clearly demonstrate what abilities a person must possess in order to successfully and effectively fulfill their duties and be successful in the professional sphere. Assessment of staff abilities based on the developed ability models allows to diagnose the personal component of staff development. Based on the results of the assessment of personnel abilities based on the model of abilities, the management of the company was given clear recommendations on the development of individual abilities of personnel.*

Keywords*: key abilities of employees, competitive advantages of an enterprise, personnel development, assessment of personnel behavior patterns, ability models, individual staff abilities.*

Introduction. In modern economic conditions, the strategic priority of the enterprise is an effective strategy for the development of personnel management. The role of a person, the requirements for manpower and his professional training of an industrial personnel enterprise is currently changing significantly in the current conditions of economic development. The peculiarity of the modern development of the business environment of enterprises is constant, complex, chaotic and unpredictable changes, which require enterprises, on the one hand, to constantly adapt to new operating conditions, and on the other hand, to search for new competitive advantages within the enterprise, using the potential of intra-organizational factors for effective organizational development. One of the most important factors is the development of personnel, as well as its abilities as a pledge to ensure competitive advantages. It is the capabilities of the personnel of enterprises that acquire particular importance in the context of the fact that personnel are the bearer of knowledge and abilities that are crucial for ensuring the competitive advantages of enterprises: the knowledge, skills, experience and abilities of personnel are transformed into competitive advantages of enterprises and thus become integral. condition for the formation of their key abilities.

Business owners expect from their employees and managers independence, initiative, inner consciousness and responsibility. Such employees do not need to be managed in trifles, they are independently capable of setting operational goals for themselves and developing themselves and their subordinates to achieve them. Such ideology requires the formation of new approaches to the management of personnel behavior and values and the introduction of HR-management tools such as developing feedback, training, coaching and, of course, models of abilities and competencies that act as connecting standards, since it is the abilities and competencies and form the necessary standards of employee behavior.

Research results. Over the past 20 years, emphasis has shifted significantly in the requirements for the professional abilities of staff. In general, abilities associated with managing and solving problems are in the first place (recently, the complexity of these problems has increased, since abilities to solve complex problems are in the first place in the ratings).

The formation and development of the personnel abilities of enterprises provides the company with significant competitive advantages associated with an individual approach to the individual, identifying key knowledge, skills and abilities of the employee and their use in the formation and development of personnel. This should lead to the fact that the competences and abilities of each employee

will be used precisely in the area where they can bring maximum benefit, and his work will be the most productive.

Thus, the development of enterprise personnel based on the key abilities of its employees implies the expansion and strengthening of knowledge, skills, experience, value systems and motives, behavioral patterns of employees aimed at achieving both individual and corporate goals. In this regard, ensuring competitive advantages of enterprises is based not only on the formation and implementation of activities aimed at developing the professional abilities of employees, such as learning ability, creative problem solving, analytical skills, cognitive abilities, ability to work with large volumes of information, orientation for the future - but also the creation of favorable conditions for the development of such abilities that determine the employee's ability and desire for professional have development through the formation of its individual goals. One of these goals is continuous training, which provides staff with the development of skills, and the company - competitive advantages.

The company's activities can be presented in the form of intellectual, innovative and productive activities, where intellectual assets create a resource base, including the intellectual potential of staff, as a source of productivity growth. The dynamics of changes in business and the rapid obsolescence of acquired skills constantly force organizations to develop key personnel abilities.

Constant socio-economic development requires continuous resolution of important issues related to improving the quality of the workforce, the formation of a powerful industrial complex, the revival of roles, the prestige of working professions and the social protection of workers. World practice shows that the requirements for knowledge, professional skills is complicated.

Thus, the urgent tasks are to determine the characteristics of the key abilities of the labor personnel and the development of the corresponding system that ensures the continuous development of the personnel of the enterprise.

Ensuring the competitive advantages of the enterprise based on the key capabilities of the personnel is carried out through the processes of personnel development. Personnel development covers two main practical areas of activity of the enterprise: organizational development is different - training and development. In today's competitive environment, it is difficult to fundamentally differ from a competitor: all resources are almost equally available in the market.

Therefore, in economically developed countries have begun a very active search for reserves and new competitive advantages. If organizational development is focused on the organizational level and is related to individuals, then learning and development is focused on individuals and development-related enterprises [1].

Commonly defined ones are:
- professional education;
- career management;
- organizational development.

Most forms of enterprise personnel development can be carried out on the basis of the formation of models of abilities, which corresponds to the best international HR practices. Foreign experience shows that professional development of an employee is a profitable investment in an enterprise. The possibility of using models of abilities in the development of enterprise personnel is presented in Table 1.

Table 1. *The possibility of using models of abilities in the development of personnel*

Staff development	**Ability to use models of abilities**	**HR practices**
Corporate training	Organizational development goals Staff development goals Preliminary staff assessment *based on competencies* Staff adaptation Identify training needs Selection of staff for training (*based on assessment of skills*) Formation of directions and content of corporate learning based on abilities Definition of types of training Assessment of learning outcomes (*based on ability models*)	Staff planning and payroll Staff adaptation or prior system Decision making system regarding the end of the probationary period of a new employee Development of qualification requirements for key positions based on models of personnel abilities (abilities, behavioral skills, attitudes)
Career Management	Personnel assessment based on ability models Identification of personal potential of employees *based on abilities* Staff selection (according to ability) The placement of personnel in accordance with their potential abilities to achieve organizational goals (*ability models*)	Staffing system Staff selection system Staff bonus system
Organizational development	Defining organizational goals for staff development Staff development goals Improving the competitiveness of enterprises in the labor market *(based on ability models)*	Staff selection system

Research approaches to the formation and development of staff abilities in the system of development of personnel of the enterprise made it possible to form a scientific and methodological approach to the development of personnel of the enterprise in the context of ensuring the competitive advantages of the enterprise. The theoretical basis of the developed approach is the use of a competence-based approach in personnel development, and the formation of a procedure to ensure competitive advantages of an enterprise based on the development of personnel abilities, model structure and approaches to assessing personnel abilities significantly expands the functionality of personnel development (in the context of ensuring competitive advantages of an enterprise).

Personnel competence modeling allows you to link human resource management with an enterprise strategy: a competency model is a descriptive tool that identifies the skills, knowledge, personality, and behavior needed to effectively perform work in certain positions and helps businesses achieve strategic goals.

The procedure for ensuring competitive advantages of an enterprise based on staff development is presented in Fig. 1.

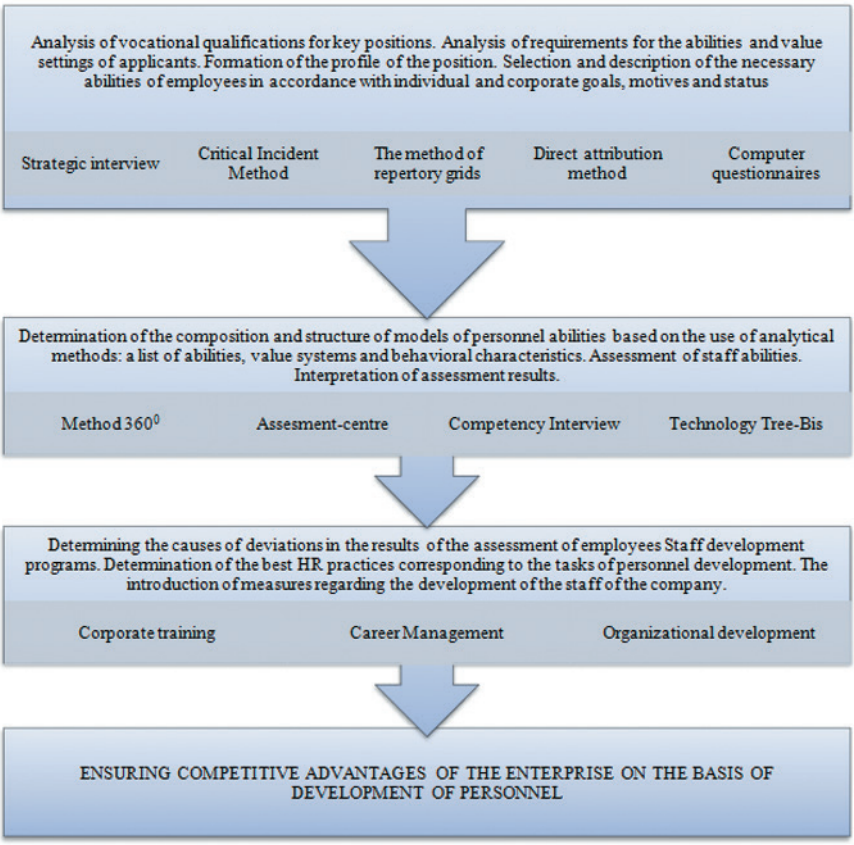

Figure 1. *The procedure for ensuring the competitive advantages of the enterprise based on the development of personnel abilities*

The development of abilities of the personnel of an enterprise is carried out through the formation of models of capabilities. Ability models are an integral part of the staff competency model, which refers to the combination of personal and professional qualities (characteristics) of enterprise personnel and behavioral indicators, which allow to determine the most significant knowledge, skills, abilities necessary to achieve the goals in specific conditions [2].

To formalize the process of forming and developing the capabilities of the personnel of the enterprise, we have proposed a generalizing hierarchical model of personnel abilities (Fig. 2).

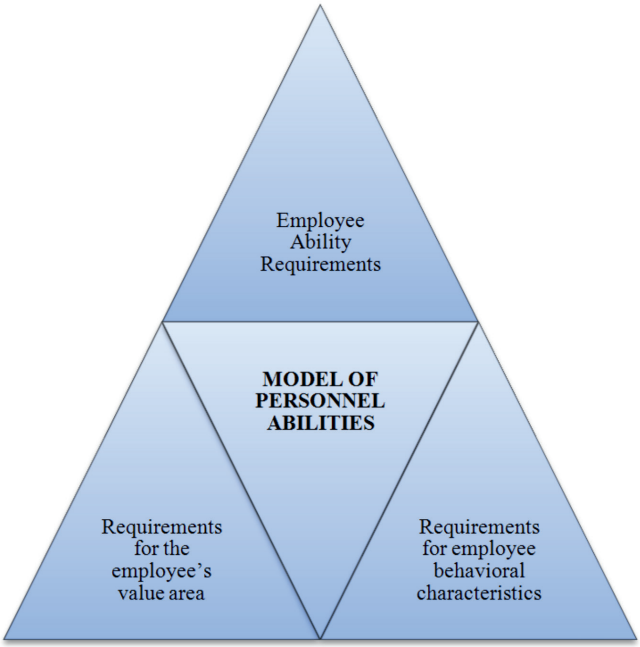

Figure 2. *Hierarchical model of enterprise personnel abilities*

The staff capacity model contains information on the knowledge, professional skills, interpersonal skills, behavioral and sociocultural characteristics of an employee, which are necessary for successful work in a position. The results of the analysis of the ability model contain characteristics grouped in three blocks:

- a hierarchy of requirements for abilities, which contains 23 key abilities in order of importance for a given position, which reflect the degree of expression of each of them in a particular employee;

- hierarchy of requirements for values (6 types) - requirements for positions placed on the value areas of a person and reflecting the existing factors of motivation. This section explains why and in what atmosphere an employee can and should work in order to achieve high results in work;

- hierarchy of requirements for behavioral characteristics (8 characteristics) - shows the characteristics of employee behavior necessary for effective work in the position. The higher the behavioral characteristic is, the more important it is for the position, the less discomfort will be felt by the employee who possesses this characteristic, and the more efficiently he will work.

According to the results of the assessment of staff abilities based on the model of abilities (personal and professional qualities and abilities, employee behavioral patterns), the management of the company is given clear recommendations on the development of individual staff abilities:

- assessment of personal and professional qualities of staff;
- assessment of the importance of personal and professional qualities of staff;
- 15 of the most powerful behavioral patterns (examples);
- 15 behavioral patterns (examples) that received a minimum rating;
- behavioral examples and personal qualities of the employee;
- assessment of personal and professional qualities in comparison with the importance of these qualities;
- comments and recommendations for staff development.

An example of the evaluation of personnel behavioral patterns are presented in Table. 3

Table 3. *An example of the evaluation of behavioral patterns of staff [3]*

Behavioral pattern	Recommendations
The ability to quickly and calmly respond to changes in the situation and take the necessary measures	In hotel cases, restrain emotions.
Ability to solve several tasks simultaneously	Cope with large amounts of work
Ability to solve several tasks simultaneously	The most valuable quality for a manager
Calmly perceives and implements predetermined stages of work.	Always performs tasks on time
Inspires those around you with a clear vision.	Rarely communicates with people informally.
Supports the ability of others to work thanks to the ability to clearly organize and direct their activities	Differs in excellent organizational skills

Assessment of staff abilities based on the developed ability models allows to diagnose the personal component of staff development. The data obtained from the results of such an assessment provide the manager with information on how to make the most effective use of personnel:

- identification of key employees whose knowledge and abilities are particularly important for the position, planning the number of staff and the wage fund;
- placement of personnel according to the identified abilities;
- changes in the organizational structure of the enterprise (the introduction of new positions or the elimination of existing ones, changing the working conditions of some employees, allowing them to increase personal effectiveness);
- determination of the need for training of personnel, forms and methods of training;

- formation of a personnel adaptation system;
- the formation of the concept of mentoring in the enterprise;
- definition of organizational goals for staff development.

Conclusions. The proposed methods will affect the development of the company's personnel abilities and will provide competitive advantages by increasing staff productivity and quality, increasing staff motivation to improve the knowledge, skills and abilities of staff, which in general will increase the overall efficiency of the company. In general, the development of personnel abilities allows achieving organizational goals in the field of HR-management, ensuring high standards of human resources development and ensuring the achievement of competitive advantages through the use of knowledge, talents and abilities of personnel.

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范式方法论作为企业成长理论系统化的基础
PARADIGM METHODOLOGY AS THE BASIS FOR SYSTEMATIZATION OF THEORIES OF CORPORATE GROWTH

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注解。 本文证实了使用范式方法分析关于公司增长模式的科学思想发展的可能性，以及确定三种主导范式的基础 – 因果范式，增长结果范式和过程范式。 企业成长的理论和模型是在选择其基本特征的基础上提出的，这些特征构成了将组织视为机械或有机系统的每种范式的核心。

关键词：范式，企业成长，组织成长模型，机械和有机组织，系统方法

Annotation*. The article substantiates the possibility of using the paradigm methodology for analyzing the development of scientific ideas about the patterns of corporate growth, as well as identifies the foundations of the three dominant paradigms - the causal paradigm, the growth results paradigm and the process paradigm. Theories and models of corporate growth are proposed on the basis of the selection of their essential features that constitute the core of each of the paradigms that treat organizations as mechanical or organic systems.*

Keywords*: paradigms, corporate growth, models of organizational growth, mechanistic and organic organizations, system approach*

Introduction

Formulation of the problem. The paradigm methodology has become widespread in studies of the laws governing the development of scientific knowledge after the publication of the book “The Structure of Scientific Revolutions” by T. Kuhn [1]. On the extensive material on the history of science, T. Kuhn showed that “normal science” is the development of scientific knowledge within the framework of the dominant theory underlying the paradigm, which produces themes, research goals and suggests methods for achieving them. According to Kuhn, the absence of one dominant paradigm and the coexistence in a certain scientific field

of a multitude of hypotheses, theories, concepts, and even the presence of two competing theories, which most researchers gather around themselves, is a sign of the immaturity of the scientific field, its "predigm" state. The adoption of this criterion sharply narrowed the concept of science, scientific theory, creating the problem of assessing knowledge.

Further development of the methodology of science allowed to overcome this difficulty. In particular, the methodological tools of the paradigm approach were supplemented with ideas about the conceptual “core” that unites the theories of the paradigm, the idea of the coexistence of several paradigms at the “normal science” stage, about the evolution of scientific knowledge, various aspects of which were studied by I. Lakatos [2], C Tulmin [3], P. Feyerabend [4], C. Polanyi [5] and other representatives of the post-neopositivist philosophy of science. As a result of the work of these and a number of other methodologists of science, T. Kuhn did not quite correspond to the ideas, but a more realistic view of the evolution of scientific knowledge, according to which its development is carried out within several paradigms.

The methodology of paradigms can be successfully applied in economics to identify and systematize the trends of its development [6]. The advantages of this methodology are as follows:

• first, it allows you to systematize theories, highlighting their common methodological, general scientific and private scientific foundations or principles that constitute (in the terminology of I. Lakatos) the “core” of scientific research programs;

• secondly, to form a view on the development of a particular discipline as a twofold process: the development of both theories included in the paradigm and its core;

• thirdly, to substantiate the idea that all the paradigms of a given subject area are explored only by individual aspects of the subject that are “programmed” in the paradigm.

• fourth, the concept of a paradigm makes it possible to make a forecast regarding trends in a particular discipline, based on the idea of the “maturity” of a paradigm.

Based on these considerations, the task of the research can be formulated as follows: to make a classification of the concepts of corporate growth by combining them into each group around their common theoretical-methodological core, the structure of which can be represented in an explicit form, that is, characterizing them as belonging to one or another paradigm growth.

Review of literature and research methods. The field of study of the laws and conditions of corporate growth has a rich history of the development of scientific ideas and is full of many theories, concepts and models that aim to define the conditions and reveal the growth mechanisms of organizations. A significant

number of them gave rise to a specific problem - the classification of the growth concepts of a company that finds certain solutions in a number of works [see, eg: 7; 8; 9; 10; 11; 12; 13].

Even a quick glance at these typologies allows us to note that, usually, authors rather arbitrarily select features that they consider in the context of their own research goals as essential as the basis for classification. These can be, for example, such growth characteristics as its pace, localization of its driving forces, sources (primarily in different versions of the firm's resource theory), impact on growth of environmental factors, competitiveness as a growth factor, level and types of organization's adaptation to environment as a growth condition (population-ecological theory of a company), key competences, innovations, features of production organization (for example, TQM methods or lean management as growth levers) and much more. At the same time, the selection of attributes that are essential for classification corresponds to the dominant research idea: for example, developing recommendations for choosing a strategy or a system of anti-crisis measures.

The variety of principles and foundations of classifications of growth theories testifies to their artificiality. This conclusion is reached by researchers who systematically deal with this problem. Thus, American scientists A. Macpherson and R. Holt, highlighting 13 theories of firm growth that differ in various aspects, conclude: "The goal of our research was to identify empirical data that could serve as the basis for further study of business growth. However, the data we found only indicate a multitude of frequently occurring asymmetric connections between entrepreneurs, consumers, consultants, technologies, whose contribution to growth cannot be considered by one common set of classification criteria and recommendations" [14, p. 186].

Considering a large number of different approaches to the study of the growth of the company, A. Code comes to similar results. He concludes that theories that try to explain growth do not in themselves always correspond to reality in the sense that newly discovered facts often not only do not fit into them, but even often contradict them, which creates a big problem for empirical confirmation of such concepts. But in this case their "scientificness", in the sense of the ability to generalize judgments, their universality and significance, is called into question. A. Code writes: "We found that the theoretical basis for understanding the growth of a company is very limited, even deceptive. The only way we see the true path of empirical analysis. We would recommend using the methodology of G. Simon, in accordance with which the actual data are first subjected to practical testing, and only then summarized in theories, which verify the hypotheses that have emerged "[15, p. 59]. It is difficult to agree with the advice of A. Koud regarding the shift of attention to the empirical level. It is difficult to make correct generalizations based on empirical observations, since the growth of a particular firm is highly

individualized and often proceeds with a large degree of uncertainty. And even if we provide a more qualitative level of empirical observations, the following generalizations in the form of theories themselves will not reduce, but multiply the number of growth models, making the overall picture more variegated, and the task of classifying theories more complicated.

Research results and discussion

In contrast to the artificial, with its fairly arbitrarily chosen bases, the natural classification should group growth theories around their common theoretical and methodological core, the structure of which can be represented explicitly, that is, characterizing them as belonging to a particular corporate growth paradigm.

The main structural element of the core of the corporate growth paradigm is one or another understanding of the basic organization model, which stems from the dichotomy of the “mechanical / organic” organization.[1].

The main methodological feature of the mechanical model is the complete reducibility of organizational processes to a set of causal relations between the constituent parts of an organization (reductionism). In this sense, an organization is like a clockwork, where the movement of any part of it can be explained as a result of the impact of a particular cause (force, torque, etc.). In the organizational reality picture created on the basis of such representations, if surprises and uncertainties arise, then it is only as a result of incomplete information collected or errors in constructing a model of the reality being studied.

In the end, mechanistic, deterministic ideas about the ways and possibilities of researching organizations and their growth formed the "mainstream" of organizational science. Such a dominant and present view of corporate growth, which unites many concepts, models, theories, and approaches, is called the *causal growth paradigm*.

The causal paradigm opens up wide possibilities for research. It includes all the many causal relationships, hypothetically generating organizational growth, determining its characteristics, as well as hindering growth. In general, the research methodology of the causal paradigm is fully consistent with the hypothetical-deductive model of the development of scientific knowledge adopted in natural science: a hypothesis is put forward regarding the causal relationship between two (or more) phenomena, then the statements obtained from it are deductively approved under verification procedure given the status of empirical law (laws).

Often, researchers hypothesize the existence of several reasons for growth and build corresponding models, which is quite acceptable in the framework of the causal paradigm. For example, B. Gilbert, P. McDougall and D. Audrech define

[1] One of the most thoughtful classifications of mechanical and organic models of organizations belongs to G. Morgan. [16].

the availability of available resources, a clearly defined company growth strategy, its favorable market and geographical position and, what is significant, the presence of an entrepreneur's personal qualities as necessary and sufficient growth factors. clarity of goals, will, willingness to take risks, ability to make optimal strategic decisions, knowledge and skills [17].

Models of the causal paradigm can be quite complex and require special techniques and skills for their verification. Such, for example, is the growth model based on a balanced scorecard, first proposed by R. Kaplan and D. Norton [18]. But this complexity is seen as the production of a large number of causal relationships, which, moreover, are in interaction and interrelationships, which leads to the emergence of dependencies of a higher order than linear ones.

The research success of the theories and models of the causal paradigm depends on the solution of the following five problems:

1. correct, reasonable allocation of the unit of analysis or the object of study;
2. understanding of the essential features of the difference in growth patterns;
3. the possibility of extrapolating the revealed patterns of growth into the future;
4. the right choice of growth indicators;
5. identifying differences in the degree of readiness of firms to grow.

In case of successful solution of these problems, an empirical level is provided for verifying hypotheses and constructing a specific growth model for the firm.

The principal difference of the organic model is that the organization considers it as a complex system consisting of a set of subsystems connected by heterogeneous connections, the properties of which cannot be derived from the properties of the subsystems (the methodology of holism). Such a system is in a quasi-stable state with its surroundings, at the same time demonstrating the emergence (appearance of new properties) and signs of dissipative structures capable of self-organization and increasing their own systemic complexity. Two paradigms are built on such conceptual foundations: the growth outcome paradigm and the growth process paradigm.

The paradigm of *growth results* considers the organizational changes resulting from growth as the subject of their analysis. Here we are not talking about the reasons for growth, but its consequences: approximately as in the case of a pediatrician who controls the anatomical and physiological manifestations of a child's growth, without raising the question of the reasons for growth as such. This paradigm focuses on studying the phases of the life cycle of organizations, the characteristics of their passage, raises the question of the existence of special zones in them fraught with an increased risk of growth crises - a kind of "bifurcation points", is studying the organization's relations with the external environment, primarily its stakeholders. The focus is on the problems and difficulties of growth

and how to overcome them, questions of the theory and practice of organizational change. [19].

The growth outcomes paradigm serves an important mission in management: it kind of tells the managers what changes can occur on the development trajectory of their organization, what threats may arise in this connection. Numerous life-cycle models that are part of this paradigm unite the notion that growth is not a rigidly deterministic process caused by one or several reasons, but a change in the current state of dynamic equilibrium of an organization and its environment by another state of equilibrium, the impetus for which situational factors generate crises threatening the existence of organizations. L. Greiner first drew attention to this circumstance, calling them “periods of substantial turbulence located between relatively quiet periods of evolution” [20, p. 194].

The methodological foundations of the growth outcome paradigm include a population-ecological approach, which is rather widely represented in modern economics. The similarity, on the one hand, of the life cycles of populations of one species, occupying certain ecological niches, the mechanisms of adaptation and interaction between which are studied by the ecology of populations, and on the other, competing groups of companies in one industry whose competitiveness and competitive strategies are studied by strategic group analysis and similar methods , gave rise to numerous “biological” analogies, the most famous of which are models of the ecology of organizational populations, the basis of which laid R. Nelson and S. Winter in the early 1980s [21] and the organizational concept of DNA [22]. In the model proposed by R. Nelson and S. Winter, individual firms from the “population” change in accordance with patterns that mean “the relatively unchanged position of the firm, which it occupies in relation to non-standard, non-pattern-related problems that it has to face” [21, p.54].

Moving further into the logic of growth restrictions of a firm through “patterns”, standards of behavior or stereotypes, it is possible to come to an analogy with the DNA of living organisms, in which various stages of genes are activated at different stages of ontogenesis, which first trigger the growth and maturation mechanisms, and then aging, degradation and death.

The concept of organizational DNA seems to explain the nature of the results of growth, providing it with analogies, and in this incarnation, at first glance, is similar to the objective function of the theories of causal paradigm. However, this is only an appearance, since organizational DNA does not deduce the reasons for the changes, but is a peculiar form of their fixation, being, according to American researchers G. David and G. Nilsson, "a metaphor denoting the fundamental factors determining the nature of the organization and helping to explain its effectiveness" [23, p. 7].

However, in addition to the explanatory function of metaphor, organizational

DNA also performs a methodological function specific to the paradigm of growth outcomes that S. Thomas defined, characterizing DNA as "a method or tool used to identify the difficulties that an organization faces in its development, hindering its effectiveness, as well as ways to overcome such difficulties" [24, p. 102].

Theories and models of the process paradigm of corporate growth are focused on identifying and describing changes that accompany the growth of organizations or are necessary for their growth. Thus, the concepts that make up this paradigm, not only describe the stages of growth of the company, but also explore what happens with the organization at these stages. Their research task can be formulated as a question: "how does growth affect the structure of the organization and its business processes?".

Within the framework of this paradigm, an image of a growing organization is created, in which, in connection with growth, changes occur literally in all areas of its operation. The rates of change and their localization are individual, difficult to predict, so it is difficult to formulate general rules or regulations for growth - the theories of this paradigm are descriptive (that is, they record events and describe what happened).

The subject of the theories of the process paradigm are the special characteristics of growth characteristic of a particular organization. The paradigm explains why it is impossible to copy the success of outstanding companies, and attempts to turn in detail the case studies of the success of leading companies into step-by-step instructions for moving to the top of efficiency and productivity usually have no chance of becoming a reality. This idea was expressed by E. Garnsey and co-authors as follows: "The growth of firms is rather disordered, chaotic, multidirectional, rather than straightforward and ordered based on general principles and rules, and the options for growth of a company cannot always be predicted" [25, p. 3].

The process paradigm presupposes the existence of different development trajectories for different organizations, thereby including in their foundations the principles of incrementalism and equifinality, [26] orienting researchers to understand the individuality of growth, the uniqueness of particular events that led to this (sometimes outstanding) result, thereby legitimizing randomness, as an essential condition for growth. In practical terms, when developing growth strategies, the paradigm focuses planners on creativity, the search for individual ways and methods, as if warning against copying someone else's success even in its "creatively reworked" version.

Conclusions

Concluding consideration of the paradigms of corporate growth, we note that these three growth paradigms do not exhaust the entire field of possible hypoth-

eses and rational assumptions about growth. Rather, they sufficiently cover possible approaches to understanding the mechanisms and phenomenology of organic growth. And on this assertion only recently (at least until the end of the last century) one could put an end. However, in recent decades, new models and concepts of growth have emerged, namely, models of external or supra-organizational growth, which demonstrate new forms of its manifestation and the rapid emergence of a new paradigm of corporate growth - integration, which is evidenced by an increasing number of publications discussing principles or foundations of such a new paradigm. Perhaps it will combine, above all, well-studied growth options through mergers, affiliations, acquisitions, and relatively new models and methods of external growth — outsourcing, the formation and development of inter-organizational network structures, different types of vertical integration associations, strategic alliances and other forms of integration, arising as a result of inter-organizational interaction, which will increasingly take on the features of a new paradigm as the methodological and general theoretical concepts become clearer Intsipov lying in the core of such a paradigm.

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开展复杂的运动专项体能训练，提高篮球运动员的运动效率
DEVELOPMENT OF A COMPLEX OF EXERCISES SPECIAL PHYSICAL TRAINING TO IMPROVE THE PLAYING EFFICIENCY OF BASKETBALL PLAYERS

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注解。 考虑了篮球学生在高中培训过程中组织培训过程的特点。 一系列特殊体育锻炼的发展旨在改善教育过程的组织形式，并寻求最有效的方案来结合不同强度的负荷。 练习复合体和电路训练方法的结合在提高篮球运动员的游戏效率方面起着主导作用，并且直接取决于竞争负荷和精神紧张的指标。

关键词：篮球，投掷准确性，速度力量训练，游戏活动，体育活动，循环训练方法。

Annotation*. The features of the organization of the training process of basketball students during their training in high school are considered. The development of a set of exercises of special physical training is aimed at improving the forms of organization of the educational process and the search for the most effective options for combining loads with different intensity. The combination of the complex of exercises and the method of circuit training plays a leading role in increasing the gaming efficiency of a basketball player and is directly dependent on the indicators of competitive load and mental tension.*

Keywords*: basketball, throw accuracy, speed-strength training, play activity, physical activity, method of circuit training.*

Modern basketball is an athletic game, characterized by high motor activity, great intensity of game action, which requires the player to maximally mobilize functional capabilities and speed-strength qualities. This is one of the most popular games in Russia, which is explained, first of all, by the availability of this sport (low cost of equipment and equipment, the possibility of self-construction of the site, the relative simplicity of its content, etc.).

Basketball consists of natural movements (walking, running, jumping) and specific motor actions without a ball (stops, turns, movements with added steps, feints, etc.), as well as with a ball (catching, passing, dribbling, throwing). Such a

variety of movements contributes to the relationship of general and special physical training of an athlete.

Special physical training plays a leading role in the formation of the basketball player's movement abilities and is directly dependent on the characteristics of the equipment, the tactics of the game, the indicators of competitive load and mental tension. It is carried out in close connection with the mastery and improvement of skills and abilities in basketball, taking into account the conditions and nature of the player's use of these skills in a competitive environment. The basketball player's play activity is very diverse and acyclic in nature, associated with variable intensity, interspersed with rest periods. The low level of physical fitness of a basketball player limits his basketball player abilities while mastering the technical and tactical arsenal and improving it. For example, a basketball player who is not well developed jumping ability, can not master the modern technique of a jump in a jump and participate in the fight for the ball at the shield.

The leading role in basketball is played by speed-strength abilities. According to the science in basketball, more than 70% of movements are of speed-power character. However, when moving in a protective stance, pulling out the ball and other so-called hard actions, considerable static efforts are required. Therefore, the strength training of the player must be versatile and develop muscle strength in various modes.

An important kind of muscle strength is explosive strength, reflecting the ability to exert as much strength as possible in the shortest possible time, governed by the conditions of sports exercise or game action. Basketball players use this kind of power in jumps, fast-breaks, powerful long passes.

The effectiveness of means in teaching basketball depends largely on the methods of their use. The choice of methods is carried out taking into account the tasks, the level of preparedness of students and specific working conditions. Depending on the task, the same tools can be used in different ways, using different methods. In addition, it should be borne in mind that the sequence of tasks in each type of training and the sequence of the types themselves have a certain logical connection, the nature of the tasks in one type of training changes qualitatively, creating the basis for another type of training.

Basketball consists of natural movements (walking, running, jumping) and specific motor actions without a ball (stops, turns, movements with added steps, feints, etc.), as well as with a ball (catching, passing, dribbling, throwing). The confrontation, the objectives of which are to take the opponent's basket and protect one's own, causes the manifestation of all the physical qualities vital for a person: speed, speed-strength and coordination abilities, flexibility and endurance. Almost all the functional systems of his body are involved in the work, the main mechanisms of energy supply are included. Achieving a sporting result requires

the players to have a sense of purpose, perseverance, decisiveness, courage, self-confidence, a sense of collectivism.

The relationship between skills of the game and physical qualities is widely used in the domestic system of upbringing and education. The success of sportsmanship, the skill of a basketball player depends on many factors of an objective and subjective nature, which can reduce the performance of an athlete, in the technique of teamwork, in the accuracy of throws around the ring. That is why the study of factors affecting the accuracy of throws is a rather topical issue, the development of which will allow the coach to use them in their work in order to achieve an increase in the playing efficiency of basketball players.

The basketball player's activities in the game are not just the sum of separate methods of defense and attack, but a set of actions united by a common goal into a single dynamic system. The correct interaction of team players is the basis of collective activity, which should be aimed at achieving the common interests of the team and, relying on the initiative and creative activity of each player.

Each player must not only be able to attack, but also actively defend his ring. To intercept the ball from an opponent or not give him the opportunity to make a throw, it is necessary to react promptly and correctly to all his actions, given the location of the players of the opposing team, partners and the location of the ball. The game activity is based on the stability and variability of motor skills, the level of development of physical qualities, the state of health and intelligence of the players.

By participating in competitions, a basketball player performs a great job: for a game, a highly qualified athlete overcomes a distance of 5000-7000 m, making 130-140 jumps, a lot of jerks (up to 120-150), accelerations and stops. Movement at high speed combined with gears and throws the ball in the basket. Studies have shown that a basketball player participating in the game without a substitute, directly operates with the ball for only 3.5-4 minutes, and the rest of the time plays without a ball.

In recent years, the game has intensified significantly. This is expressed, above all, in increasing the maneuverability and mobility of the players, in an effort to vigorously fight for the ball or place at each site of the site. Intense physical activity during the game requires a huge expenditure of effort.

The essence of the game will be disclosed incompletely, if you do not take into account the great tension of the nervous system of the players and the need for moral and volitional efforts to achieve victory. Knowledge of all parties that characterize the activities of a basketball player helps to plan training and competitive processes, to create regulatory frameworks or model characteristics, to achieve which the training process should be directed [1, p. 87].

By the nature of muscular activity, the jump belongs to the group of speed-

strength exercises with an acyclic structure of movements, in which the maximum power efforts having a reactive-explosive character develop in the main link of the jerk. Speed-power abilities manifest themselves in various modes of muscle contraction and provide rapid movement of the body in space. Their most common expression is the so-called "explosive" force, that is, the development of maximum stresses in a minimum short time - the jump.

Distinguish between general jumping, which means the ability to perform a jump (up, long jump) and special jumping ability - the ability to develop a high repulsion speed, which is the main link in the education of jumping ability, i.e. combination run and jump. Thus, jumping ability is one of the main specific motor qualities that determine the speed of movement in the final phase of repulsion. The faster the repulsion, the higher the initial take-off speed.

To effectively perform the jump, both in height and in length, it is necessary to have good speed-strength qualities. The jumping index is very important for playing basketball. The higher this figure in an athlete, the more he brings to the whole team. Jumps are used in the game as when pushing with two legs and one foot in different game situations.

Also jumping is necessary when making shots around the ring, since all experienced players do this in a jump. Throws around the ring can be made both from the spot - with vertical repulsion (or with a body tilting back) with two legs and in motion - the repulsion can be with two legs, but in most cases one foot (depending on the game situation). The higher the player pushes when making a ring, the harder it is to play defense actions against him.

Improving the efficiency of the learning process of playing basketball is largely dependent on the ability of the teacher to build all the material in a certain sequence, observing the principles of continuity in learning and taking into account the age characteristics of the players.

In the training process of preparing students-basketball players at the Samara State Technical University, a set of exercises of special physical training of basketball players is used. The combination of this complex and the method of circular training of players leads to a significant increase in the efficiency of the game interaction of basketball players in the university team.

The circular training method sets itself the task of comprehensively educating physical abilities with the active independent exercise of students and control by the teacher, over the effect on the body system. The effectiveness of this technique lies in the fact that the density of classes is significantly increased, as all students exercise at the same time and at the same time independently, commensurate with their capabilities and efforts. This form of organization has a great educational value: students have the practice of conducting self-study, which is the basis for preparing them as players of the university team.

Circular training is an organizational and methodical form of work that involves continuous, sequential execution of a specially selected set of physical exercises for the development and improvement of strength, speed, endurance, and especially their complex forms - strength endurance, speed endurance and speed strength. Those engaged in moving from one exercise to another, from a projectile to a projectile, from one place of execution to another, moving as it were in a circle. Having completed the last exercise in this series, they return to the first one, thus closing the circle.

In the physical training of basketball players, circular training gives the opportunity to independently acquire knowledge, to form physical qualities, to improve individual skills. In this process, one of the most important tasks of a teacher should consist, on the one hand, in modeling special complexes and developing algorithmic instructions for their implementation, and on the other hand in the ability to organize and manage students' independent activities in basketball lessons.

In circular training, the algorithmic prescription refers to the strict implementation of specific exercises, specifically selected and concentrated in a given time interval, providing the necessary effect, and, consequently, the rapid development of motor skills in a relatively short period of time.

For a circuit training session in basketball, make up a complex of 8-10 relatively simple exercises. Each of them should affect certain groups of muscles - arms, legs, back, abdominals, and should also be aimed at fixing (repetition) of special exercises (basketball elements). The simplicity of movements allows you to repeat them many times. Performing exercises at a different pace and from different starting positions affects the development of certain motor skills. Combining individual acyclic movements into an artificially cyclic structure through their serial repetitions enables the complex development of motor qualities and contributes to an increase in the overall performance of the body.

Before the start of a circular training session, an individual exercise is set for each student. This is done with the help of the so-called maximum test (MT). The maximum test is determined in the first two classes. After reviewing the exercises after they are shown and explained, students, at the command of the teacher, begin to perform the intended exercise at their stations in the stipulated time of 30–45 seconds, trying to do the maximum number of repetitions for themselves.

Determining the maximum test at each station, you need to pause for 2-3 minutes to rest. At this time, students record the number of repetitions in a personal record card and then move on to the next station, where they take their starting position for performing the next exercise. After 2 to 3 minutes, the maximum test of this exercise is determined, etc. After determining the maximum test for each individual load is set depending on the preparedness of the group.

In subsequent classes, students perform each exercise of the complex, a set

number of times, but in different versions. Each exercise of the complex (one lap) is performed a specified number of times at a strictly stipulated time (30–45 sec.), Trying to perform each movement as precisely as possible. Perform the entire complex (one lap) for a strictly determined time, repeating each exercise in an individual dosage for each (set number of times). The body of students gradually adapts to a systematically repeated load, as a result, it is necessary to gradually increase it, increasing the dosage of exercises.

Circuit training carried out in the classroom in basketball, is a holistic independent organizational - methodical form of training and at the same time is not limited to any one method. It includes a number of private methods of strictly regulated exercises with selective and general effects on the body involved.

There are the following main types of circuit training:

1) according to the method of continuous exercise (primary focus on endurance);

2) by the method of interval exercise with a hard interval of rest (the primary focus on strength and speed endurance);

3) by the method of interval exercise with full rest intervals (preferential focus on strength, agility and specialized endurance).

Option 1. Exercises are carried out without pauses, but with a target time. After the exercises have been learned and the maximum test (30 seconds of exercises and 30 seconds of rest) is held at each station, the training time is recorded for a single lap of the round with the dosage MT / 2 or MT / 4. The travel time of one lap is multiplied by the number of laps (depending on the number of stations), the target time is obtained. With a standard amount of exercise, students in a class should strive to reduce the lap times. Increasing the load is carried out by defining a new MT or moving to a more complex complex.

Option 2. Exercises are conducted without interruption with a standardized training time and a standard number of repetitions, but with a different number of rounds. After the exercises are learned and MT is determined at each station according to the principle - 30 seconds. work and 30s. rest, training is conducted with standard training time. The dosage and time of passage of each circle remain standard, and the number of circles increases. The advantage of the third option is also in the ease of fixing time. This allows the teacher to constantly monitor the course of the training, the students record the number of laps and stations covered in the achievement card.

Circular training, organized by the method of interval exercise with full rest pauses during intensive-interval work with a power of up to 75% of the maximum, is a type of interval training that aims to develop speed and strength endurance and has two options. In the first case, 10–15 seconds are practiced at each station. with rest pauses 30–90 sec., which depend on the training effect of the load. The

increase in load is due to the reduction of training time from 15 to 10 seconds. subject to maintaining the same number of repetitions, but in a shorter time.

In the second version, work at each station is not limited by time, and each exercise is repeated a maximum of 8 to 10 times on average, and the rest pause ranges from 30 to 180 seconds. depending on the training effect of the load [2, p. 114].

Increasing the load is the same as in the first version, due to the implementation of exercises at a faster pace with a constant interval of rest. During the rest, relaxation and stretching exercises are used to better recuperate and prepare the body for the next work.

To achieve an increase in the game efficiency of basketball players is one of the most important tasks that a circular training solves. In physical education, this type of training process provides an opportunity to independently acquire knowledge, to form physical qualities, to improve individual skills and abilities. In addition, circular training allows you to simulate the game situation. Therefore, it is very important to carefully select exercises for circuit training, to carry out complexes of exercises in the required time mode. Hence the need for the further development of sets of exercises for special physical training to increase the effectiveness of the interaction of basketball students in terms of gaming activities.

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后现代主义对教育专业化趋势的影响
THE INFLUENCE OF POSTMODERNISM ON THE TREND OF PROFESSIONALISM IN EDUCATION

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注解。 文章介绍了后现代主义对儿童和青少年发展的影响。 后现代社会文化影响下的教育实际问题。 揭示了教师专业化的本质和教师的实际教育任务。分析了俄罗斯教师职业化发展的趋势。

关键词：教育专业化，后现代社会文化，发展趋势，学校，NEET一代。

Annotation*. The article presents the influence of postmodernism on the development of children and youth. The actual problems of education in the context of the influence of social culture of postmodernism. The essence of pedagogical professionalism and actual educational tasks of teachers are revealed. Tendencies of development of professionalism of the Russian teachers are analyzed.*

Keywords*: pedagogical professionalism, social culture of postmodernism, development trends, school, NEET generation.*

The development of education in the 21st century is becoming a priority task for most countries of the world, not only for positive changes in science, economics and social life, but also to overcome the negative factors associated with the socio-culture of postmodernism, which everywhere affects the socialization of children and youth. Professionalism in education is considered today as the most important and necessary condition for the creation of pedagogical systems in which the process of socialization provides young people with decent opportunities for development and self-realization. Such opportunities are limited by the impact of the postmodern socioculture common in the civilized countries of the world [5].

The phenomenon of socioculture is today in the zone of close attention of scientific studies of philosophy, sociology, ethnology, psychology, pedagogy and other sciences because of its penetration into all spheres of society. Initially, the concept of social culture was introduced by P. Sorokin to denote the integration processes of the influence of a particular culture on certain aspects of social, eth-

nic, economic and political relations [5]. Moreover, the specificity of such influence is determined by the results that affect the interests, needs, motivation, behavior and goals of the individual. That is why the studies of modern education in different countries are increasingly turning to the phenomenon of postmodernism as a determining factor in the socio-cultural processes.

Post-modern socioculture negatively affects the younger generation for several reasons.

First, it determines the excessive value of consumer goods, bringing it to the level of fetishization. Special reverence, admiration and exaggeration of the significance of things, their cult in society leads to the devaluation of genuine values, blocks the understanding of their meaning for human life.

Secondly, it reflects eclecticism and syncretism, which is manifested in the combination of disparate elements that are incompatible phenomena. The mixing of phenomena occurs by chance without taking into account the phenomena of harmonization, conformity or belonging to one class of things. The social effect of the "trashcan" as an illustration of the modern Internet accompanies many educational processes in various countries of the world. The very concept of informational garbage was most widely spread in the twenty-first century, when subjects of education began to use the Internet everywhere, in many cases replacing all other sources of information with it.

Thirdly, the socio-culture of postmodernism is characterized by the loss of faith in the power of science and progress, ignoring the importance of education for successful socialization and human activity. Interest in chaos, denial of system and order, attention to disorder and the importance of small - all these are signs of the destruction of many values of the past. In fact, there is a denial of harmony and the creation of conditions for immersing a child in the sphere of uncertainty, where you can find anything and have any result that is not necessarily associated with development.

Fourth, a whole generation of young people who do not want to study and get an education, are not interested in finding a job or any reasonable employment, the so-called NEET generation (Not in Education, Employment or Training), which includes young people in age from 15 to 29 years [2]. In recent years, in many countries of the world, such social groups of young people who are living at the expense of parents, refusing social interaction, having no friends and unwilling to start a family, so as not to be responsible for the children and their home, are being studied. It is obvious that such young people have big problems with socialization and low self-esteem. What do they fill their lives with? They spend most of their time on the Internet, which corresponds to their clip thinking and syncretic view of the world. Therefore, the personal degradation of such young people is determined by excessive involvement in the Internet, not only as a virtual reality, but also as a special form of activity that provides them with a comfortable self-perception.

It is obvious that the preparation of children for creative adult life becomes the most important pedagogical (teaching, educating and developing) task of parents and teachers. Therefore, the requirements for pedagogical professionalism are becoming more stringent and systemic.

In Russia, the majority of researchers characterize professionalism through the ability of a specialist to perform their work efficiently and effectively in various conditions, and constantly and reliably. Therefore, systematic, effective and reliable results of the activities are the main signs of any professionalism. As for pedagogical professionalism, it is characterized by the same signs, plus a high level of mastering the psychological structure of professional pedagogical activity, which includes five main components: gnostic, organizational, communicative, projective and constructive [3,4]. For the first time this psychological structure of professional pedagogical activity was proposed by N.V. Kuzmina, and her approach was so universal that it is relevant today [3,4].

In essence, these five components are general educational activities that are significant in the educational process. This is due to the fact that the knowledge of his subject and the ability to teach it (the gnostic component); the ability to work with social groups of students, whether it is a school class or a student group (organizational component); developed communication skills and interaction with all subjects of education (communication component); the ability to make promising educational and thematic plans, develop educational projects (projective component), as well as the ability to design their own activities and the activities of students (constructive component) - all this is necessary for each teacher in modern society.

In general, pedagogical professionalism, the essence of which remains unchanged, is realized in modern education with due account of new requirements, since some other aspects of work are being actualized. Teachers need today to pay special attention to the educational areas of their activities related to the semantic aspects of students' life. At the same time, teachers need to maintain the self-esteem of schoolchildren in conditions of very tough social competition, both in school and in society. In the Russian Federation, when assessing the professionalism of employees of educational organizations, a professional standard comes to replace the qualification reference book. More precisely, professional standards (for fixing professional requirements for teaching staff of different levels and areas of activity). Professional standards contain lists of a significant amount of necessary knowledge, skills, abilities, abilities and competencies that professionals must possess. It is in the standards that new educational tasks are defined that teachers should be able to solve.

Unfortunately, the modern educational system of any school is not ideal for solving actual psychological and pedagogical problems. Many theorists and practitioners of pedagogy turn to the educational experience of the Soviet Union, as

one of the most effective for the harmonious development of the child's personality. Attempts to use this experience are returned to educational practice, especially in order to achieve the educational effect of professional pedagogical activity.

In general, the following can be singled out as the main trends in the development of the professionalism of education specialists.

First, the standardization of the professional activities of teachers in all areas of its implementation. Development of professional standards for teachers in various fields of education, priority status of standards (federal, state, regional, etc.) in the preparation and implementation of educational programs in educational institutions.

Secondly, the change in the functionality of pedagogical professionalism in the direction of the demand for new functions of the teacher when working with students: moderator, tutor, PC user (IT technology), etc. Most of the new functions are associated with the informatization and computerization of the educational process, the development of social networks and their relevance in the modern human life.

Thirdly, the high dynamics of the normativeness of the professional and social functions of the pedagogical profession, manifested in the increasing importance of the legal documents regulating the activities of teachers in the modern education system. The constant change or refinement of educational regulations, which periodically increase the requirements for employees of educational institutions, tighten the system of control over their activities and define the rights and obligations of each subject, is fixed in most countries of the modern world, but the Russian Federation is one of the countries with the highest rates of regulatory modernization of education .

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关于运动心理学要素在排球运动员专业和应用体育教育过程中引入的问题

TO THE QUESTION ON THE INTRODUCTION OF ELEMENTS OF SPORT PSYCHOLOGY IN THE EDUCATIONAL PROCESS OF PROFESSIONAL AND APPLIED PHYSICAL TRAINING OF STUDENTS WITH ELEMENTS OF VOLLEYBALL

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注解。 在教育过程中基于排球元素使用的一般训练方法由运动心理学的元素补充。 讨论了在体育部MSTUCA中使用这种训练方法的结果。

关键词：一般体能训练，专业应用体能训练，表现，恢复工具，伤害预防，排球运动员，运动心理学，外部竞赛。

Annotation*. The general method of training based on the use of elements of volleyball in the educational process is complemented by elements of sports psychology. The results of the use of this method of training in MSTUCA at the Department of Physical Education are discussed.*

Keywords*: general physical training, professional-applied physical preparation, performance, recovery tools, injury prevention, volleyball players, sports psychology, external competition.*

1. Relevance of the task

The development of technology contributes to the mechanization, automation of production processes. Physical activity of an employee is increasingly being turned off from production. In order to compensate for the lack of physical activity of the specialists of the ground civil aviation services, a technique of vocational applied physical training (VAPP) has been developed by means of volleyball.

The main objective of the study is to prepare specialists of ground services for the future profession. This does not exclude not only physical, mental and mental training, but also the ability to focus on the smallest details of the production sector. Flight safety depends on the work of operators, dispatchers, mechanics, engineers of various services. Proper use of VAPP allows future professionals to apply knowledge, skills, and abilities when performing their production tasks. Exercise

helps to improve health, increase the tone and efficiency of the employee, create a comfortable working environment, and are also a major factor in the prevention of occupational diseases and injuries.

Therefore, the search for new scientifically based forms, means and methods of physical education that meet the requirements of scientific and technological progress is currently the most important task of the theory and practice of the physical culture movement ([1-5]).

On the basis of observations of various violations in the posture of students, the work concluded that it is necessary to include elements of sports psychology, the foundations of which are outlined in [6], in the training process. It is emphasized that psychological gymnastics is not ordinary gymnastics. It does not contribute to the pumping up of muscles, but, correcting sensations disturbed by stresses or injuries, gives prerequisites to further properly load the muscles with the help of traditional gymnastics. The monographs of T. Hann [7] and M. Feldenkrais [8] were studied. The aforementioned authors noted that stressful situations can lead to gradually developing impaired posture and this can be firmly entrenched in the nervous system. For example, the "memory" of an organism about a previous trauma or prolonged stress can be fixed in the central nervous system, from which distorted signals can be received in various parts of the body. This may manifest itself in the future, despite the fact that the factors that caused these violations are no longer present. For example, such a paradox - after amputation, a person's hands may be disturbed by pain in an already non-existent hand. To remove such violations, the above authors have created a special gymnastics. In the present study, the authors' gymnastics [7-8] was adapted for classes with students in the hall. This aspect is highly relevant in the preparation of airline dispatchers in the context of flight safety.

Obviously, the full use of professional knowledge is possible with good health, high performance of young professionals, which can be acquired by them with regular and specially organized physical education and sports. Consequently, the quality of physical fitness is of major socio-economic importance. Research shows that it is impossible to completely solve these problems with a general physical training, since it is necessary to take into account the specific requirements of the specialty to which students are trained. Therefore, physical education must contain elements of VAPP, which should be included as an independent section in the program of physical education. The most effective means for a full-fledged VAPP are sports games, in particular, volleyball.

2. Research methods

2.1. Analysis of existing VAPP techniques in preparing students using sports games (volleyball).

One of the main directions of the restructuring of higher education is to intensify the process of preparing future specialists, aimed at developing their independent and creative activity. In this regard, there is a need to improve training at the university and the formation of students creative attitude to their future profession.

The tasks of improving the learning process in higher education and, in particular, in the field of physical culture and sports are associated with its intensification and intensification. For this, it is necessary to change the traditional system of education in its generally accepted understanding: it forms, basically, knowledge, whereas modern conditions require, above all, a wide range of professional skills.

Training volleyball players is a complex pedagogical process that is constantly being improved. The basic principle of building educational work in groups of sports improvement and in training groups at the university is universality in setting tasks, choosing means and methods for all involved, observing the requirements and in-depth study of the characteristics of each student.

The main forms of volleyball in universities are:

- training sessions in the hall, in open areas, at the stadium, etc .;
- self-study (on the instructions of the teacher);
- classes in sports improvement groups;
- Massive sports and recreational activities in their free time.

According to the Japanese coach Y. Matsudaira, five of the following factors are needed to achieve great heights in volleyball:

- physical strength, physique;
- mental training, will;
- tactics, technology;
- teamwork, cohesion;
- experience.

None of these factors can be neglected.

A number of tips and recommendations from a creatively working coach (S. Onium) is given in [9]. Here we are talking about the fixation of an object with a glance, about a psychological mood, about relaxation, about timing, about concentration, about preventing injuries, etc.

Currently, in most sports in training, a variety of additional developmental and special exercises are used. Volleyball from them does not stand aside, because the athletic qualities of an athlete do not manifest themselves in isolation from each other, but in a certain complex with a certain amount of their interaction.

3. The purpose of the study

The purpose of my scientific research is that the formation of basic study groups at a higher educational institution should not depend on the level of athletic training, qualifications, or good physical data of students. The meaning of training future specialists is that they will all be prepared according to a specially developed VAPP method, taking into account volleyball for each specialty in a particular university

(MSTUCA). The technique will enable each student to significantly improve and strengthen precisely those physical qualities that will be necessary in their future professional activities.

4. Objectives of the study

Theoretical and practical classes in the course "physical education" according to the curriculum are held in the main academic department. The theoretical classes (lectures and seminars, as well as group conversations) highlight the following topics:

- physical culture as an academic discipline in higher education;
- natural-scientific foundations of physical education;
- The basics of a healthy lifestyle;
- mode of motor activity and performance;
- basics of physical and sports training;
- professional-applied physical training of future specialists.

5. Results of the study

At the I - II courses, the passage of educational material, the reception of control exercises and norms takes place in six stages, comprising two macrocycles (two semesters).

The analysis of existing methods for VAPP in the educational process of students using sports games (volleyball) was carried out and VAPP indicators were compared for two groups of students:

General group with standard physical training;

An expert group with specialized volleyball training showed an advantage in mastering volleyball techniques in comparison with a regular group. The applied method of the training process effectively allows students to quickly implement and strengthen volleyball skills, which later will be useful in production activities as an applied physical training, which allows to increase employee productivity.

6. Conclusions

The advantages of the educational process in groups with a specialized volleyball program are shown.

The original methodology of the training process in the main academic department has been developed, which allows each student to significantly improve and strengthen precisely those physical qualities that will be needed in their future professional activities.

A system and methodology for the selection of volleyball players in the group of sports improvement based on the results of control standards has been developed.

Developed a training process in the sports department with the use of gymnastics, based on the elements of sports psychology.

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俄罗斯联邦学龄儿童的工程和技术教育是该国科学和技术发展战略的实施方向之一

ENGINEERING AND TECHNOLOGICAL EDUCATION OF SCHOOLCHILDREN IN THE RUSSIAN FEDERATION AS ONE OF THE DIRECTIONS OF IMPLEMENTATION OF THE STRATEGY OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT OF THE COUNTRY

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注解。 本文介绍了俄罗斯联邦学校教育条件下工程技术教育的发展和实施情况。

关键词：工程技术，教育，学童，俄罗斯联邦。

Annotation*. The article describes the development and implementation of engineering and technological education in the conditions of school education in the Russian Federation.*

Keywords: *engineering-technological, education, schoolchildren, Russian Federation.*

The scientific and technological progress in the Industry 4.0 format, as the fourth industrial revolution, the global competences of the future Future Work Skills, forced the government to reflect on many issues, which led to the choice of current strategies to change the socio-economic conditions in the country. So in December 2016, President of the Russian Federation V.V. Putin signed a decree "On the strategy of scientific and technological development of the Russian Federation until 2035". The development of Russia in the field of science and technology has led to the improvement of the education system, its modernization and fundamental changes. One of the priorities of educational policy, which demonstrates the importance, political significance and the need for technological re-equipment of production, providing them with highly professional staff, is engineering education. The Ministry of Education of the Russian Federation is a key element in organizing a planned and progressive policy in the development of advanced engineering education in the country.

The formation of engineering competencies as a strategy of engineering and technological development of the state must begin at the school level. One of the main components at this stage is the motivation of students who see themselves in the future as highly qualified Russian engineers who possess world professional competencies and who want to make a personal contribution to the development of science, industry, and the economy of the country. In the education system there is an interrelation between the process of education and upbringing, they are interconnected and united, and they interpret an important rule: progressive education and upbringing is a single process of formation of creative individuals with a high level of knowledge, intelligence and patriotism. [one]

According to the strategy of scientific and technological development of the Russian Federation, the Department of state policy in the field of education, developed a project "Development of engineering education", the purpose of which is "Ensuring the training of highly qualified engineering personnel in demand in the labor market. Increase the prestige of the profession "engineer". In the implementation of the project "laid the road map", the implementation of which goes in three directions:

• prestige of engineering areas and specialties;

• modernization of the content of engineering education;

• Determination of the optimal volumes and structure of engineering training based on the involvement of key employers in the process of the formation of target numbers for citizens.

Orientation to engineering and technological training of schoolchildren in the framework of technological education is becoming increasingly in demand in educational institutions of the country. This is due to [2, 3]:

• growth of the industrial production sector (the so-called re-industrialization of the economy);

• the need to train highly qualified engineering personnel, which today are in demand not only in the industrial sector, but also in the services sector (telecommunications and communications, transport, housing and public utilities);

• changing priorities in engineering training related to the integration of knowledge and professional activities, attention to scientific and technological literacy and competence, the desire for convergence in engineering training.

As part of the national-technological strategy, there are a number of decrees of the President of the Russian Federation and decisions based on the meeting of relevant committees of the State Duma to study in the educational process robotics, modern additive technologies, nanotechnologies, etc. In response to the challenges of the post-industrial society and the strategic directions of development of the Russian economy and education regional programs of engineering (engineering and technology) preparation of schoolchildren appear (Moscow, Novosibirsk

region, Penza, Chelyabins th region and others). Since 2014, in the Chelyabinsk region, the Concept of the development of natural-mathematical and technological education "TEMP" [4]. The strategic objective of the concept is based on the idea of achieving a competitive level of quality in natural-mathematical and technological education in general education organizations in the region through the rational use of socio-pedagogical, informational and technical-technological capabilities of organizations and enterprises in the educational, industrial and socio-cultural spheres, and mass media, parents and other interested persons and structures. In the Novosibirsk Region, since 2013, engineering classes have been opened on a competitive basis (from 6th to 11th classes in more than 15 general educational organizations). Competitive selection is carried out in order to create and develop specialized classes for organizing the training of gifted children in engineering and technology in general educational institutions located in the territory of the Novosibirsk Region [7]. An analysis of the curricula of engineering and technology classes in general education organizations in the Novosibirsk region shows that technology (1 hour per week), drawing (1 hour per week), mathematics (3 hours per week), fundamentals of robotics (0, 5 hours per week), introduction to engineering specialty (1 hour per week). At the expense of extracurricular activities, programs such as robotics, design and research, experimental physics, aeromodelling, computer simulation, engineering graphics and other elective courses in engineering, including professional tests, are being implemented. Since September 1, 2015 in Moscow, by the order of the Moscow Department of Education, the project “Engineering class in a Moscow school” is being implemented [8]. The aim of the project is the development of natural science pre-profile and profile engineering-oriented education for the formation of students' motivation to choose a professional activity in an engineering specialty, assisting students in professional self-determination, development, social and psychological adaptation. Parallel to this project, the Kurchatov Convergent Education Project (“Kurchatov Center for Continuing Convergent Education”) operates in Moscow, which is aimed at improving the quality of science education (through subjects - physics, chemistry, biology, geography), both at the baseline and at the core levels through the creation and use of specialized laboratories [6].

Analysis of the implementation experience of engineering and technological training of schoolchildren allows you to highlight some priorities in the content and technology of the implementation of this area of technological education:

1) the creation of engineering (specialized) classes at the level of pre-profile training and specialized training of schoolchildren;

2) the inclusion in the content of engineering training additional hours for the study of technology, drawing, mathematics, information technology, as well as an elective course in engineering (engineering, introduction to the engineering profession, etc.);

3) integration of natural science, mathematical and humanitarian training in the engineering profile (due to elective courses of integrative orientation, the problems of research and projects, the use of specialized laboratory equipment). One of such new courses with educational potential in engineering and technological training is robotics;

4) wide use of modern equipment and technologies (designers, laboratory equipment, programmable machines, 3D printers, interactive tables, etc.), which constitute the necessary technological environment for engineering and technological training;

5) emphasis in the applied methods and training technologies on research and design activities, including taking into account the specifics of engineering design. [five].

The development of engineering and technological training in Russian schools allows us to consider this direction of technological education of schoolchildren as one of the main, creating opportunities for students in their professional self-determination, and for educational organizations that implement a promising education profile for education.

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未来老师的创新能力
INNOVATIVE COMPETENCE OF A FUTURE TEACHER

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注解。 本文代表了在职业教育现代化条件下整合未来教师创新能力形成知识的社会和教学方法； 实际解决学生创新能力形成的问题； 考虑未来教师对创新职业活动的准备形成的特殊性。

关键词：未来教师的创新能力，创新的专业活动，个人和职业发展，创新能力要素。

Annotation*. The article represents the social and pedagogical approaches to integration of knowledge of formation of future teacher's innovative competence under conditions of professional education modernization; makes actual the problems of student's innovative competence formation; considers the special features of formation of future teacher's readiness for innovative professional activity.*

Keywords*: future teacher's innovative competence, innovative professional activity, personal and professional development, elements of innovative competence.*

Training of a future teacher for the innovative activities is a very hot topic, occupying minds of the modern teaching community. And in the last decade because a number of the political, cultural and educational reasons the concepts "innovative competence", "innovative activities", became a subject of special attention of a large number of researchers.

The concept "innovative activities", according to the researchers Lazarev V. S., Martirosyan B.P., serves for removal of nonconformity between desirable and actual, that requires certain innovations (innovative changes). Activities, during which implementation are made the purposeful changes in pedagogical and management systems of an educational institution, leading to increase of its efficiency, are named *innovative* [9; 10].

Researchers note that the innovative activities answer their purpose if they perform certain functions in relation to the educational activities: identification of current requirements (identification of problems) for changes within the pedagogi-

cal system (educational programs, technologies, personnel, material and technical basis, etc.); identifications of the existing developments, whose use potentially could increase the quality of the educational activities on some its sites (identification of *opportunities of development* of the pedagogical system); independent development of innovations; designing of the desirable future and movement thereto; designing of private innovations; practical implementation of innovations.

Training of a future teacher for the innovative teaching activities in the context of professional readiness of a teacher should be perceived under the conditions of improvement of the education as a unity of theoretical and practical readiness and capability of the personality to perform professional activity taking into account new growths in the field of upbringing, training and education in general. The result of the process of formation of future teacher's readiness for implementation of the innovative activities is his innovative competence.

The category "innovative competence" is considered by us through the general superordinate concept "innovative activities" and the concept "professional competence of a teacher". In the textbook of the pedagogics under the editorship of V. A. Slastyonin the following definition is given: "The concept of the professional competence of a teacher therefore expresses a unity of its theoretical and practical readiness for implementation of the teaching activities and describes his professional competence" [21, P.30].

Despite the existence of various approaches to interpretation of the concepts "competence" and "competency" we will adhere to the following: *competence* is the generalized characteristic of the professional competence of a specialist regardless of his personal qualities. It exists formally, apart from its direct carrier and needs assignment.

On the contrary, the *competency* is the personified competence, manifestation of "an individual in a profession". In this case close connection with the professional competence, mastership is observed. And we justifiably understand achievement of personal and professional manifestation of mastership by the teacher of a certain level in his innovative activities as the innovative competence.

In other words, the innovative competence is the result of theoretical and practical readiness of the teacher for implementation of the professional activity using effective innovations.

It is possible to present the content of the innovative competence of the teacher in the context of his professional competences in the form of competences for work with an innovation (acquaintance, acquisition, implementation) in the context of training, educational, research, organizational and methodological types of the professional teaching activities. The innovative competence concerns the following basic components of the professional training of the teacher: axiological reference points of the professional training; structure of the process of the profes-

sional training; content of the process of the professional training; pedagogical tools of the professional training; pedagogical conditions of the professional training.

The first approach (functional) is connected with practice of creation and organization of the educational process. In works of S. N. Novikov, L.S. Podymova, V. A. Slastyonin, V. A. Khutorskoy the system of professional training of the teacher for the innovative activities is analyzed in the project and standard relation, that is from the point of view of statutory requirements for its creation and organization of the educational process at a higher education institution.

Supporters of the functional approach treat the innovative competence as the mechanism of implementation of axiological reference points and content of the productive professional training, which are realized through the organizational and pedagogical conditions, which build the professional training. Owing to the fact that study is the main work of a student, and "formation of the innovative competence" is considered as a component of the single educational process in the form of formation of readiness for the innovative activities through study continuation. Formation of the innovative competence of a future teacher is connected with such types of activity as training, upbringing, development, professional enhancement; self-education; participation in programs of the academic mobility and insight into schools of sciences, innovations in the education; participation in grants; accomplishment of the special training program (specialized master's programs); passing introductory, production and pre-graduation practice; management of own educational activities; following of own educational path of study; experience exchange; activity of a future teacher involving self-actuating and receipt of the possibility of good employment, etc.

Within the functional approach the interrelation of the innovative competence and the *labor competence* is noted. The interrelation, according to V. I. Boyko, N. V. Vasiliev, I. O. Maltseva, is shown through axiological orientations of the professional training. "Labor competence is the specific form of the social behavior in the sphere of employment, consisting of involvement of workers in the professional community in the sphere of employment, which is becoming related according to a nature of work (complexity, qualification). The labor competence as the integrity, through which may be implemented both one, and several types of professional and common cultural competences" [15, P.20].

According to S. N. Novikov, namely the unique (of innovative nature) education is one of the main steps on the way to the highest social status: gives an individual the chance to develop his capabilities, to master properly a profession and, respectively, to climb higher on a social scale, having got a good education. At the same time, the innovative competence illustrates goodness of the process of its achievement. Owing to this fact the innovative competence of the education

substantially causes the social mobility of the student's personality and promotes his personal fulfilment [16, P. 18].

The innovative competence, being a component of the educational process, performs a number of functions: promotes adaptation of students to new social and educational environment, disclosure of professional and common cultural capabilities, obtaining mastership and new opportunities for personal fulfilment in the modern global world.

Representatives of *the second approach* (personal) are E.I. Artamonova, L.K. Grebenkina, L.P. Illarionova, L.S. Podymova, who determine the innovative competence as the instrument of self-development, professional enhancement of the teacher's personality. Training of a future teacher for the innovative activities is analyzed in the personal and strategic relation, are accented both existing, actual, and potential opportunities and capabilities of the personality to self-development.

Researchers consider the "innovative competence", first of all, as a method of personal fulfilment of the individual and see its main role in formation and development of personal qualities of the teacher. Supporters of this approach believe that the "innovative competence" promotes: appearance of young people with broad-based knowledge, high intellectual level, ready for professional communication; gives the fair opportunity for obtaining and transfer of knowledge and is the tool of cultural and intellectual exchange; develops knowledge, skills and capabilities of the student; encourages his aspiration to life-long education and self-education; promotes cultural and academic exchange and cooperation, personal growth, learning new skills and abilities of a future specialist for successful participation in the public life after completion of a course.

The innovative competence may be also considered as a form of the selective biography (autobiography) and promote appearance of the person, being more independent in his creative manifestation. The innovative competence strengthens belief of the person that he is able to cope with the changed surrounding situation, to control himself and not to be under control of others, to influence life situations by a reflexive method, perceiving risks as the new inducing driving forces. The cognitive interest and cognitive activity give impulses for the personal growth and independence of students.

The innovative competence, therefore, expands the horizons of the personality, stimulates intellectual flexibility and raises the general level of knowledge. Besides, the innovative competence is a mobility of thoughts, ideas and methods. It is the integral form of existence of intellectual potential of the personality, reflecting its implementation in motion within social, economic, cultural, political relationship and interrelations [2]. The innovative competence expands boundaries of cooperation of a student and a higher education institution and prolongs its time [24].

Speaking about the definitions given by representatives of the second ap-

proach, it should be noted that the concept of the innovative competence is often substituted for the concept of self-improvement of the personality, ignoring at the same time specific mechanisms and terms of implementation of the innovative competence of students. The innovative competence of the student is considered as the individual response of the subject of educational activities to a challenge of the changing modern system of the education, as the personality characteristic, shown within the process of implementation of the spiritual potential of the personality.

Researchers note interrelation of the innovative competence with the concept of the *social and professional competence,* which is connected with manifestation of the ability of fast professional and personal reorientation as when preserving professional and social identity, and in case of its change, under obligatory correlation of past experience and new activities [6, P. 26]. The innovative competence is characterized by change of positions of the personality, caused by such external circumstances as participation in grants concerning scientific researches or creation of an individual path of training, as well as by the need for adaptation of the student to building new interpersonal relations and to participation in the communication process.

For students of a teacher's training college the aforesaid is inseparably linked also with *the pedagogical competence*. The pedagogical competence is the ability of the personality (teacher, andragog (person, who teaches, educates adults), manager of education) to organize "co-activity" of subjects of the learning and educational process (students, their parents, colleagues, administration, partners, representatives of society) according to the purposes and tasks of the modern concept of the education, the values of world, domestic, regional and national, professional culture, implementing the competence, including, in the course of judgment and forecasting of the results of the subject-subject relations, organized by the teacher [16].

Thus, from the perspective of the personal approach, the innovative competence takes the sense and meaning of personal readiness of graduates for solution of the tasks of innovative nature. This approach assumes the work at a higher education institution, aimed at formation of the integral personality of a future teacher. The special attention is drawn to the work involving self-improvement of the future teacher. The self-understanding and self-determination of the teacher from the very beginning of study at a higher education institution become the significant directions of the training process and further – self-development of the personality.

The third approach (cultural) – E.I. Artamonova, I.F. Isaev, E.G. Silyaeva, E.N. Shiyanov, etc. - assumes that the innovative competence represents the difficult complex, consisting of mastering professional and other types of culture, the culture of individual work. It gives the fair opportunity to obtain and transfer

the knowledge and is the mechanism of the cultural and intellectual exchange. Besides, the innovative competence is a form of internationalization of the professional education by means of identification within the teacher's profession. The innovative competence of students from the perspective of the cultural approach highlights characteristics, interesting to a researcher, of the studied phenomenon: orientation of the personality, professional position of the personality, style of the professional activity, and also - international students' exchanges, academic mobility, which train a future teacher for communication with the new educational space, the foreign-language cultural environment.

Researchers share the view that the innovative competence includes the period of nonconventional training or practice that is important for interest of the personality in gaining the social and pedagogical experience through the additional education, the academic mobility. The attention to pedagogical tools of the professional training is drawn. At the same time, researchers refer to the concept of the academic mobility, removing the process of mastering the innovative competence by the teacher even on the international level. At the same time, it should be noted that the innovative competence in the area of international cooperation of the higher school may not be reduced only to the specific actions, technologies and tools, connected with getting the opportunity to get acquainted with an innovation through the project of exchange of students, as well as scientists and teachers from educational institutions of different countries. Here there is the complex and multidimensional process of development and personal fulfilment of the personality within the environment, being new therefor, its acquisition of common cultural competences and the possibility of professional growth. The innovative competence as the readiness and the capacity for perception and transmission of an innovation is shown through a specific number of common cultural competences.

The innovative competence of the teacher just permits to create *new opportunities* for personal fulfilment of the teacher's creative potential. Owing to this fact the degree of development of the innovative competence is determined by many factors: the overall volume of the general educational development, the level of theoretical and professional knowledge and production skills, the developed social structure of the society and regularities of its dynamics.

The fourth approach (virtual) permits researchers to consider the concept "innovative competence" and training of teaching staff for the innovative activities through arrangement of the virtual educational environment, search of means and reserves of increase of efficiency of teacher's training through use of opportunities of local, corporate and global computer networks. Supporters of this approach (Weindorf-Sysoeva M. E., Moiseev V. B., Nechaev V. I., Sharonova S. A.) consider the virtual mobility of students, under the conditions of the cybersocialization of the personality, extended as broad front, the main mechanism of formation

of the innovative competence of a future teacher and the remote training as means of training of a future teacher for the innovative activities.

In our opinion, the virtual approach, expands the educational space of training of a future teacher for the innovative activities, gives the chance to participate in short-term actions of the higher education institution, being other for the student (scientific conference, scientific seminar, round table, etc.), as well as to use the latest technologies of designing, modeling of pedagogical situations and use of effective pedagogical conditions. At the same time, the need for the organization of physical movement with the view of insight into an innovation, or conducting a pedagogical experiment is removed.

The analysis of practice of the innovative activities of the teacher and writings concerning formation of a professional program of the teaching activities (Yu. K. Vasiliev [3], N. V. Kuzmina [8], V. A. Slastyonin [21], A. I. Scherbakov [23], etc.) makes it possible to speak about relevance of the following functions: identification, decision-making, design, organizational function, evaluation function, control and correctional function. At the same time, it is reasonable to specificate the mentioned functions, taking into account a relevant class of problems, which are solved by the teacher in this field. Fully enough such specification is executed in the work of V. S. Lazarev and B. P. Martirosyan [10]. Researchers allocated and substantially disclosed the following functions of innovative activities: the function of identification of problems, the function of identification of opportunities of development, the function of development of the innovation, the function of designing and planning of changes, the function of innovations introduction.

As we see, compliance of training of graduates of teacher's training colleges with the requirements of their readiness for the innovative activities faces numerous problems. At the same time, the quickly changing society, both on regional, and on international levels imposes on teacher's training colleges the need for better training of a teacher, in particular, the need for formation of the innovative competence of the teacher.

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培养未来教师在创新活动中的社会教育决定因素
SOCIO-PEDAGOGICAL DETERMINANTS OF TRAINING THE FUTURE TEACHER AT THE UNIVERSITY FOR INNOVATIVE ACTIVITY

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注解。 本文作者在教育教学方向体系中更新了创新活动的问题和未来教师创新能力的形成，阐明了概念的本质和内容，并通过访谈描述了问题研究的片段。 教育教育领域的专家。

关键词：创新活动，创新能力，教育质量。

Annotation*. The authors of the article update the problem of innovation activity and the formation of innovative competence of the future teacher in the system of pedagogical direction in education, clarify the essence and content of concepts, and also describes fragments of the study of the problem by interviewing experts in the field of pedagogical education.*

Keywords*: innovation activity, innovation competence, quality of education.*

Preparing a future teacher for innovation is a very topical issue that attracts the attention of the modern educational community. In the last decade, for a number of political, cultural and educational reasons, the concepts of "innovative competence", "innovative activity" have become the subject of increased attention of a large number of researchers.

The concept of "innovation activity", according to researchers Lazarev V.S., Martirosyan B.P., serves to eliminate the discrepancy between the desired and the cash, which requires certain innovations (innovation changes). Innovation activity meets its purpose if it performs certain *functions* in relation to educational activities: identifying actual needs (identifying problems) of changes in the pedagogical system (educational programs, technologies, personnel, material and technical base, etc.); identify existing developments, the use of which could potentially improve the quality of educational activities on some of its sites (identifying *oppor-*

tunities for the development of the pedagogical system); independent development of innovations; designing the desired future and moving towards it; designing private innovations; practical implementation of innovations [3].

Formation of readiness for innovation is in the modernization of domestic pedagogical education an important area of work of students, teachers, administrative educators.

In the current socio-economic conditions, vocational training is an organizationally organized logically-structured didactic process, the purpose and result of which is "a certain type of independent person-professional", prepared, at the level of relevant knowledge, skills and experience of solving professional tasks, to be included in specific socio-cultural environment. Education, operating in the vocational training mode, is able to successfully (although not quickly enough) respond to the actualization in the professional implementation of innovation activity and the appearance of new professions and specialties on the labor market. And, therefore, - on the introduction of new technologies of preparation for professional activities in educational institutions; to promptly meet the needs of society for the retraining of already qualified specialists, shaping readiness for innovations. The semantic context of the terms "prepared" and "preparation" in this case acquires special significance. According to S.I. Ozhegov, preparation is "a stock of knowledge gained by someone (specialist)", and to prepare means to train, to give the necessary knowledge for something [6].

V. Dal interpreted the word "ready," in relation to a person, as he was gathered at all, adapted to something, able and willing to do something [2]. To clarify the nature and process of teacher training for innovation, the etymological aspect of the concepts under consideration is very important, the teacher's innovation activity simultaneously acts as both an external process of transferring relevant knowledge and skills, as well as an internal process of appropriating them, mastering and creative use.

Education focused on the training of a specialist, who is distinguished by his *interest in everything new, willing to change, diversity of views, orientation to information, responsible attitude to time and its measurement, time planning and personal effectiveness, personal dignity, optimism* (V.V. Kozlovsky, A.I. Utkin, V.G. Fedorova and others). Already today, the prospects for vocational education designated by scientists require its serious restructuring. This circumstance is reflected in the Constitution of the Russian Federation, the Federal Law "On Education in the Russian Federation", the National Doctrine of Education in the Russian Federation for the period up to 2025. At present, the regulatory framework governing the functioning of modern vocational education is fundamentally oriented towards innovative development of education. This development involves:

- support for regional integrated vocational education programs aimed at achiev-

ing the strategic goals of innovation development and stimulating the interaction of organizations of science, higher, secondary and primary vocational education, Russian and foreign companies in the framework of development projects and programs;

- personnel training in priority areas for the modernization of Russia's technological development;

- equipping with modern educational and production, computer equipment and software of educational institutions of vocational education, introducing modern educational programs and teaching technologies, organizing internships and training specialists in leading Russian and foreign educational centers;

- increase of indicators of academic mobility of students and teachers;

- cooperation of vocational education institutions with the external environment for the formation of sustainable comprehensive relations on the employment of graduates and the maintenance of continuing education processes for employees of enterprises.

The creation of an updated system of training, retraining and advanced training of teachers is provided by the program for the modernization of teacher education [5]. An important factor determining the preparation of a teacher for innovative activity is the all-out development of cooperation between non-governmental and non-governmental organizations and public associations. This is the most important direction of development and formation of a civil society in Russia, the formation of a social initiative of citizens, a form of uniting people of the scientific industry, and including them in social activities [4]. Teaching social life has stepped up the work of future teachers already from college. They gain social experience of professional activity, provide real practical help to the population, for example, through participation in the volunteer movement, in the social projects “Protection of childhood”, “I am a professional”, “Young defenders of nature”, etc.

Particularly noteworthy is the impact of science on education, the help of science in preparing the teacher for innovation. Science in the 21st century is intensively integrated with pedagogical education, which focuses on the knowledge that multibranch science generates in the process of transition to the coming post-industrial society. Taking into account the national and cultural differences of different countries, it was recognized as necessary to properly treat the already existing in those or other countries terms for innovative activity, a new type of activity. For example, the use of the new terms “social teacher”, “social pedagogue”, and “social educator” has intensified, with the recognition of other equivalent and equivalent terms.

The researchers note that one of the most optimal ways out of this situation is to ensure Russia's participation in the integration processes of the formation of a common European space of higher professional education. Russian education, experiencing the influence of European and global trends, requires innovative activity of a teacher.

The results of education at each stage should be evaluated in terms of credit units (credits). V.I. Baydenko, V.M. Filipov, V.N. Chistokhvalov note the need to consider the possession of competences (general and special) as the result of education. If educational modules are defined, the development of which allows mastering relevant competencies, the volume of programs can be estimated in terms of credits. Under the system of credit units is understood the systemic definition of all the main aspects of the organization of the educational process based on the use of credit as a measure of the laboriousness of the academic work, expressing the totality of all the components related to the organization of the educational process. The complexity of organizing teacher training for innovation lies in the fact that innovation competence, as a result of readiness to implement pedagogical innovations, is not indicated in the competence series.

To assess the state of affairs in the formation of innovative competence in domestic higher pedagogical education, employees of the Pedagogy Department of the Moscow State Regional University together with the Laboratory for Analysis of Innovative Processes in Education of the International Academy of Pedagogical Education (IAPE) in March 2018 surveyed 52 experts (60 doctors of pedagogical sciences, professors and 44 are candidates of pedagogical sciences, assistant professors) working in the field of teacher training (18 universities RUSSIA). They are unanimous in recognizing the need to specifically prepare future teachers for innovation. 79% of the experts, assessing the current state of the system of preparing future teachers for innovation, noted only partial compliance with modern requirements. As noted by 54% of the experts, a smaller part of the graduates of the pedagogical profile leaves the university prepared for innovative activity and have the competences that ensure it. The main disadvantages of preparing future teachers for innovation are:

firstly, with the content of the programs implemented in the system of teacher training that do not ensure the formation of innovative competence in future teachers. 66% of experts believe that the content of the programs requires significant changes; 41% only local changes; 8% - the content must be formed "from scratch". At the same time, 68% of experts note significant opportunities for general professional disciplines, 64% of special courses, 75% of humanitarian cycles, elective courses (75%);

secondly, with the lack of readiness of students to discuss the problems of improving education, 59% of respondents noted that for professional self-development and improvement - 29%;

thirdly, an insufficient level of organization of pedagogical practice. Experts noted a number of shortcomings: the absence in the programs of pedagogical practice of the tasks of student participation in the innovation activities of an educational institution - 79%; the lack of necessary conditions for the inclusion of

trainees in the innovative activities of an educational institution - 69%; lack of information on current problems of the educational institution - 45%; difficulties for trainees in establishing creative interaction with the teaching staff of an educational institution - 36%; the tasks stipulated by the program of pedagogical practice are not focused on the analysis of the results of the development of the educational institution (including the evaluation of failures and unsuccessful decisions) - 59%; the regulations of pedagogical practice do not contribute to the acquisition by students of innovative experience in the field of education - 55%; weak motivation of trainees to solve problems of improving the educational process - 52%; heads of pedagogical practice are not sufficiently prepared to plan and organize innovative activities of students in the conditions of pedagogical practice - 10%; heads of educational institutions (on the basis of which the practice is conducted) do not seek to include trainees in innovative activities - 69%;

in the fourth, - insufficient use of the students 'research potential: the SRW opportunities are fully utilized - 29%; SRW opportunities are involved only partially - 35%, SRW opportunities are not actually involved - 8%.

All of the above is typical for most universities recognize 79% of the experts. At the same time, there are a number of other reasons: the state standard for higher pedagogical education does not clearly define the requirements for such training - 45%; heads of universities do not see the need for such training when studying at a university - 25%; faculty of universities does not have the necessary readiness for this - 29%; the content of educational programs does not ensure the formation of the necessary competencies - 33%; the absence of special disciplines in the curricula of universities for the development of innovative competence among students - 54%; the lack of special educational technologies - 27%, clear indicators and criteria of readiness - 79%, assessment systems - 48%, didactic means - 29%; congestion of training programs - 29%; inefficient use of the potential of teachers and university employees - 37%; poor coordination of department interaction - 55%.

As we see, the compliance of the training of graduates of pedagogical universities with the requirements of their readiness for innovation activity faces many problems. At the same time, the rapidly changing society, both at the regional and international levels, dictates to the pedagogical universities of higher education the need for better teacher training.

The main principles of pedagogical management for the preparation of a teacher for innovation include: clearly defined ideals and goals of education; pedagogical design of innovation; competent advice; rationing; operational, reliable (objective), complete, accurate and permanent accounting; fair treatment of students; mutual discipline of teachers and students; remuneration (in points and / or with the use of moral means, stimulating the motivation for innovation) for the high-quality and timely execution of tasks; the fact that teachers and students have

clearly worked out standard instructions and their strict observance, which contributes to improving the quality of student service by teachers, the objectivity of the mutual control of teachers and students, and the predictability of students' grades.

As part of the modernization of national education, the introduction of a multilevel system allows to reflect the diversity of forms and levels of training for innovation and is the most effective and investment-attractive. Bachelor's and master's programs require substantial and practical completion to ensure the self-sufficiency of this degree. When developing educational standards for the preparation of bachelors and masters in the direction of training "Pedagogical education", the modern requirements for the professional areas of the teacher's activities, reflected in modern educational standards, of which teaching practice is special, are taken into account.

As part of the credit form of the organization of the educational process, the subject-subject concept of education is most fully realized, since from the point of view of functional aspects, credit-based education is the basis: an individually-oriented organization of the educational process, giving students the opportunity to create individual study plans, independently determine the sequence of disciplines ; the right to free choice of teaching methods; continuous development of curricula, programs and educational content standards; determination of the conformity of student tuition fees and teachers' salaries. The introduction of a system of credit units will allow a transition to an individually-oriented organization of the educational process based on progressive principles of pedagogical management. To this end, it is necessary to develop appropriate descriptors as specific indicators of the professional competencies of the subject's innovation activities. Interesting developments in this direction are carried out at the IAPE Laboratory of Analysis of Innovative Processes in Education.

At present, a social need is being formed to effectively use innovative activity. The pedagogical organization of innovation, as a new kind of professional activity, has serious regulatory requirements requiring the teacher to solve professional and pedagogical tasks of different levels of complexity, and also assumes that he has certain abilities related to personal qualities that need constant development for its effective implementation. their professional functions in a changing environment.

Thus, the adoption of new educational standards and the consistent implementation of the main directions of state modernization of higher professional education into practice creates conditions for the sustainable development of personnel training with higher professional education for innovation activities and their application with due account for the requirements of the modern labor market.

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利用网络技术形成未来ESL教师的交际创造力：结构 – 动态模型
FORMING COMMUNICATIVE CREATIVITY OF FUTURE ESL TEACHERS BY MEANS OF NETWORK TECHNOLOGIES: STRUCTURAL-DYNAMIC MODEL

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抽象。在形成实验中测试了关于在英语教学过程中使用网络技术的功能的假设，目的是培养未来外语教师的交际创造力。该实验计划是在教育相互作用系统的功能和发展理论的基础上发展起来的。

该过程中的基准是形成所需能力的六个层次的特征。

指示该过程是将系统从实现转移到下一个级别。在每个后续阶段，工作中使用的网络服务和/或其中的活动都会发生变化。教师在网络中进行操作咨询的可用性确保了外语交际创造力的发展过程的强度。

达到的水平描述了实际发展的区域，实现水平的特征与其后的水平的比率定义了学生最近发展的区域。

该过程的教学管理获得了新的质量，矫正个体效果由于其对特定学生的成就的充分性而变得更加准确，并且对应于他个人掌握能力的速度。

关键词：教育互动系统动力学，外语，阶段，层次，网络技术，交际创造力。

Abstract. *The hypothesis about the functionality of the use of network technologies in the process of teaching English with the goal of developing the communicative creativity of future teachers of a foreign language was tested in a forming experiment. The experiment program was developed on the basis of the theory of the functioning and development of systems of pedagogical interactions.*

The benchmarks in the process are the characteristics of the six levels in the formation of the desired competence.

The process is instructed as the transfer of the system from the achieved to the next level. At each subsequent stage, the network services used in the work and / or activities in them are changed. The availability of the teacher for operational consultations in the network ensures the intensity of the development process of foreign language communicative creativity.

The achieved level describes the zone of actual development, and the ratio of the characteristics of the achieved level and the level following it defines the zone of the nearest development of the student.

The pedagogical management of the process receives a new quality, the corrective individual effects become more accurate due to their adequacy to the achievements of a particular student, and correspond to his individual pace of mastering the competence.

Key words: *dynamics of the system of pedagogical interactions, foreign language, stages, levels, network technologies, communicative creativity.*

An important component of a professional competence of the foreign language teacher is his or her ability to make constructive communication in a foreign language. The ability to choose proper words quickly in an ambiguous language situation especially in the conditions of limited lexicon (as it is at the initial stages of training), is a result and an implementation of an expert's communicative creativity. We consider communicative creativity to be the property of the personality, that allows making active the common cultural competences of the expert, which are responsible for a non-standard exit from a problem situation, which will help to construct communication so that it was productive for all participants of communication. This new quality includes abilities to fast adaptation in the foreign culture language environment, to the original solution to the communicative tasks in the conditions of a limited lexicon, manifestation of flexibility and tolerance to cultural distinctions, refusal of stereotypes and personality's orientation to cross-cultural values [1, p. 225; 2, c. 320; 3, p. 26].

Searching the methods of developing this important professional quality is a practically significant problem. We conduct research into pedagogical opportunities of its decision by means of using the network technologies. The aims of our research are revealing the efficiency measure of future English teachers' foreign-language communicative creativity development by means of network technologies; identification of pedagogical opportunities of using the network technologies in educational process, allocation of a complex of relevant to a task means among those, which are functioning in the network.

The research was carried out on contents and within a training course "English language".

Network technologies have the powerful capacity to formation of students' communicative creativity at the expense of a possibility of the developing and the publicizing foreign-language products which are professionally focused and personal communication in network, a possibility of creating own network for training and communication, self-education, mutual education. The possibility of communication with foreign-language agents in network by means of Skype forces the communicator to adapt the pronunciation to the level of understanding of the partner in communication. Sugata Mitra (India) has made series of indicative experiments, which have shown the improvement of pronunciation by means of

work with the computer (the program of voice-activated control) in experimental conditions, interest and high pupils' motivation at the lessons with use of computer technologies [4]. English language, being the international language, has also become international in the global Internet, which betrays the fact that forming communicative skills using network technologies can be extremely productive [5-8].

For complete and consecutive representation of dynamics of formation of communicative creativity by means of network technologies it was decided to consider this process from a position of the theory of functioning and development of systems of pedagogical interactions (O.V. Krasnova). Theoretical modeling of the process is held by means of the device of this theory. In methodology of this approach the process of training and development of the pupil, as well as his or her results, represents "the natural movement from level to level which is logically determined by structural and functional characteristics" [9, 10].

Levels are determined as stated achievements, quality growths in the process, "process statics fixed in dynamics" (O. Krasnova). We characterize them in terms: the student "can / cannot ...", "is able ...", "independently / with the help of a teacher performs ...". The chronology of their occurrence in the process is uniquely possible and determined by the logic of the functioning and development of a system of pedagogical interactions aimed at developing communicative creativity, from actions on the model, according to the rules, under control and with the help of a teacher to autonomous free functioning in the specific field.

Substantial characteristics of the six quality levels in the dynamics of the process of formation of communicative creativity of future teachers of English are accumulated and summarized in the process of experimental work, observations, studying the pedagogical experience of colleagues, educational and methodical literature on professional training of future teachers of foreign languages. (why are there exactly six levels, what are their qualitative differences and why their sequence is unambiguous, and what lies at the basis of the mechanism, it is shown in the scientific works of O.V. Krasnova).

A meaningful description of the levels makes it possible to identify characteristics that can perform diagnostic functions. Therefore, the process becomes clear from the point of view of fixing the current results and setting specific work goals in each moment both for the teacher and for students.

Diagnostic characteristics of the level of the development of foreign language communicative creativity were chosen to be universal – they should be functional for the diagnosis of students in the control group who studied without using network technologies.

The dynamics of the process is meaningfully derived from the characteristics of the quality levels. It is also pedagogically vivid for the teacher and students: the task of each stage is to transfer students and the system of pedagogical interac-

tions from the present level to the next level (because it is functional only if it is adequate to the level achieved by the students). The stages are characterized by the content, methods and forms of pedagogical interactions that implement the transfer of the system from level to level. We have already characterized the dynamics of the process with reliance on network technologies.

The model of forming communicative creativity of future ESL teachers as result of theoretical modeling and experimental study. The levels:

Level I (indefinite) – initial, start of pedagogical interactions. Stochasticly different initial states of students' readiness for mastering the subject, previously determined by more or less successfully formed growths in other areas and in other systems of pedagogical interactions on the subject. As a rule, most students have a small vocabulary, a weak understanding of the grammatical structure of a foreign language and cannot communicate in English. It is extremely important that at this starting level the students are positively motivated for the difficult long-term work on the development of communicative creativity.

Level II (integration crisis). The basic grammatical structures of the English language are updated, a basic vocabulary is formed within the studied topics. Typical mistakes of level II are blunders when using grammatical constructions and even forgetting words, high constraint in direct and network communication, fear and panic in a situation requiring spontaneous response, self-doubt and ability to master the language at the level of free spontaneous communication and adequate operational response to the situation.

Level III (manipulative). The student is able to act in trivial situations according to a pattern - confidently uses pattern phrases, builds dialogues along the pattern. Type of mistakes: errors in applying pattern phrases, applying the wrong phrases, applying phrases in the wrong place. As a rule, panic in the situation of spontaneous English communication and the manifestation of communicative creativity is overcome, but the student still needs to be monitored and corrected by the teacher.

IV level (pragmatic). Students have learned the structure and essence of tasks in the process of education. They see the connection between the material, which has been studied and the material which is studied at the moment. They are able to analyze grammatical phenomena, effectively search for the information in foreign language texts and electronic sources and conduct a dialogue in a foreign language within the framework of this topic. Mistakes occur because of the speed, speed of response to the situation of foreign language communication in the network. Mistakes can be because of the ability / inability and correctness of the spontaneous application of the studied and meaningful structures. Emotional color of activity in situations of uncertainty has changed to positive: courage, confidence, success, perceived stability of the formed competence.

Level V (crisis of differentiation). Visible measurable results have been achieved - above satisfactory and good levels. Students actively participate in the discussion of new material, willingly use a foreign language to construct monologic utterances and implement communication, they themselves are looking for new vocabulary in additional sources, communicating both within the framework of specified topics and react to situations of uncertainty. Difficulties at this level can only be due to extraordinarily unusual situations (for example, in communication with foreign-speaking subjects who speak English poorly and are illegible, speak and write). But the achieved level assumes the ability to figure out the incomprehensible, unobtrusively ask again, rephrase questions about the situation, predicting which expressions might be familiar to the partner, etc.

Level VI (autonomous). The students are well-versed in the topics studied, are able to select grammatical and lexical constructions in accordance with the arising communicative situation, carry out creative projects, choose the most interesting areas for them to implement creative ideas. Communication (on the network and without it) is characterized by spontaneity and effectiveness. Communication is creative, it is carried out in accordance with all the norms of foreign language communication. At this level, the subject has come to the realization that he had achieved a complete understanding of aspects of the studied area, acquired the desired skills and abilities and he is ready for practical application of the acquired competence, chooses the ways of further development in connection with the didactic results obtained.

Formed growths at each level make it possible to choose the complexity of the content of educational activities and the measure of student autonomy / appropriate pedagogical management at the next stage (Table 1).

Table 1

The content of the activities of the teacher and students in the process of targeted step-by-step development of foreign language communicative creativity through the use of network technologies

Level	Teacher's activity	Student's activity
I-II Orientation	The level of training of each student is diagnosed, the tactics of the educational process are built up taking into account the possible presence of different levels of students' readiness, but a group form of training. A repetition of the past. Acquaintance of students with new material, demonstration of samples, which must be sought in the learning process. The study of basic concepts, work with visual material. In Quia, the teacher creates all possible types of test tasks; virtual classrooms, keeps electronic records of performance, observes statistics on each individual activity.	The students are engaged in the repetition of the material they have studied, take notes of the new educational material, become familiar with the most important concepts, fix the necessary lexical base. Work with theoretical sources in the network (search engines, Pinterest), with the Quia service - effective for consolidating and checking students' grammar and lexical skills. Each student has his own personal account, where he sees the last added tasks. Work on the site of a foreign language teacher (sections Vocabulary, Discussions, Tips for Writing)
II → III Adaptation	The grammatical norms of the English language are updated; a new vocabulary is intensively introduced. Working with the Quizlet service (virtual classrooms are also created here, students are grouped together, their performance is monitored) begins. Teacher creates a set of definitions or words on the topic with a translation (to prepare students for communication). In one column, he writes a term (English word), in another - a definition (translation). It is possible to supplement each definition with a graphic image or audio file.	Grammatical structure of the English language is being studied. Work on increasing the volume of familiar lexical items in the Quizlet service. According to the sets of definitions set by the teacher, the service generates and offers students various types of learning activities aimed at memorizing terms or foreign wordsRegistration is carried out on the Internet resources required for network communication. Communication of students with foreign language agents in the information space is for informational purposes only. At this stage, it is especially important that students do not experience discomfort when using English - they should not be afraid to make mistakes.

III → IV Funktionalization	Explaining the norms of foreign language communication, checking grammatical and lexical skills, familiarizing students with more complex grammatical structures. The teacher regulates every action of students in the information space, shows new information resources. When studying each topic, he offers assignments to search for relevant information in the foreign language communities of Facebook, posting this information in student's profile and discussing this information with all other students and other affiliated groups.	The longest and most laborious stage. Students learn the norms of foreign language communication, learn to build various grammatical and lexical constructions and use these constructions depending on the situation. Students perform grammatical and lexical tasks in the framework of classroom work and at home, working on the teacher's website and under the guidance (or with the help of) the teacher. Work under the guidance of a teacher in the information space, acquaintance with new resources in the network (Facebook, Epals.com). Students take part in discussions, look for foreign language information on social networks, communicate with students from other countries, give their comments on events, photos, videos. Students practice the listening comprehension of foreign language statements on the topics studied.
IV → V Optimization	Grammar skills of pupils are improved, communication at the lesson is situational. The teacher gives students tasks related to electronic communication, explains the details of foreign-language networking projects, and monitors the implementation of tasks. He monitors the results achieved through networking, in the form of meetings with native speakers and in the form of events with the participation of representatives of different nationalities with communication in English	Students learn to build communication in various situations; work is actively carried out in the information space. Students understand the intricacies of foreign grammatical structures, try to use them in accordance with the tasks; students carry out educational activities on several Internet resources at once, use them to make creative projects
V → VI Autonomization	Theoretical and grammatical material is fixed while doing the independent work and making creative projects. The teacher only points to additional resources for finding information and comments on the creative activities of students in the information space. The results are consolidated and monitored in the form of organizing communication in English with non-English-speaking students and with native speakers.	Students independently perform grammar assignments, communicate on the network, look for additional information to carry out projects in the sources indicated by the teacher, take creative initiative both in foreign language communication on the network, and in the process of its further improvement in interaction in English with the teacher, native speakers and non-English communicators

Data of the ascertaining experiment is shown in the table 2.

Table 2

The level of communicative creativity of students of experimental and control groups according to the data of the indicative experiment

	Experimental group (77 students)		**Control group (57 students)**	
Level	Number of persons	Percentage in a group	Number of persons	Percentage in a group
Indefinite	49	63,64%	39	68,42%
Integration crisis	17	22,08%	10	17,54%
Manipulative	7	9,09%	5	8,77%
Pragmatic	2	2,60%	2	3,51%
Crisis of differentiation	1	1,30%	0	0,00%
Autonomous	0	0,00%	0	0,00%

The indicative experiment did not find statistically significant differences between the groups that were selected as experimental and control.

In the framework of the Work program of the academic discipline "Foreign Language" there was developed the methodological modification of this program for the experimental group. The modification includes methods, principles, conditions and activities aimed at forming the communicative creativity of future English language teachers. The control group worked on the authentic - main - curriculum.

The data of the final test in the course of the forming experiment is shown in the table 3.

Table 3

The level of communicative creativity in the experimental and control groups at the beginning and at the end of the experiment

	Experimental group (77 students)		**Control group (57 students)**	
Level	**At the beginning of the experiment**	**At the end of the experiment**	**At the beginning of the experiment**	**At the end of the experiment**
Indefinite	63,64%	6,49%	68,42%	26,32%
Integration crisis	22,08%	7,79%	17,54%	24,56%
Manipulative	9,09%	16,88%	8,77%	33,33%
Pragmatic	2,60%	24,68%	3,51%	12,28%
Crisis of differentiation	1,30%	27,27%	0,00%	3,51%
Autonomous	0,00%	16,88%	0,00%	0,00%

The data demonstrate the undoubted advantage of the learning process based on network technologies for the selected model, but the same data suggests that, despite its effectiveness, there remain students who are not advanced in the process of developing communicative creativity. The reasons were analyzed individually, the main of which was a weak level of foreign language training at the beginning of the experiment, an unfair attitude to classes in the course of the experiment, little communication practice in the language, in the network in particular. It can be assumed that cases are possible when the problem lies in the structure of the general abilities and neurodynamic features of the student: such a student can correctly perform the task in a calm, not stressful environment, but the quick response in a stressful situation to online communication causes an insurmountable difficulty. We continue to study such cases in more detail.

The overall result of the formative stage of the experimental work made it possible to consider the shifts as a result of the experimental influences significant, the difference in the final achievements of students in the experimental and control groups - statistically significant, and the hypothesis - confirmed. The criteria of McNamar and Pearson were applied, for this level of communicative creativity of each of the students of the experimental group at the ascertaining and control stage were divided into “high” (IV, V, and VI levels of the applied model) and “low” (III, II, I)).

The use of networking technologies in the course of developing the English language communicative creativity of future English teachers in the foreign language course with the gradual complication of content and the increasing difficulty of learning tasks in the six-level model has proved to be effective. It allows to get better results than the results which can be achieved using the traditional model without level diagnostics and system monitoring of successive qualitative changes in the development of the desired growth. The developed system has been introduced into the educational process of the Sevastopol Pedagogical College (2017/2018 academic year), and the appearance of new network applications in the future and their involvement in the educational process will allow it to be constantly improved.

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中国学生动词类型教学的特点
FEATURES OF TEACHING OF VERB TYPES BY CHINESE STUDENTS

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注解。 本文致力于为中国学生教授动词类型的特殊性。 中国学生是一支特殊的学生队伍，俄语教学方法，特别是动词类型的教学方法，这组外国学生应该根据他们的心态，国家教育体系和母语的特点。 这项工作的目的是显示俄语和汉语之间的差异，这应该决定在词汇和短语，单词构建，语法和语音层面教授中国学生动词类型的方法。

关键词：动词类型，中国学生，词汇和词组水平，词汇形成水平，语法水平，语音水平。

Annotation*. The article is devoted to the peculiarities of teaching verb types to Chinese students. Chinese students are a special contingent of students, methods of teaching Russian language, in particular methods of teaching verb types, this group of foreign students should be based on the peculiarities of their mentality, national educational system and native language. The aim of the work is to show the differences between Russian and Chinese languages, which should determine the approach to teaching Chinese students verb types at the lexical and phraseological, word-building, grammatical and phonetic levels.*

Keywords*: verb types, Chinese students, lexical and phraseological level, word-formation level, grammatical level, phonetic level.*

In the method of Russian as a foreign language, the problem of teaching a verb type to foreign students occupies a special place and is one of the actual problems. This is due to the fact that in many languages this category is absent, and similar meanings are expressed differently: for example, through a complex system of verb tenses, etc. Thus, even in the Old Russian language there was no category of species, but there were four forms of the past tense: two simple (aorist and imperfect) and two complex (perfect and pluperfect). Over time, there was a unification of the old system of past times (a single form was established) and the category of the species appeared.

It must be said that the category of a species is a Slavic category, that is, peculiar only to Slavic languages. Therefore, for non-Russian students whose language does not belong to the Slavic languages, mastering the types of the Russian verb causes enormous difficulties. First of all, for non-Russian students, the forms of expression of specific meanings are difficult because of their diversity and ambiguity and the semantic potential that appears during the functioning of imperfect and perfect verbs in speech. The emergence of new meanings is possible with the participation of various linguistic factors: the lexical meaning and form of the verb, time, voice, mood, structural-semantic elements of the context, the communicative orientation of the utterance.

As you know, at present, foreign students come to study at many universities in the Republic of Belarus. Among them are many representatives of China. Chinese students study in our country both independently and through exchange programs. When working with Chinese students (as well as with other foreigners), it is important to take into account their mental characteristics, features of China's national educational space, as well as features of their native language. It should be understood that in teaching Chinese students the Russian language, we inevitably encounter the problem of interference: students unconsciously transfer the rules of the Chinese language to Russian, even if they have been learning the language for more than a year.

Russian as the language of synthetic education and Chinese as the language of analytical education differ from each other in formal structural characteristics that predetermine significant differences in the lexical and semantic system of two languages: 1) there are many morphological categories and grammatical forms in Russian; in Chinese, the grammatical meaning is expressed not morphologically, but with the help of auxiliary verbs, prepositions, conjunctions and other official words, as well as with the help of word order; 2) the distinction between Russian and Chinese is found in the basics of word formation and ways of replenishing vocabulary, which causes incomplete equivalence of the lexical semantics of the two languages [Li Xiangdong, 30].

Work on verb types is very closely connected with work on almost all aspects of teaching Russian: vocabulary and phraseology, word formation, grammar, and even phonetics.

Lexical and phraseological level. In Chinese, the category of a species is not presented as a morphological category of a verb, it is expressed in the sentence by verb dependent members. Interestingly, at the lexical level, only one Chinese verb corresponds to the Russian verbs of a perfect and imperfect form, which are unidirectional and multidirectional. Therefore, the category of the form for Chinese students is a fundamentally new semantic and grammatical category.

The study of the category of the form by Chinese students is associated primar-

ily with the lexical meaning of the verbs. Species meanings of verbs are usually presented in opposition: 1) fact / result of action; 2) process / completeness of action; 3) repeatability / one-time action; 4) parallelism / sequence of actions. The most difficult, as practice shows, is the use of the type of the verb in the actual meaning, when

In Russian, difficulties for Chinese students are also delivered by another group of verbs - the verbs of movement. They are non-platformers and platformers. Verbs of movement have an independent semantic characteristic: one moment, one direction (verbs of unidirectional movement) / many times, various directions (verbs of multidirectional movement): *идти – ходить*, *нести – носить* and etc. (*пойти – походить*, *перенести – переносить* and etc.).

The use of species is also accompanied by certain words (*обычно*, *часто*, *редко*, *иногда*, *каждый день*, *всегда*, *никогда*, *всю жизнь*, *два*, *три*, *четыре … часа* (*дня*, *года…*), *долго* and etc. – when using an imperfect form; *в конце концов*, *наконец*, *вдруг*, *сразу*, *неожиданно* and etc. – when using the perfect form).

In addition, many verb meanings of both imperfect and perfect forms, especially colloquially, are phraseologically related, for example: ***Слушай*** *тебя!* Ничего путного не посоветуешь (can't use the verb *послушай* in perfect form); *Вы только* ***посмотрите*** *на него!* (can't use the verb *смотрите* in imperfect form) and etc.

Word formation. From the point of view of word formation, Chinese students must first understand the grammatical implications of the word formation of the prefix process (раз-(рас-), с-, по-, про-, под-, на-, из- (ис-), при-, -у, пере- и др.) and verb suffixes (-ива-, -ыва-, -ва-, -и- и др.), i.e. perfective (*читать – **про**читать*, *слышать – **у**слышать*, *ждать – **подо**ждать* и др.) and imperfective (*дать – да**ва**ть*, *рассказать – рассказ**ыва**ть*, *ответить – ответ**а**ть*, *выбрать – выб**и**рать* и др.), because the word formation of the Chinese language differs from the word formation of the Russian language: it is carried out mainly at the expense of "… composition, the new concept in Chinese most often gets its form of expression in the form of neologism based on the addition of two or more free morphemes already existing in the semiotic system" [Li Xiangdong, 32].

It must be remembered that a specific pair is always given to foreign students in a strict sequence (an imperfect look is a perfect look), so that students memorize the forms accurately. As a rule, the prefixed verbs in Russian are perfect verbs, and non-prefixed verbs are imperfect. (an exception *покупать – купить* and etc.). A separate group consists of supppletive species pairs (*говорить – сказать*, *брать – взять*, *класть – положить*, *искать – найти*, *ловить – поймать* and etc.). In addition, in the Russian language there are single and two-specific verbs. In other words, work with Russian verb types should be carried out continuously and correspond to the level of proficiency of foreign students.

Grammar Level. The interaction of the species with other morphological categories of the verb - tense, voice and mood - this is a very important aspect of a correct understanding of the use of verbs of an imperfect and perfect form.

1. *Type and time*. Already at the very beginning of learning Russian, students are introduced to a very simple rule that a perfect verb has the shape of a future tense and has no present form, and an imperfect verb has both a future shape and a present tense (with the present and the form of the future is complex, with an auxiliary verb *быть*).

2. *Type and pledge*. The connection of the species with the pledge (real and passive) is also traced in the Russian language and causes certain difficulties for Chinese students. Especially when it comes to the verb form - participle, because the central place in the Russian passive voice is the form "short passive participle + verb-link *быть* in zero or non-zero form", and return verbs form the periphery [Bondarko: 101].

3. *Type and inclination.* The problem of choosing the right type often arises when the verb in a sentence must be used in an imperative. For example, Chinese students are given the notion that, in an imperative, imperfective verbs express an invitation to action or a request, and perfect verbs have a more categorical meaning of the order: *Не забывайте* свои вещи в общественном транспорте! *Прочитайте* этот текст и *ответьте* на вопросы.

In addition, the study of various syntactic structures allows Chinese students to more freely navigate the specific category of the verb. Students in the syntax type: Д.п. + …лет (*Мне* 20 лет. *Оле* 19 лет. *Игорю* 22 года.). At subsequent stages, the dative case is studied after the verbs: инфинитив + В.п.+ Д.п. (читать книгу *своему брату*). During the study of the participle as a form of the verb, the syntactic construction with the dative case is given: И.п. (В.п.) + причастие в И.п. (В.п.) + Д.п. (книга, принадлежащая *моему младшему брату*) etc.

Phonetic level. The relationship between the category of a species and phonetics is observed at the level of intonational structures. Depending on where the center of the intonation structure is located, the semantic pattern of the whole sentence changes, for example: ***Ты*** *унёс мою тетрадь?* (the verb of the perfect form *унёс* - the meaning of the rebuke) or *Ты* ***унёс*** *мою тетрадь?* (the verb of the perfect form *унёс* – expectation value).

In our opinion, A. A. Karavanov rightly notes that the course by types of the verb "... can be defined as a combined, integrated, combining work on the species with in-depth work on other aspects of the language ... the course by type should be inseparable from the general course of speech development - from the basic course; it must be "embedded", "inscribed" in this course; the type and development of speech should be closely intertwined and form a coherent whole ... must be long enough; trying to learn species quickly, "intensively" is impossible task (species should be studied not "intensively", but "extensively", going not "deep down", but "widening") "[Karavanov 2005, 155].

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阿塞拜疆医科大学

ON THE ROLE OF GRAMMAR IN TEACHING AZERBAIJANI LANGUAGE FOREIGN STUDENTS OF THE PREPARATORY DEPARTMENT AZERBAIJAN MEDICAL UNIVERSITY

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注释。 它是以下内容： 这项工作的数量和顺序。 显然他们一直在使用它。 写在正射，拼写和标点符号范围内。

关键词：计划，外国学生，学生，课程，规则，书面，目标

Annotation*. From the main task of studying the Azerbaijani language by foreign students of the preparatory department of the Azerbaijan Medical University it follows that the Azerbaijani language program should, first of all, be aimed at developing oral and written language, contain clear instructions on the content, volume and sequence of this work. The main purpose of teaching foreign students of the Azerbaijan Medical University to the Azerbaijani language is to teach them to practically use the Azerbaijani language, consciously read and understand any text available to their level, correctly build sentences, express their thoughts coherently both verbally and in writing within the orthoepic, spelling and punctuation norms.*

Keywords*: program, goal, speech, training, foreign students, lesson, rules, written, goal*

In accordance with the Law on the State Language, the Republic of Azerbaijan considers the use of the Azerbaijani language as a state language to be one of the most important signs of its independent statehood, takes care of its use, protection and development, creates the basis for the Azerbaijanis of the world to provide their needs for national and cultural expression. related to the Azerbaijani language.

Thus, the State language of the Republic of Azerbaijan in accordance with part 1 of Article 21 of the Constitution of the Republic of Azerbaijan is the Azerbaijani

language, in connection with which every citizen of the Republic of Azerbaijan is obliged to know the state language. The Republic of Azerbaijan ensures the use, protection and development of the state language. The alphabet of the state language of the Republic of Azerbaijan is the Azerbaijani alphabet with Latin graphics.

Education in the Republic of Azerbaijan is conducted in the state language.

The activity of educational institutions in other languages is carried out in the Azerbaijan Republic in the manner prescribed by law. In such schools, the teaching of the state language is mandatory. During admission to higher and secondary vocational schools in the Republic of Azerbaijan, an exam is taken in the discipline "Azerbaijani language".

Over the long years of teaching the Azerbaijani language at the preparatory faculty at the Azerbaijan Medical University, the teachers of the department have accumulated a great deal of experience and achieved some success in the field of theory and practice of teaching foreign students coming to Azerbaijan from Turkey, Iran, Iraq, Jordan, Pakistan, Sudan, Africa and etc. Every year, highly qualified teachers raise the teaching of the Azerbaijani language to a new level, improve the methods of teaching the language, familiarize students with the history, culture, traditions, grammar of the Azerbaijani language. All this follows from the requirements and tasks adopted by the leadership of the Republic. Thus, based on the State Program signed by the President of the Republic of Azerbaijan Ilham Aliyev in 2013, great attention is paid to teaching the Azerbaijani language to foreigners, publishing new textbooks and teaching aids for in-depth and accelerated teaching of the Azerbaijani language by foreign citizens studying and working in Azerbaijan.

The fundamental issues include the question of the role and place of grammar in the general system of work for the development of the speech of foreign students. Without a clear understanding of the role of grammar, it is impossible to solve such essential questions as the question of the principle of building programs and textbooks on the Russian language, the question of the relationship between theory and practice in the learning process, the question of the nature, content and target orientation of the oral and written exercises etc.

In connection with the special attention to the language, reflected in the Laws, the State Program, the issues of teaching the State language in Azerbaijan are of particular relevance and deserve special attention. In recent years, a great deal of work has been done in the republic on restructuring curricula and textbooks. The analysis of this Program for students of the preparatory department of AzMedUniversity testifies that the system of work on language teaching reflected in them is based on new principles and corresponds to the goals and objectives of studying Azerbaijani language by foreign students.

The main attention of teachers is paid to strengthening the practical orientation of the learning process, searching for a new, more rational and efficient system of work, a system in which practical learning of the language would be central to every lesson.

So, the question of the role and place of grammar in the work on the development of the speech of foreign students has a theoretical and practical side. The main task of language teaching is to teach foreign students at the preparatory department to practically use the Azerbaijani language. The solution of this basic task should be subordinated to the entire system of language training.

The mastering of any language is carried out, as is well known, on a grammatical basis, i.e. through the study of grammar. What is the role of grammar in the process of mastering non-native language? Through the study of the rules of grammar, students consistently and systematically conceptualize and learn, and then, performing various exercises, learn in practice, by developing, consolidating and automating speech skills, the grammatical structure of the language: learn to correctly form forms from different parts of speech, build phrases and sentences of various types. Consequently, knowledge of the rules of grammar helps foreign students to comprehend and comprehend, and on this basis, consciously assimilate the norms and patterns that are difficult for them in the area of pronunciation of specific sounds, voiced and deaf consonants, form-building and construction of phrases and sentences of the Azerbaijani language. When familiarizing with the phonetic system, it is advisable to use tables, which makes it possible to visually capture the spelling of words with voiced and deaf consonants, as well as words with specific sounds of the Azerbaijani alphabet. Improving the pronunciation skills of various sounds of the Azerbaijani language, consolidating the skills of pronunciation and spelling of words with paired consonants and vowels is achieved by using and explaining a table with examples of writing such words. A carefully selected system of examples and samples is intended to reveal to the students the meaning of the rule, to show the norm of the language and thus serve as the basis for awareness and practical assimilation of the facts of the Azerbaijani language. The work on this section is summarized by phonetic analysis of words. Taking into account the medical profile of the university, students in sufficient quantities are invited to perform phonetic analysis of terms in biology, physics, and chemistry. As a result of this work, they already at the initial stage of learning learn the correct spelling of the proposed terms.

The section of the Program on Lexicology provides for the study of the direct and indirect meanings of words, unambiguous and polysemantic words, homonyms, antonyms, synonyms, archaisms and neologisms, phraseological turns, and also borrowed words, which are in sufficient quantity in the Azerbaijani language.

The role of grammar in training at the preparatory department was expressed in

the principles of the presentation of material on morphology. According to the approved Program, the material is located linearly. At the same time, parts of speech are studied one after another: first a noun, then an adjective, a numeral, a pronoun, and after them the other parts of speech are a verb, an adverb, a union, etc. The study of parts of speech was preceded by the theme "Composition of a word".

According to the goals and objectives of teaching, the consistent principle of arranging grammatical material on morphology as a means of understanding and assimilating new, unknown to learners, phenomena of the Azerbaijani language not only introduces, but also enables the assimilation, formation of morphological forms, as well as the sequence of their use in coherent speech. The basic normative material that is subject to study and assimilation provides a gradual complication of syntactic constructions, which creates the most favorable prerequisites for practical use of certain phenomena in a coherent speech.

The question of the relationship between theory and practice, which arises from the question of the role of grammar in the process of teaching the Azerbaijani language by foreigners, has not only an external, quantitative aspect, but also an internal, qualitative one. Without theoretical knowledge, there will be no practical result. Teachers face the challenge of associating theory with practice. To achieve these goals, along with a large amount of theoretical information, there is also a sufficient amount of oral and written practical exercises.

Thus, the theme of the Program compiled for the 2018/2019 school year had a beneficial effect on the construction of lessons. During the lessons, more attention was paid to the students' speech practice. According to the Program, taking into account the medical profile of the university, the students on the scientific style and development of speech are offered the texts "Skeleton", "Parts of the body", "Healing properties of oil", "System of organs", "Angina", "Heart structure", "The lungs" and others. Work on these texts consists of analyzing the text, composing questions to the text, retelling this material and helps correct pronunciation, replenishment of lexical stock and development of coherent speech. Dialogues such as "At the cardiologist", "At the pharmacy", "Doctor-patient" and others cause great interest and allow students to apply their knowledge, learned constructions in their speech. When foreign students studied the Azerbaijani language, illustrative examples and visual aids in the learning process have always played an important role and contributed to a better understanding and assimilation of the material. This technique of visualization is successfully used by teachers who show maximum attention to the system of illustrative examples and samples in explaining and memorizing medical texts, which has a positive effect on learning.

Oral and written grammar exercises offered to learners are designed to enhance speech activity and direct it to the development, consolidation and automation of speech skills of foreign students. A well-thought-out and rationally organized sys-

tem of exercises is a necessary condition for the successful mastery of the target language.

The exercise system should lead learners from easy to difficult, from the known to the unknown, taking into account the difficulties that students must overcome. The success of the study of the Azerbaijani language will largely depend on the activity of the students themselves, which can manifest itself only if the students themselves at each lesson feel their own progress, will feel that with each lesson the learned language becomes more accessible and understandable. And exercises bring effect only when they are accessible and feasible, consistent with the level of speech development of students in the Azerbaijani language. The level of speech development depends, as is well known, not only on the quality of teaching, but also on the degree of prevalence of the language in the environment.

Good preparation for each lesson, systematic, properly defined vocabulary work, systematic writing dictations and statements, checking notebooks, using visual aids, paying due attention to the development of students' speech, enriching their vocabulary, have a beneficial effect on mastering the norms of the Azerbaijani language. Purposefulness of the lesson, the ability to interest students, to make them active participants in the educational process bring good results in mastering non-native language.

西方俄罗斯联邦形象的特征
FEATURES OF THE IMAGE OF THE RUSSIAN FEDERATION IN THE WEST

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注解。 对于国家而言，不仅经济的发展及其政治进程，而且其在现代国家中的声誉和形象都具有重要意义。 如果我们追溯俄罗斯与其他国家关系发展的历史，我们可以得出结论，国际形象的严重问题已经困扰俄罗斯很长一段时间了。 但与许多正在经历“暂时困难”的国家不同，俄罗斯的“形象失败”是传统的。 作者认为，为了摆脱这种局面，俄罗斯应该更积极地利用公共外交机制，制定长期战略，不仅在西方，而且在整个世界提高声誉。

关键词：俄罗斯联邦形象，刻板印象

Annotation*. For the country, not only the development of the economy and its political course, but also its reputation and image among modern states is of great importance. If we trace the history of the development of Russia's relations with other countries, we can conclude that serious problems with the international image have been haunting Russia for quite some time. But unlike many other countries that are experiencing "temporary difficulties," the Russian "image failure" is traditional. The authors believe that in order to get out of this situation, Russia should more actively use the mechanisms of public diplomacy, as well as develop a long-term strategy to improve reputation not only in the West, but in the world as a whole.*

Keywords*: image of the Russian Federation, stereotypes*

Today, world politics and the structure of international relations are undergoing significant changes. One of the most important aspects of the general characteristics of a state is the impression it makes on the world stage. But none of the most successful action that forms the external image can in any way compensate for the unresolved internal problems and the more efforts the government makes to self-promotion, the more obvious the existence of these problems.

Studying the issue of national image, one may encounter a certain contradiction. Its essence lies in the fact that even despite the active development of the media, the general principles on the basis of which peoples form an idea of each other have not changed. The national (state, country) image is still based on sustainable perceptions, i.e. on stereotypes that are rooted in the depths of the national consciousness and very often are mistakenly compared with “historical memory”. They perform a function, a kind of information filter, which forms either a positive attitude or a negative one. Stereotypical thinking is equally characteristic of developed civil societies, as well as of local ethnic groups. The difference lies only in the means affecting the activity of consciousness and the forms of realization of this activity.

But why is the continuous flow of new information not able to destroy established stereotypes? After all, it is known that the expansion of information exchange is an objective phenomenon, taking place against the background of a change of generations, the approval of new life styles and standards. Russia, throughout the post-Soviet period, tried to create a positive and convincing image of the new country. However, these attempts turned out to be untenable, since after the fall of the information curtain and the cessation of anti-Soviet propaganda, the problems of the country's external perception not only did not disappear, but became much worse.

The stable geopolitical situation during the Cold War period was maintained through tough intersystem confrontation and did not have impartial assessments; nevertheless, it provided a constant interest in studying the USSR as a dangerous enemy or strong friend. However, the Soviet Union stubbornly walked through, pushing through any information barriers, created its own semantic field and formed a political space around itself, which attracted the attention of the international community. Together with the collapse of the USSR, the certainty that served as a support for past ideas disappeared, and without it, the positive image of the country did not want to spread. Negative, on the contrary, filled an informational niche, without encountering serious obstacles and previous restrictions. Today, the overwhelming majority of our contemporaries live in a special, almost universally spreading media space. “The basic characteristics of a person — a picture of the world, attitudes, values — were traditionally formed within social reality and, accordingly, belonged to it. Now the listed categories have ceased to “belong” to a person, having come under the dense influence of the media environment. As a result, it is not the social, but the media environment that becomes the substance through which the world around us is perceived.” [3].

If we look at the image of Russia in Great Britain, then it is worth noting that it is directly related to the changing situation in the international arena, because after the collapse of the USSR in 1991, the Russian Federation emerged and from

a strong partner it turned into a loser country in the Cold War, whose opinion had a significant weight. Even today, in the statements of British political leaders and articles of journalists there are stereotypes that often have nothing to do with reality.

British media outlets often describe Russia as a country of political despotism. The notion that Russia is a monarchy, according to Western journalists, is connected with the peculiarities of the Russian national consciousness, which has characteristics such as a tendency to lack of freedom and submission to the authorities. The Russian president in the British media is viewed as “the anointed one of God”, enjoying absolute power. When VV Putin was only elected to the presidency in 2000, in an article by the British newspaper The Guardian "Tsar Vladimir", the following was published: "Once there was an ascetic young tsar, rich, corrupt boyars who threatened the survival of Russia. Like Putin, he had pure moral ideals, but he didn’t have to use it. His name was Ivan IV, remembered as Ivan the Terrible.” [5]

Another popular stereotype about Russia is the image of a “bear”, which has been used in the West to describe the country for several centuries now, thereby firmly entrenched in the Western consciousness. Despite the fact that the bear personifies strength, power and greatness, Russia is presented as an evil bear who roughly invades the territories of sovereign states. [2] “If you poke it, he will respond. It is not a good idea.” [6]

The disseminated information, forming the representations and the introduced installations reflect the order of things, which is more characteristic of the media space. It is not entirely correct to reduce the problem to the introduction of stereotypes that supposedly distort the image of the country in the eyes of the foreign community. In fact, the new reality creates an audience need for certain information, in which the presentation will dominate. At the same time, the sources of ideas will be the mass media - they carry out their policies or express someone's point of view, adhering to the norms and prohibitions that already exist in society. Be that as it may, many of the rules that determine the form of presentation of the material, appeared not so long ago and also under the active influence of media reality.

Significant difficulties arising from the understanding of Russia in the West are largely due not to a hostile attitude, but to the simple lack of readiness of Western audiences for positive information about it. Due to the established information situation, interest in modern Russia is significantly limited and is formed, in most cases, in a negative way. Meanwhile, “in today's conditions, promoting objective perception of Russia abroad on the basis of reliable information is a problem not only of international prestige, but also of national security” [4]

Are there any methods that can improve the image of Russia in the eyes of Western partners? First of all, it is necessary to take into account that the image of the Russian state will always be a prisoner of its policy. Even the most favorable

political conditions will not guarantee its stability. At the same time, in the eyes of the foreign public, the image of the state is often associated (and sometimes it just merges) with a portrait of the ruling regime. Under the influence of media structures, this is a potential source of discredit. Moreover, the image of Russian society is highly vulnerable, since it does not fit into Western ideas about democracy, legal protection, social well-being and material wealth. The situation with the image of an economically successful and dynamically developing state is not easy. Despite the abundance of resources, the raw nature of the economy does not make Russia more attractive to Western consumers. S. Anholt rightly notes that "it is quite difficult for foreign consumers to draw a parallel between Russia and the goods that they would like to purchase here. Heavy industry, oil and weapons - the only thing that is automatically associated with Russia. None of the Russian brands has become so popular in Europe, North America or Asian countries to improve the reputation of our products."[1]

Summing up, it can be concluded that Russia needs to pay more attention to public diplomacy, which is an integral component of the "soft power" of the state, since the stereotypes that have developed in the course of history are extremely strong. Russian policy is still inferior in this area to other world powers that have built clear programs for several decades. Our country needs to develop a comprehensive long-term strategy in order to create a credible reputation on the world stage.

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俄罗斯青年政治社会化的信息和交流机制
INFORMATION AND COMMUNICATIVE MECHANISMS OF POLITICAL SOCIALIZATION OF YOUTH IN RUSSIA

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注解。 文章论述了信息社会的概念，突出了其特征和特征。 信息和通信机制及其对年轻人的影响已成为一个特殊的研究对象。

关键词：信息社会，机制，信息和沟通机制，青年，社会化，政治社会化。

Annotation*. The article discusses the concept of the information society, highlights its features and characteristics. Information and communication mechanisms and their impact on young people have become a special object of study.*

Keywords*: information society, mechanisms, information and communication mechanisms, youth, socialization, political socialization.*

New social approaches associated with the concept of "information society" emerged due to the development of information and communication technologies. The main members of the concept of "information society" are young people, this term has begun to form new social values that are transformed by an understanding of the vital aspects of youth. The ability to extract, accumulate and use information has become an integral part of the development of the younger generation.

The concept of the information society indicates the base of public organization - knowledge and information. Information is social in nature. Its carriers are representatives of different generations, each of which carries the "imprint" of the previous one. The most important is the management of intelligence, images, ideas, symbols. The processed information is important for society, and this implies a gradual shift in the focus of human capital from material to spiritual values.

"The alarming tendencies are connected with the replacement of spiritual culture with narrow professional knowledge, orientation of leisure towards consumer entertainment, the crowding out of live communication with virtual, the changing nature of human thinking from creative to instrumental and formalized." [1]

Among all social processes, communication is located at one of the leading places, which is connected with the fact that it is the most important element of interaction, which carries out the mutual transfer of values, information, assessments, feelings, values, meanings, etc.

The concept of "mechanism" is understood as "the internal structure of relations, as well as a goal-oriented set of elements and links within the information and communication system. At the same time, the movement of any of the elements affects the functioning of the rest, inevitably sets in motion and modifies other parts of the act of social and political interaction...". [2]

The subject of analysis in social informationology are informational - communicative mechanisms.

Informational and communicative mechanisms of political behavior is a complex of various conditions, factors, structures, means, connections and relationships that ensure the formation of attitudes, motives, forms and concepts, the political behavior of young people under the influence of the media and mass communication, social and political institutions power and the very youth in the process of communication.

In social informationology, there are such information and communication mechanisms for the formation of political behavior of young people as: psychological mechanisms of socialization and adaptation, integration, identification, orientation and social communication.

Information and communication mechanisms develop in the process of education, i.e. in the process of activities aimed at the transfer to the next generation of socio-political experience. Education means "purposeful and systematic influence on human behavior and consciousness in order to form individual principles, attitudes, value orientations, and concepts that provide the conditions for its development and preparation for social life, work". The process of education is associated with building social practices that guide the development of the subjective world of young people, promoting their conscious acceptance of social orientations, values, behaviors (including political ones), as well as independence in solving social problems in accordance with ideals and samples of society.

Taking into account the specifics of young people as a special socio-demographic and psychological group, which is characterized by increased expressiveness, emotionality, suggestibility, mental mobility, a tendency to mental infection, imitation due to insufficient political and social experience, its psychological and informational age, are characteristic of young people. people's mechanisms of political behavior and political socialization: the mechanism of assimilation and adoption of social roles, the mechanism of the shift of motive on purpose l, as well as the mechanisms of suggestion, infection, manipulation, imitation, reflexive control.

The mechanism of adoption and development of social roles is a mechanism in many respects similar to the mechanism of identification, but it has several distinctive features, the most important of which is the lack of personalization of the sample being

mastered. Characteristic to him is the description with the help of the concepts of social position and social role. These concepts are useful in helping to structurally divide the social environment and, without resorting to a real actor, describe a certain regulatory system of actions that he is obliged to perform, a style of behavior that he must learn and the relations into which he is obliged to enter.

The mechanism for shifting a motive to a target is the mechanism for generating motives, which is outlined in the theory of activity. Its essence is as follows: the goal, which had previously prompted the realization by some motive, eventually becomes an independent motivating force, that is, it itself becomes a motive.

Modern orientations of young people are built in the conditions of a profound transformation of the socio-economic, political, spiritual and ideological foundations of human life. The question of determining the place and role of youth in the political process of any country is fundamental.

The moral and political world of young people who enter into life in conditions of social transformation is characterized by confrontation and even chaos of competing values.

Analysis and diagnostics of the direction and nature of the transformations taking place with the political values of the modern Russian young generation gains special relevance in connection with the global development of modern information technologies. First, the formation of the political views of the modern young generation occurs under the influence of the Internet and television, which are the main products of society. Secondly, the Russian media, using samples of popular culture, become channels of influence on the younger generation, capturing consumer attitudes and potential conflicts in the socio-political sphere in the minds of young people. Third, the erratic development of information technologies, to which more young people have access, hinders their integration behavior, which, subsequently, leads to political alienation.

Thus, the development opportunities of the young generation as an innovative force of the state cause well-founded concerns and need to be monitored by society and the state.

The influence of political power on young people and the formation of forms of interaction with it, properly built information technology that relies on knowledge of the needs and interests of young people and attracting young people to participate in the political process - all this can determine the political activity of Russian youth in the near future.

Due to the urgency of attracting young people to participate in the modern political process in Russia, the necessary specific communication mechanisms for influencing young people can be considered.

The first mechanism is the use of "symbol images". A symbol in this case can have two basic meanings: an artistic image that embodies an idea; a subject that serves to identify any image. The use of "images-characters" makes more expressive ways to influence young people.

The special properties of the "image-symbols" are - their unambiguity, laconism, comprehensibility, which does not require additional explanations for all who are familiar with this symbolic system, rely on global understanding.

One of the most important mechanisms of influence on young people is the use of "slogans". They are classifiers that cause an unambiguous reaction of a mass audience, abstract concepts. Used without an exact meaning, they have a special political and ideological content.

Such vocabulary is designed for "naive listeners" who usually do not understand that the meaning of these concepts may vary depending on the general political context. These words contain a hidden ideological assessment of a negative or positive nature. They are designed to predominantly influence the behavioral and emotional "zones" of the psyche of the target audience.

One of the most important mechanisms of influence on young people is an individual information campaign of the head of a political organization. This method is considered universal. It can be used as a youth political organization, and any other actors.

In the process of conducting an individual information campaign of the head of a political organization, his popular mental image is formed. This image is a set of individual properties that, in the opinion of young people, should be inherent in this leader. For the most effective activity, the information campaign should first establish what type of leader, today, there is a need for young people.

Also an effective mechanism for influencing the youth of Russia is political advertising.

One of the main distinguishing features of political advertising is the lack of interpersonal communications, that is, when it is shown, there is no direct link between young people and representatives of the "advertiser" (the subject of the policy). Among the main channels of political advertising, outdoor advertising, periodicals (print), transport, television (radio), and communications — all this, simultaneously affects all the "zones" of the psyche of the target audience. This fact transforms political advertising into one of the most productive methods of influence in the younger generation.

The current young generation of Russia is a social segment, which in the future is capable of becoming one of the driving forces of the political process. The essential opportunities of the "youth resource" make it significant for all political actors without exception. This leads to the growing importance of the younger generation in the modern political process of the state and the onset of a period of information and state struggle for this resource.

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研究传统和创新形式的最终测试和知识评估对大学生专业自我评估的影响

STUDY OF THE IMPACT OF TRADITIONAL AND INNOVATIVE FORMS OF FINAL TESTING AND EVALUATION OF KNOWLEDGE ON PROFESSIONAL SELF-ASSESSMENT OF UNIVERSITY STUDENTS

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注解。教育质量和诊断大学生培养水平的具体情况是教育科学的一个重要问题。现代教育科学充分研究了监测和评估知识的方法，特别是它们在教育过程中的应用。作者分析了大学教育空间中最终测试的传统形式和创新形式之间的主要差异。研究各种形式的工作对大学生专业自我评估的影响，在研究两个学科的过程中分阶段进行：教育学和心理学，由主要教育课程的课程提供。研究的所有结果使我们能够总结出专业教学方向的两个组成部分的综合作用：个性的专业自尊及其水平。所提出的实验研究结果可用于高等教育机构的教育过程，以衡量学生的职业自尊水平。

关键词：学生，评估，自我评估，创新方法，研究，专业定位。

Annotation*. The quality of education and the specifics of diagnosing the level of training of university students is an important problem of pedagogical science. Methods of monitoring and evaluating knowledge, especially their application in the educational process are fully investigated by modern pedagogical science. The authors analyze the main differences between traditional and innovative forms of the final test in the educational space of the university. The study of the influence of various forms of work on the professional self-assessment of university students is carried out in stages in the process of studying two disciplines: pedagogy and psychology, provided for by the curriculum of the main educational program. All the results of the study allow us to conclude about the integrative role of the two components of the professional pedagogical orientation: professional self-esteem of the personality and its level. The presented results of an experimental study can*

be used in the educational process of higher educational institutions in order to measure the level of professional self-esteem among students.

***Keywords**: student, assessment, self-assessment, innovative approach, research, professional orientation.*

The development and implementation of new generation standards, the approval of a teacher's professional standard, a discussion of the concept of supporting the development of pedagogical education require changes in the organization and content of training future teachers in the competence-based educational paradigm.

Replacing traditional forms of teaching students with innovative ones allows creating new educational models for preparing individuals, with a high level of adaptation to new conditions, as indicated by a number of authors M.R. Ginzburg, I.S. Kon, A.K. Markova, N.S. Pryazhnikov, the study of professional orientation is inextricably linked with personal self-determination.

New educational standards introduce a new direction of assessment activity - an assessment of personal achievements. This is due to the implementation of the humanistic paradigm of education and the student-centered approach to learning. The current situation in the development of higher education is aggressively designated as a requirement - the introduction of new learning technologies into the learning process [1]. The professional activity of a teacher has specific characteristics: insufficient qualification is not allowed in teaching activities: high requirements for professional competence on the part of the educational system are made from the first to the last day of work; the teacher does not have the opportunity to suspend the pedagogical process, to postpone it in order, for example, to get advice during the break; due to the large variability of the education system, there are no significant repetitions in the activities of the teacher; the activity of the teacher requires a professionally accurate response [2].

An important professional quality of a teacher is self-confidence, which provides him with optimal mobilization and stability of behavior. Technologies are important not as separately existing education, but as part of a holistic process of forming competencies among students [4]. It is very important at the early stages of professionalization to take into account the laws of professional and personal self-determination of students.

The professional orientation of an individual develops when students actively acquire competences in psychology, general and professional pedagogy, the methodology of vocational training, master pedagogical technologies and pedagogical skills [2].

In our study, we are trying to conduct a comparative analysis of the traditional method of testing knowledge using tests and exams and testing knowledge through

a collection of test items developed by university professors. As an example, we used the tests developed by us for the disciplines "Pedagogy" and "Psychology".

The first part of our research was the study of the influence of professional self-evaluation of students of the psychological and pedagogical faculty. Empirically, the main variations in the orientation of the personality were studied, the degree of independence was determined, and the conditions for the effectiveness of students' educational and professional activities were determined. When analyzing the data obtained, several groups were identified according to the orientation of the individual.

At the first stage, the subjects were offered a questionnaire, the purpose of which was to identify the level of satisfaction with the choice of profession and assess the formation of the image of a psychologist. As a result, a generalized list of qualities inherent in the psychologist, which consisted of 20 personality traits, was created.

The second stage was a diagnosis of the level of claims and self-esteem. These features were studied using the method of Dembo-Rubinstein (modified by A.M. Prikhozhan). And the second technique is S.A. Budassi made it possible to identify the level of self-esteem of students of the psycho-pedagogical faculty using the ranking of qualities. The results were as follows: 22 students had a realistic level of aspirations, 30 subjects had a high level of aspirations. And in 24 subjects, an average level of claims was found. The results obtained using the method of Dembo-Rubinstein were confirmed using the method of S.A. Budassi In 24 subjects, adequate self-esteem was found. 30 subjects were found to have excessive self-esteem.

The third stage of the study was to rank 20 professional qualities, which were proposed to rank according to the image of yourself as a future professional; depending on their ideas about the ideal psychologist; depending on the expected assessment from classmates; from the general idea of the student; on the severity of these qualities in a close friend; from the severity of these qualities in a famous psychologist (favorite teacher).

Analysis of the results at this stage showed that 40 first-year students have the best image of the future professional, which is based on the general ideas about the student. And in 10 people of the second courses the image of the future psychologist is based on the expression of qualities in a close friend. Third-year students have the best developed image of the future professional, which depends on the expression of these qualities in a famous psychologist (favorite teacher). And only on the 4th year the true idea of yourself as a professional, such students of 20 people, is formed.

At the fourth stage, the graphic technique “Professional self-development” was applied. Self-assessment was presented on the graph in three levels: predic-

tive (I want in the future), actual (I can), retrospective (already have quality). At the final stage of the study, an interview was held, where the interrelation of the results was discussed.

The second part of the study was to identify the advantages and disadvantages of testing knowledge with the help of the exam, we asked teachers to put three marks on a separate form. One based on current classes, mainly seminars. It was a teaching assessment of student knowledge. The second objective assessment, in the opinion of teachers, characterizes the individual answer of the student on the exam, independent of any data about the student; and the third, which is exhibited in the test record.

The data obtained and conversations with teachers about the grades exposed revealed certain advantages of examinations and tests. One of them is the opportunity to check the depth of understanding of the student questions discussed at the exam: whether the student can bring his own examples, apply general knowledge to new facts and so on, one can see how well the student has a monologue speech, which is important for the future teacher. You can judge the awareness of a student of scientific problems.

However, some shortcomings of such a test of knowledge were clearly made. Thus, the three marks made by teachers often do not coincide with each other. In one of the groups of 40 people, the marks only coincided in ten cases. In three cases, the assessment coincided with a preliminary mark, in three - with an objective one, and in eight cases the final mark did not coincide with any of them.

The reasons for such discrepancies are varied: for example, encouragement of diligence, a halo effect, when a student has passed all previous exams for 5, and on this exam he received 5, although he is not up to this mark, taking into account his psycho-physiological state. Thus, the subjective factor strongly affects the exam.

In addition, the knowledge on the exam, the test is tested selectively, and the student can get a ticket for which he was better prepared.

The foundation of test tasks in pedagogy and psychology, with the help of which we conducted a knowledge test, was tested for reliability. At repeated testing of the same students identical results were obtained.

For a more complete understanding of the advantages and disadvantages of the test, we conducted an individual interview with students in one of the groups (20 people) in order to test the students' competence in the test tasks that they performed correctly.

As a result, some of the expected merits of the test were confirmed. The test covers all sections of the course being studied, which largely removes the selectivity of the answers.

It also eliminates many aspects of the subjective factor characteristic of the exam. For example, the halo effect. But at the same time, there were also disad-

vantages of the test. So, many students poorly know the classification of pedagogical technologies, they confuse the methods of education and training.

Since in many other tasks it is necessary to choose the correct answer from a number of erroneous ones, the process of recognition works, and when reproducing this material there are difficulties, some correct answers are given by eliminating less likely answers. The test does not allow to assess the degree of development of oral speech of the subjects, which is important for assessing the level of creative thinking of future teachers. Since our test was created by analogy with other tests of this kind, we can assume that these shortcomings are characteristic of other tests used in training.

All the empirical data of our study were processed. Analyzed the dynamics of self-esteem and the dominance of some personality traits of the future professional over others. In addition, a correlation was calculated between the various factors of self-esteem, qualities characteristic of each year of study from 1 to 4 courses.

Thus, the whole complex of investigated problems related to the psychological support of modern vocational education creates the conditions for solving the actual problems of modern vocational education. The study made it possible to draw a conclusion about the integrative role of the two components of the professional-pedagogical orientation: ¬ professional self-esteem of the personality and its level. As a result, it can be said that neither traditional methods of tests and examinations, nor tests are perfect methods for the final check and assessment of students' knowledge. Consequently, in the educational space of the university, it is necessary to use modern educational technologies, which can significantly improve the level of professional self-esteem of modern students.

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为成年人口组织静止血液护理
ORGANIZATION OF STATIONARY HEMATOLOGICAL CARE FOR THE ADULT POPULATION

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注解。 研究了2006 - 2015年萨马拉地区（俄罗斯）成年人口在静止条件下的血液病治疗组织。 住院患者的血液病治疗量显着增加。 为成年人口提供血液学护理的主要医疗住院组织是萨马拉国立医科大学诊所，萨马拉地区临床医院和Tolyatti市临床医院5号（俄罗斯萨马拉）。

关键词：血液系统疾病; 血液保健组织; 住院治疗

Annotation. *The organization of hematological care in stationary conditions for the adult population of the Samara region (Russia) for 2006-2015 was studied. There is a significant increase in the amount of inpatient hematological care. The leading medical inpatient organizations providing hematological care to the adult population are the Clinics of the Samara State Medical University, the Samara Regional Clinical Hospital and the Tolyatti City Clinical Hospital No. 5 (Samara, Russia).*

Keywords*: diseases of the blood system; organization of hematological care; inpatient care*

Introduction The prevalence of blood disorders among adults has recently increased. A significant role in the provision of specialized care, including hematological, is played by an inpatient service, the importance of which for patients with hematological pathology does not decrease [1–4].

Purpose of the study. Give a scientific assessment of the organization of stationary hematological care for the adult population of the Samara region.

Materials and research methods. The paper uses materials from the official

data of the Samara Regional Medical Information and Analytical Center (MIAC) and the Territorial Department of the Federal State Statistics Service for the Samara Region (Samarastat) for 2006-2015. The main research methods were statistical and analytical.

The results of the study and their discussion. During the considered period of 2006-2015, three medical organizations provided specialized hematological care to the adult population of the Samara region: Samara Regional Clinical Hospital named after V.D. Seredavina (SRCH), Clinics of the Samara State Medical University (SamSMU) and Tolyatti City Clinical Hospital No. 5 (CCH №5). During 2006-2015, every year all three of these hospitals provided hematological care on an ongoing basis.

Considering the volume indices of inpatient hematological care in the Samara region for the years 2006-2015, we can note the growth of their values in all parameters. The number of specialized hematological beds increased from 160 to 185 units, or by 15.6%, the total number of bed-days spent by patients in hematological hospitals also increased from 51022 to 55121, or by 8.0%. As a result, the total number of treated patients (those who left the hospital) increased from 2860 to 3665, including those who were discharged while reducing the number of deaths.

In the structure of hospital beds in 2006, 50% of beds (80 units) were accounted for SamSMU Clinics, 25% each (40 units each) at CCH No. 5 in the city of Tolyatti and SRCH. By 2015, the proportion of hematological beds for adults in SamSMU Clinics increased to 54.1% (100 beds), in CCH No. 5 in Tolyatti practically did not change (24.3%, or 45 beds) and in SRCH decreased to 21, 6% (40 beds).

A more objective characteristic of stationary hematological care is given by relative indicators calculated by comparing absolute values with the population. Thus, from 2006 to 2015, the provision of an adult population of the Samara Region with hematological beds in non-stop hospitals increased from 6.1 per 100 thousand inhabitants to 7.0, or 14.8%. During this period, the number of bed-days spent by patients on hematological beds per 100 thousand people of the adult population increased from 1956.2 to 2084.8, or by 6.6%.

The hospitalization rate of the adult population for hematological beds in hospitals in the Samara region increased from 109.7 patients per 100 thousand inhabitants in 2006 to 138.6 patients in 2015, or by 26.3%. Among the urban population of the region, the hospitalization rate increased from 132.7 patients per 100 thousand inhabitants to 155.0, or 16.8%. Among the population of rural areas, the level of hospitalization increased more significantly, from 41.1 patients per 100 thousand inhabitants to 90.6, or 120.4%, that is, more than twice.

The hospitalization of adult patients for hematological beds is highest among

the urban population (156.8 ± 12.0 on average for 2006-2015), which is significantly and reliably ($p < 0.01$) higher than among the rural population (56.6 ± 12.0). At the same time, it should be noted that the multiplicity of indicators of the level of hospitalization among the urban and rural population decreased from 3.2 times in 2006 to 1.7 times in 2015, which indicates a gradual reduction in the difference in hospitalization rates in urban and rural areas.

It is necessary to emphasize the various growth rates of the considered indicators characterizing inpatient care. Thus, the provision of adult population with hematological beds in 2006-2015 increased by 14.8%, while the number of bed-days spent by patients on hematological beds per 100 thousand inhabitants increased by only 6.6%, while the level of hospitalization increased most significantly, by 26.3%.

Such an uneven growth in the resource indicators of inpatient hematological care may indicate not only the growth of extensive indicators of providing the adult population with resources in this profile, but also an increase in intensive performance indicators related to the work of the bed.

Thus, against the background of a decrease in the average annual bed occupancy by 6.0%, over the period 2006–2015, the turnover of the hematological bed increased from 17.9 to 20.1, or 12.3%, and the average length of stay on the bed was significantly reduced from 18,8 to 14.9 days, or 20.7%. It is characteristic of this that hospital mortality over the ten-year interval has more than tripled, from 1.43% to 0.41%.

In the Samara region, adult hematological patients are hospitalized only in three hospitals. In the structure of hospitalizations for 2006-2015 (in average annual value) SamSMU Clinics ranked first, in which 45.3% of patients were treated, in second place - Tolyatti City Clinical Hospital No. 5 (CCH No. 5) (33, 5% of patients), in third place - Samara Regional Clinical Hospital named after V.D. Seredavina (SRCH) (21.2%).

Almost half of all hospitalized patients (45.3%) are at SamSMU Clinics, and in 2012, 47.9% of the total number of hospitalized patients were treated at SamSMU Clinics.

All individuals physicians providing specialized hematological care in the Samara region, work in a hospital. In the years 2006-2015, there was an increase in the number of hematologists in hospitals in terms of full-time positions from 21.5 to 27.75 rates (by 29.1%), for occupied posts from 17.25 to 22.5 rates (by 30.4%) and for individuals from 17 to 25 people (by 47.1%).

Faster growth rates of individuals of hematologists in terms of the number of full-time and full-time positions led to a decrease in the number of secondary employment from 1.01 in 2006 to 0.89 in 2015, with an average annual value of 1.09. At the same time, the difference between full-time and full-time positions remains,

providing staffing at the level of 80.2 - 97.9 (average annual value - 86.1), which is not enough and is a reserve for increasing the part-time ratio to 1.0.

By 2015, out of 27.5 full-time positions of hematologists in hospitals of the Samara region, 40.9% of the rates (11.25) were accounted for at the Sama State Medical University Clinic, 33.6% (9.25 rates) on the SRCH and 25.5% 7.00 rates) - on the CCH №5 Tolyatti.

Of the 22.25 occupied positions of hematologists, almost half, 48.3% (10.75 rates) came from SamSMU Clinic, 27.0% (6.00 rates) on SRCH and 23.7% (5.50 rates) - on CCH №5, Tolyatti.

Thus, there is a lack of staffing in the positions occupied by hematologists (80.9% in 2015), which has not changed since 2006 (80.2%). The lowest staffing level is noted in SRCH (64.9%), it is higher in CCH No. 5 in Tolyatti (78.6%), in SamSMU Clinics - the maximum (95.6%).

Of the 25 individuals of hematologists of the Samara region, more than half, 52.0% (13 doctors) work at SamSMU Clinics, 24.0% each (six people each) at SRCH and CCH No. 5 in Tolyatti.

The optimal ratio of part-time jobs in 2015 was noted at the SRCH - 1.00, at CCH No. 5 in the city of Tolyatti it was 0.92, at the SamSMU Clinics - 0.83. The low value of the coefficient of part-time hematology at SamSMU Clinics is due to the excess of individuals over their positions at the expense of the faculty participating in the SamSMU Clinics.

It should be noted that in hospitals the growth rates of staff and occupied positions of hematologists in 2006-2015 (respectively, 127.9% and 129.0%) were significantly lower than in outpatient units (171.4% and 142.9%). %), that is, the staffing of the outpatient unit by hematology doctors is growing at a higher rate relative to hospital.

At the same time, the growth rates of the staff of hematologists in hospitals in 2006-2015 exceed the growth rates of the number of hematological beds (115.6%), which leads to a slight decrease in the workload of hematologists. So, in 2006, one hematologist's rate was 9.3 hematological beds for adults and 165.8 treated patients; in 2015, these figures decreased to 8.3 beds (by 10.8%) and to 164.7 patient (0.7%).

The excess of individuals of hematologists over the number of positions they occupy in the absence of an increase in workload at the inpatient level may indicate an imbalance of the medical hematological personnel towards inpatient care and the possibility of transferring doctors to the outpatient unit.

At the same time, it should be noted that since 2015, on the basis of two hospitals of the Samara Region, 15 hematological day-care beds for adults have been opened: ten beds (66.7% of their total number) at SamSMU Clinics and five beds (33.3%) in CCH №5 Tolyatti. In 2015, 660 patients were discharged, of which 45 people (6.8%) were from rural areas.

The day stay beds worked quite intensively: the average bed occupancy in 2015 was 358 days (312 days in SamSMU Clinics and 452 days - CCH №5 in Tolyatti). With a high bed turnover (43.8), the average length of stay was 8.2 days (10.8 days at SamSMU Clinics and 6.1 days at CCH №5).

The introduction of day-care beds allowed an increase in the number of hospitalized patients in 2015 to 4325 people, of which 84.7% were treated in 24-hour hospitals and 15.3% in day-stay hospitals. As a result, in 2015, the provision of the adult population of the Samara Region with hematological beds (including day-stay beds) increased to 7.6 per 100 thousand inhabitants (by 7.0% compared to 2012, when the largest number of beds was noted) the hospitalization rate is up to 163.6 per 100 thousand. residents (by 4.7% compared with 2012, when there was the highest level of hospitalization).

Taking into account the day hospital beds, the load on one occupied post of hematologist in 2015 was 9.0 beds and 194 treated patients.

Findings. The region has developed a system for providing hematological medical care to the adult population, which is inpatient at the SamSMU, SRCH Clinics and Tolyatti CCH No. 5 Clinics. From 2006 to 2015, there has been an increase in the volume of inpatient hematological care, almost half of which is at the SamSMU Clinic. In hospitals, there is a lack of staffing in the positions of hematologists, which requires appropriate organizational and management decisions.

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晚期早产的新生儿结局
NEONATAL OUTCOMES OF LATE PRETERM BIRTH

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注解。目的：分析易患孕龄34-36周儿童的因素，研究晚期早产儿的发病结构。

材料和方法：对国家医疗机构“围产期中心（临床）阿尔泰地区”的27个女性生育史和31个胎龄出生的31个发育史的回顾性分析，从34 0/7到36 6/7周。 。

结果：在大多数分娩时间为34 0/7 - 36 6/7的妇女中，注意到复杂的妊娠。最常见的并发症是终止妊娠的威胁，宫颈功能不全，先兆子痫，妊娠高血压，轻度贫血，泌尿生殖系统感染。确定住院期间晚期早产严重程度的主要原因包括：呼吸系统疾病，形态功能不成熟，高胆红素血症，传染病，低血糖，红细胞增多症。 ICU晚期早产儿的平均治疗时间为4.3±3.5天。新生儿产科医院晚期早产儿的平均住院时间为6.1±1.9天。

结论：部分晚期早产儿在出生后的头几天需要进行复杂的强化治疗;超过一半的晚期早产儿需要在专门的住院环境中接受医疗护理。有必要继续对这类新生儿进行研究，以改善对他们的医疗保健。

关键词：晚期早产，早产，早期新生儿适应

Annotation. *Objectives: to analyze the factors that predispose to the birth of children at gestational age 34-36 weeks, to study the structure of the incidence of late premature infants.*

Materials and methods: a retrospective analysis of 27 birth histories of women and 31 developmental histories of newborns born on gestational age from 34 0/7 to 36 6/7 weeks was conducted in the State Healthcare Institution “Perinatal Center (Clinical) Altai Territory”.

Results: In the majority of women who gave birth at a period of 34 0/7 - 36 6/7, complicated pregnancy was noted. The most frequent complications were the threat of termination of pregnancy, isthmic-cervical insufficiency, preeclampsia,

gestational hypertension, mild anemia, urogenital infections. Among the main reasons determining the severity of late preterm at the inpatient stage of treatment were: respiratory disorders, morphofunctional immaturity, hyperbilirubinemia, infectious diseases, hypoglycemia, polycythemia. The average duration of treatment for late premature infants in the ICU was 4.3 ± 3.5 days. The average length of stay of late premature babies in the newborn obstetric hospital was 6.1 ± 1.9 days.

Conclusion: Part of late premature babies needs in the first days after birth to conduct complex intensive therapy; More than half of late premature infants require medical care in a specialized inpatient setting. It is necessary to continue the research of this category of newborns in order to improve the provision of medical care to them.

Keywords: *late preterm, preterm labor, early neonatal adaptation*

Introduction. In the last decade, there is a tendency to increase the frequency of miscarriage. The increase in the number of preterm births, including late pregnancy, is due to a number of predisposing factors, such as increasing the age of first-birth women, increasing the frequency of assisted reproductive technology, improving the quality of prenatal diagnosis of fetal distress, changing approaches to obstetric and gynecological care for women with complicated during pregnancy, as well as the expansion of indications for early delivery [1-2]. Most of the preterm birth is due to an increase in the number of "late preterm" - a unique subgroup of premature babies at high risk. The selection and special approach to this group have only recently been identified as a special area of research in neonatology. Many questions have arisen that need to be answered regarding nursing, and most importantly, the outcomes associated with miscarriage in late pregnancy. [3]

Purpose of the study: to analyze the factors predisposing to the birth of children at gestational age 34-36 weeks, to study the structure of the incidence of late preterm infants.

Materials and methods: A retrospective analysis of 27 birth histories of women and 31 histories of development of newborns born on the gestation period from 34 0/7 to 36 6/7 weeks was conducted at the State Healthcare Institution "Perinatal Center (Clinical) Altai Territory" from January 1 to April 1, 2016. The anamnestic data of women, the course of pregnancy, childbirth, methods of delivery, as well as the features of the course of the early neonatal period are analyzed. Statistical data processing was carried out using Microsoft Excel 2013 program. When evaluating quantitative indicators, the mean value, standard deviation (m ± SD), and median were calculated.

Results and discussion: The average age of women (n = 27) who gave birth at a period of 34 0/7 -36 6/7 weeks was 27.75 ± 6.00 years. Analysis of anamnestic

data showed that in 100% of women, the somatic and obstetric-gynecological history was aggravated. Among the analyzed group, multiparating women prevailed (92.5%). A history of recurrent pregnancy had spontaneous miscarriages or artificial interruption of pregnancy, recurrent miscarriage or premature birth. In the structure of extragenital pathology, kidney diseases, diseases of the cardiovascular system, endocrine disorders were most common, in some cases a combination of different extragenital diseases was noted (Table 1).

Table 1. *The frequency of factors aggravating the course of pregnancy in women who gave birth at a period of 34 0/7 - 36 6/7 weeks.*

Factor, aggravating during pregnancy	**number**	**%**
Chronic pyelonephritis	5	18,5
Oncological diseases	2	7,4
Thrombophilia	1	3,7
Thyroid disease	4	14,8
Habitual miscarriage and spontaneous abortion in history	7	25,9
Premature labor in history	6	22,2
Threatened miscarriage	10	37,03
Cervical insufficiency	4	14,8
Pre-eclampsia	7	25,9
Arterial hypertension and neuro-circulatory dystonia	14	51,8
Anemia	19	70,3
Urogenital infections	5	18,5
Chronic placental insufficiency: • with circulatory disorders	23 5	85,1 18,5
Premature rupture of amniotic fluid	4	14,8
Multiple pregnancy	4	14,8
Obesity	7	25,9

Most women who gave birth at a period of 34 0/7-36 6/7, had a complicated pregnancy. The most frequent complications were the threat of termination of pregnancy, isthmic-cervical insufficiency, preeclampsia, gestational hypertension, mild anemia, urogenital infections. Symptoms of placental insufficiency with circulatory disorders were found in 18.5% of women. Single pregnancies that ended on the period of 34 0/7-36 6/7 weeks, amounted to 23 (85%) cases, multiple pregnancies (twins) - 4 (15%). 3 multiple pregnancies occurred spontaneously, 1 - as a result of the use of assisted reproductive technologies.

Analysis of delivery methods showed that only 37.1% of births occurred through the natural birth canal. Cesarean section was performed in 62.9% of cases. Indications for cesarean delivery in most cases were combined factors on the part of the mother and the fetus. Anthropometric characteristics and assessment of the status of premature babies on the Apgar scale at the 1st and 5th minutes after birth are presented in Table. 2

Table 2. *Anthropometric characteristics and assessment of the status of premature babies of gestational age of 34–36 weeks on the Apgar scale*

Indicator			**n=31**
Body weight, g (*m±SD)*			2484,8±*423,4*
Height, cm (*m±SD)*			47,2±*2,3*
Head circumference, cm (*m±SD)*			32,3±*1,5*
Apgar score, points	on the 1st minute	min	4
		max	8
		median	7
	on the 5th minute	min	5
		max	8
		median	8

As follows from the data table. 2, the anthropometric indicators of late premature babies at birth in the vast majority of cases were within the age norm. Signs of intrauterine growth retardation (physical development indicators of less than the 10th percentile along Fenton T.R. 2013 curves) were detected in 2 (7.4%) of newborns.

In 15 (48.3%) children, in the first minutes of life, there were signs of respiratory disorders, which required their transfer from the delivery room to the intensive care unit and intensive care of the newborn (ICN). 2 (7.4%) late premature babies were born with malformations of internal organs (persistent upper vena cava, hydrocephalus), 1 (3.7%) of the child had Down syndrome.

The majority of late premature babies (16, or 51.7%) were transferred from the delivery room to the newborn department (ND) obstetric hospital. After stabilization, children from ICN were transferred to the Department of Pathology of Newborns and Premature Babies (DPNPB), and 2 children from ND were transferred to DPNPB due to identified violations of early neonatal adaptation. About half (15–48.3%) of late premature babies did not require special nursing conditions and were discharged home from the ND obstetric hospital in satisfactory condition.

An analysis of intensive care methods revealed that 6 (19.3% of the total) of late premature babies required non-invasive respiratory support by the CPAP method (Continuous Positive Airway Pressure - spontaneous breathing with constant positive pressure at the end of exhalation). 1 child required mechanical ventilation. In addition, it was found that due to the development of severe respiratory distress syndrome of the newborn (RDSN) 1 (3.2%), the late premature in the first hours of life required the administration of an exogenous surfactant drug through an endotracheal tube. Antenatal prophylaxis RDSN in this case was not carried out. While 2 (6.4%) late premature babies, whose mothers underwent a antenatal course of RDSN prophylaxis, did not require the introduction of surfactant. These children had mild to moderate respiratory disorders, and they needed non-invasive

respiratory support. In connection with the implementation of intrauterine infection, 7 (22.5%) late premature babies required the prescription of antibacterial drugs. In order to correct blood coagulation factors, transfusions of fresh frozen plasma were performed to 2 children (6.4%), 1 newborn (3.2%) - a replacement blood transfusion was performed to treat hemolytic disease of the newborn.

In addition to respiratory disorders and morphofunctional immaturity, the causes determining the severity of the condition of late premature at the inpatient treatment stage were: hyperbilirubinemia - 11 (35.4%) children; infection (congenital pneumonia) - 1 (3.2%); digestive disorders (intestinal paresis) -2 (6.4%); hypoglycemia - 6 (19.3%); polycythemia - 4 (12.9%) hemorrhagic syndrome - 2 (6.4%).

Despite the large number of medical problems, all children recovered and were discharged from the hospital. The average duration of treatment for late premature infants in ICN conditions was 4.3 ± 3.5 days. The average length of stay of late premature babies in the ND obstetric hospital was 6.1 ± 1.9 days.

Conclusion.

1. The majority of women with late preterm labor had a burdened somatic and obstetric and gynecological history. The severity of the condition of late premature infants in the neonatal period is most often determined by respiratory disorders, hyperbilirubinemia, and intrauterine infections.

2. A part of late premature babies needs in the first days after birth to conduct complex intensive therapy; More than half of late premature infants require medical care in a specialized inpatient setting. It is necessary to continue the research of this category of newborns in order to improve the provision of medical care to them.

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患有慢性阻塞性肺病的老年人慢性肾脏疾病：早期诊断的可能性
CHRONIC KIDNEY DISEASE IN ELDERLY PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: POSSIBILITY OF EARLY DIAGNOSIS

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In 90 elderly patients with chronic obstructive pulmonary disease (COPD), the main biochemical markers of systemic inflammation and their effect on the development of chronic kidney disease (CKD) were studied. For the first time, chronic kidney disease was diagnosed in 47.7% of patients with COPD. The tumor necrosis factor was significantly higher in smoking patients with COPD. The likelihood of developing CKD was higher in patients with severe COPD and more than 10 years of experience.

In comorbid patients with COPD and CKD, a course of COPD was noted more severe, as well as significantly increased endothelial dysfunction (ED). The interrelation of the CRP level and TNF-α was revealed. It was shown that markers of kidney endotelian disfunction (ED), homocysteine (HC), interleukine IL-6, IL-8, C-reactive protein (CRP) and fibrinogen, were significantly correlated with the severity of renal dysfunction.

HC had significantly increased values before the clinical manifestations of CKD and could be determined during a slight decrease in GFR (glomerular filtration rate). This study confirms the impact of systemic inflammation in COPD on the CKD development and identifies a marker of kidneys ED (HC), as one of the reliable predictors for early kidney damage diagnosis.

Keywords: chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD), endothelial dysfunction (ED), biochemical markers.

Chronic obstructive pulmonary disease (COPD) is one of the leading of morbidity and mortality causes worldwide, leading to significant economic and social damage.

The World Health Organization (WHO) classifies COPD as a group of diseases with a high social burden, since it is widespread in both developed and developing countries. The prevalence of COPD among adults older than 40 years old is 10–15% and by 2020 their number can double [1, 2].

Exposure to tobacco smoke and occupational hazards is a proven risk factor for the onset and development of COPD [3], but not the only one. In the "Global strategy for diagnosis, treatment and prevention" (GOLD, 2016 revision), besides tobacco smoke and occupational hazards, special attention is paid to the role of associated diseases and their impact on the severity of COPD, quality of life, prognosis and survival [3]. The toxic effects of air pollutants on the human body are characterized by the development of oxidative stress, since activation of the inflammatory response and formation of cytokines occur [4, 5].

At the present stage, COPD seems to be a disease with systemic damage to lungs and other organs and systems [6]. The study of kidney damage in COPD is very important, since there is an increase of kidney lesions accidences of a secondary genesis.

COPD is one of the infectious-inflammatory diseases, which cause complications of the urinary system, and can be a progression factor of both the the underlying lung and cardiovascular system deseases.

The actual problem of COPD is early diagnosis, because at the early stage of the disease the pathological process is partially reversible and timely steps to prevent can be most effective.

The respiratory tract inflammation is a major component in the COPD pathogenesis, which is currently regarded as a systemic disease [1, 13, 14], and confirms the need to identify markers of inflammation.

Among the predictors of vascular damage, homocysteine takes a significant part. High concentrations of homocysteine can be toxic to cells. Violations of homocysteine metabolism lead to a sharp increase in its concentration in the blood and can cause the huge variety diseases [20, 14, 21, 22, 23, 24].

Research over the past 15 years has shown homocysteine as a ranked independent risk factor for many diseases and it is believed that hyperhomocysteinemia is a more informative sign of cardiovascular diseases development than cholesterolemia [18, 20,19].

Hyperhomocysteinemia is common among patients with chronic renal failure (when renal function is reduced, but not so much that replacement therapy is required) and is almost always observed in the final stage of renal disease [25, 19]. This may be accompanied by accelerated development of atherosclerosis and disease progression [13, 8, 14].

Today one of the most studied biomarkers of blood plasma is C-reactive protein (CRP). Its level increases in COPD, regardless of other factors, in particular, smoking and the presence of associated diseases, and significantly correlates with the rate and severity of COPD progression [11,15,16, 17].

In support of the theory of systemic inflammation role in COPD, it is evidenced by the fact that several large-scale studies revealed increased levels of TNF-α, IL-6 and IL-8, CRP in patients with COPD [11, 18, 19, 4].

Objective: to study various biomarkers of kidneys endothelial dysfunction and their possible role in the onset and progression of COPD.

Objects and methods. Ninety patients with COPD of various severity degrees, aged 60–82 years, treated in the pulmonary hospital and city clinics, participated. The diagnosis of COPD was set in accordance with the criteria of the Global Initiative for Chronic Obstructive Lung Disease (GOLD, 2016).

The study group included 57 men (63.3%) and 33 women (36.7%). The patients were divided into 2 groups. The first group consisted of 59 patients (65.5%) with a moderate degree of COPD. The remaining 31 patients (34.5%) were assigned to the second group with severe COPD.

The following indicators were determined: C-reactive protein (CRP), homocysteine - (HC), creatinine (Cr), urea (Ur), fibrinogen (F), total cholesterol (TCh), prothrombin index (PTI), tumor necrosis factor - (TNF-α), interleukin (IL) -6, IL-8.

Kidney function was assessed by serum creatinine level and glomerular filtration rate (GFR). The calculation of the GFR was made according to the formula CKD-EPI.

The study included 4 follow-up examinations for 1 year: a primary assesment for inclusion in the study, and then after 3, 6 months, 12 months. All patients were allowed to take medications for the treatment of COPD during the entire study.

A comparative analysis of the data obtained was carried out using the «SPSS Statistics 21.0 for Windows» software package. The data obtained with normal distribution are presented as the arithmetic mean and the standard error of the mean ($M \pm m$). The significance of differences between the studied groups under normal distribution was calculated using the t-test for paired samples. Differences were considered significant at $p < 0.05$.

Results. According to the results of a comprehensive study, it was found that 72% had the harmful habit of smoking among the patients examined. Mostly these were men (71.3%). Their average smoking experience was ≥10 packs / year (Table 1).

The total number of hospitalizations for COPD exacerbations was significantly higher in patients with severe disease, and the frequency of COPD exacerbations in women was 25% higher than in men. Arterial hypertension was detected in 56%

of patients with COPD, the mean values of systolic and diastolic blood pressure were 153.58 ± 0.61 and 96.2 ± 0.42 mm Hg, respectively.

Our purpose was to study the systemic inflammation effect on the urinary system organs in patients with COPD and the CKD development. According to the recommendations of the National Kidney Foundation (NKF), glomerular filtration rate (GFR) is the best universal indicator of renal filtration function. The main criterion for CKD is a reduction in GFR of less than 60 ml / min / 1.73 m^2, persisting for more than 3 months. A decrease in GFR was suggested as the earliest CKD marker.

In our study, GFR (according to the CKD-EPI formula) less than 60 ml / min / 1.73 m^2 was detected in 60 patients (66.7%), in 43 (47.8%) of COPD patients for the first time. This allowed us to think about the convicing systemic inflammatory impact of COPD on the state of the renal parenchyma.

An early decrease in GFR is an important sign of the CKD development, since this indicator usually appears before the onset of clinical signs of kidney disease - macroalbuminuria and an increased serum creatinine level. It has been called "preclinical kidney disease" (PKD, preclinical kidney disease), a condition without clinical kidney disease. However, this is the "golden" segment, which is most effective for preventive measures to reduce the chronic renal failure and its progression.

In comorbid patients with COPD, there is no clear relationship between true GFR and serum creatinine levels. This often leads to an underestimation of the GFR calculated using the MDRD and / or CKD-EPI formula, which justifies the need to search for more sensitive and specific markers of renal dysfunction in the GFR range> 60 ml / min / 1.73 m^2.

In our study, we found that CRP, IL-6, IL-8 levels were increased in all patients with COPD. The highest rates were observed in patients of the 2nd group with severe disease. The indicators dependence on smoking was not revealed.

In both groups of patients, increased levels of TNF-α and fibrinogen were detected. Moreover, their quantities were much higher in smoker patients than non-smokers. Smokers with high titers (> 4.0 g /L) of plasma fibrinogen were characterized by a higher incidence of hospitalization for COPD, compared with those with low fibrinogen levels (<2.0 g /L). However, it should be noted that significantly high rates of these endothelial dysfunction markers were in patients with GFR lower 60 ml / min / 1.73 m^2. Encreased creatinine levels and blood urea in these patients were found. Moreover, the level of fibrinogen and TNF-α, directly correlated with the degree of the renal failure (Table 2).

It was noted that the ratio of fibrinogen / CRP also directly correlated with the severity of COPD and the severity of CKD. The results of the study suggest that increased plasma fibrinogen levels are an independent predictor of CKD development in patients with COPD.

The study revealed that creatinine was above normal in 21.2% of patients of the first group and 46.1% in the second group. In 5 (5.5%) patients with COPD with a moderate degree and in 8 (8.8%) patients with severe COPD, there were significant increase in creatinine and urea. They were first diagnosed with CKD with chronic renal failure II degree.

Heightened levels of TNF-α were determined in 15% of patients with COPD and in 97% of comorbid patients with COPD and CKD. This fact indicates low significance of TNF-α as a biomarker in COPD, but its significance as endothelial marker of renal dysfunction.

One of the research important results was clarification of homocysteine role in the chronic renal dysfunction development. Homocysteine is a toxin which high concentration causes endothelial damage. Damage to the endothelium initiates changes that predispose to atherosclerosis and related vascular diseases, including the renal arteries. This seems to justify the fact that hyperhomocysteinemia is always determined in patients with end-stage renal disease.

In our study, in all patients with COPD with reduced GFR, homocysteine levels were increased. Creatinine clearance, which determines the presence of renal failure, is inversely correlated with the level of plasma HC.

Studies have confirmed the inverse relationship between the HC level and kidney function, as well as its role, as a specific marker for the early diagnosis of kidney disease with COPD comorbidity.

A significant direct correlation between the level of homocysteine and fibrinogen was also detected. In all cases of increased fibrinogen in patients with COPD, HC had increased values (Table 3).

Conclusion. Thus, the results of patients nexamination with COPD allowed us to obtain information on the association of biomarkers of endothelial dysfunction with clinically important points, including the development and progression of chronic kidney disease.

When kidney function is impaired, there is an increase in the homocysteine content in the blood, and also, while there is a positive correlation with the creatinine concentration of in the blood. To some extent, the presence of hyperhomocysteinemia may explain the rapid progression of atherosclerosis in patients with severe kidney disease.

Our findings are consistent with the findings of J. Blacher et al. (2002). Homocysteine is an independent marker of CKD onset and progression, and high cardiovascular mortality along with systolic blood pressure and C-reactive protein levels in patients with COPD.

Inclusion of homocysteine assessment into examination protocols for patients with COPD will improve the early diagnosis of CKD, increase the effectiveness of treatment, reduce the complications incidence, hospitalizations number and

mortality. Screening for homocysteinemia is necessary for all people with COPD who are at renal disease high risk: diagnosed with coronary and renal occlusion, thrombosis, hypertension (essential hypertension and symptomatic hypertension), renal failure, metabolic syndrome, diabetes.

At the same time, the question of whether hyperhomocysteinemia is an independent risk factor for renal diseases or an increase in the homocysteine level is a consequence of other predisposing to renal pathology conditions remains open today. Of course, this requires the studies continuation to determine the place of homocysteinemia, other biochemical markers of endothelial dysfunction in the pathogenesis of nephrological diseases.

Table 1. - *Main characteristics of patients with COPD included in the study*

Parameters	**Patients with COPD n = 90**
Age	69,2±1,09 years old
Gender: Male Female	 57 (63,3%) 33 (36,7%)
Social status: Employees Workers Retired / disabled	 19 (21,1%) 17 (18,8%) 54 (60%)
Harmful habits: smokers non-smokerse	 65 (72%) 25 (28%)
Disability: working idle	 36 (40%) 54(60%)
COPD severity: Moderate Severe	 59 (65,5%) 31 (34,57%)
Number of stationary stays with COPD exacerbations,(average) Moderate Severe	 3,08±0,41 раза в год 4,3±0,24 раз в год

Table 2 - *Biochemical parameters in patients with COPD and patients with COPD and CKD.*

Parameters	Patients with COPD,n=30	Patients with COPD and CKD,n=60	P comp. norm.
CRP (mg/L)	7,67 ± 3,45	14,92 ± 4,4*	<0,05
Homocysteine (μM/L)	19,8±7,51	39,9 ± 6,34*	<0,05
IL-6 (pg/ml)	8,67 ± 5,12	9,37 ± 2,84	<0,05
Il-8 (pg/ml)	132,9 ± 11,05	152,39 ± 43,745	<0,05
TNF-α (pg/ml)	5,7 ±1,25	16,54 ± 5,47*	<0,05
Fibrinogen (g/L)	4,2±0,7	4,6±0,8	<0,05
PTI (%)	102,4±6,2	114±4,3	<0,05
GFR (average) (ml/min/1,73m2)	82,6	46,4	<0,05
Creatinine (μM/L)	111,3±6,7	398±3,2*	<0,05

Note: * COPD and CKD compared to COPD

Parameters	Patients with COPD	Patients with COPD and CKD
GFR (ml/min/1,73м2)	82,6	42,4
Creatinine (μM/L)	111,3±6,7	398±3,2*
Homocysteine (μM/L)	19,8±7,51	39,8 ± 7,14*

Note: * P p<0,005

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遗传性疾病的早期诊断 – 疼痛的非敏感性综合征。 临床病例
EARLY DIAGNOSTICS OF RARE HEREDITARY DISEASE - NON-SENSITIVITY SYNDROME OF PAIN. CLINICAL CASE

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注解。 所描述的病例是由疼痛受体侵犯的敏感性引起的相当罕见的遗传性常染色体隐性遗传疾病。 主要临床诊断标志：先天性疼痛不敏感，体温调节受损，起源模糊，无汗，精神发育迟滞，自我伤害，缺乏对热或疼痛的汗液反应，情绪和化学刺激。 人类遗传对疼痛综合征无症状的敏感性通常被延迟诊断。

这导致高死亡率（高达20%），与病毒感染期间危险的身体过热和急性炎症过程相关，这更常发生在儿童早期。 没有疼痛的反射会显着增加受伤的可能性。

关键词：遗传性疾病，人类先天性无痛性疼痛，早期诊断。

Annotation*. The described case is a rather rare hereditary autosomal recessive disease caused by sensitivity of pain receptors violation. Main clinical diagnostic signs: congenital insensitivity to pain, impaired thermoregulation, fever of vague origin, anhidrosis, mental retardation, self-harm, lack of sweat response to heat or pain, emotional and chemical stimuli. Human Hereditary Insensitivity to Pain syndrome with anhidrosis is usually delayed diagnosed.*

This leads to a high mortality (up to 20%), associated with dangerous body overheating during viral infections and acute inflammatory processes, which more often happens during the early childhood. The absence of painful reflexes significantly increases the likelihood of injury.

Keywords*: hereditary diseases, Human Congenital Insensitivity to Pain with anhidrosis, early diagnosis.*

Human Congenital Insensitivity to Pain with anhidrosis, (CIPA), or hereditary sensory and autonomic neuropathy type 4, pain insensitivity syndrome with anhidrosis (MIM No. 256800) belongs to the group of hereditary sensory and autonomic neuropathies [3].

This syndrome was first described in 1963 by A.G. Swanson with two brothers [11]. Later, P.J. Dyck identified 5 types of hereditary sensory and autonomic neuropathies, which are genetically and clinically heterogeneous group of diseases associated with sensory dysfunction [5]

The fourth type - insensitivity to pain syndrome with anhidrosis, is inherited by an autosomal recessive mechanism, but can occur sporadically. Less than 50 accidents of this disease are described in total.

It is believed that a genetic defect associated with a mutation in the NTKR1 gene (neurotrophic tyrosine kinase receptor, `type 1, located on chromosome 1 (1q21-q22)) encodes a type 1 tyrosine kinase receptor that plays a key role in nociceptive sensitivity regulating. The absence of a coordinating growth factor of sympathetic cholinergic neurons (including those innervating the sweat glands), as well as sensitive neurons of the spinal ganglia located in the posterior roots of the spinal cord, leads to a violation of peripheral fibers myelination [2,8,9]. The presence of anhidrosis is realized by the lack of innervation of the sweat glands [3,6]. In addition, the altered NTRK1 gene becomes an oncogene, which may eventually lead to the development of papillary thyroid carcinoma [12]. In some cases, SCN9A mutations have been identified that encode a subunit of the potential dependent sodium channel. At the same time, non-mutational in any of these genes families with the disease are described.

The clinical presentation of pain insensitivity with anhidrosis develops in the first year of a infant's life. It is characterized by the absence of pain sensitivity but presence of taste and tactile sensitivity, anhidrosis and a constant increased body temperature. The patient's body does not respond to antipyretic drugs and its reduction can be achieved only by physical methods of cooling.

Also, patients are characterized by mental retardation and autoaggression. A distinctive feature of the neurological status is the corneal reflex absence or reduction with normally caused other reflexes. Electroneuromyography (EMG) does not reveal signs of conduction disturbance along the nerve motor fibers. Also pathology of the visual system such as- corneal ulcers, keratoconus [4,7] can be detected. Lack of ectodermal structures innervation results to early tooth loss, recurrent osteomyelitis, aseptic necrosis [1].

The prognosis for pain insensitivity syndrome with anhydrosis is poor. There is a danger of body overheating during viral infections and acute inflammatory processes, for example, appendicitis, as patients do not feel pain and the temperature may rise to 42-43º, which leads to high mortality among such patients (up to 20%), especially during the early childhood period [10].

Lack of reflexes to pain significantly increases the likelihood of injury. Due to impaired teeth growth, dysfunctions of the articulatory apparatus and dysarthria take place, Sensitivity disorders cause self-damage to the gums and cheeks. In addition, the social adaptation is difficult, which is associated with a articulatory apparatus and spoken language development violations due to the absence of teeth.

Given the fact that pain insensitivity syndrome with anhidrosis is rare and late diagnosed, knowledge about the main symptoms and markers of the disease is very important. We present the case history of a child with an insensitivity pain syndrome with anhidrosis who was treated in the Regional Children's Clinical Hospital (RCCH) in Stavropol.

Materials and Methods. The analysis of the history of the boy R., at the age of 4 months, who was treated in RCCH in June, 2013 was carried out.

Results and discussion. Complaints when admitted: a persisting increase of body temperature up to 39 C. From the anamnesis: child of the 2nd pregnancy, the pregnancy proceeded with the interruption threat on 6-7 months, the birth in term (39-40 weeks), mass at birth 4050 g., trouble shoulders delivery, fracture of the clavicle.

Infant has never had sweating. Episodes of rising body temperature to 38–39 ° C from neonatal period to admittance, while the child's well-being were not suffered, the laboratory parameters were unchanged. Temperature reduction was achieved only by physical methods of cooling. Antipyretic drugs were ineffective. The child at the age of 4 months was hospitalized in the infectious diseases unit of the RCCH with suspected current infectious process.

The status was regarded as severe. The reaction to the examination is limp, inactive. There was a pronounced neurological symptoms: the head retains uncertain, the look is not centered, there is no support reflexes, the physiological reflexes were caused partially. Diagnosis at admission: «fever of vague origin, intrauterine infection, cytomegalovirus».

During examination, significant changes in clinical and biochemical analyzes of blood and urine, abnormalities in instrumental studies of the brain, abdominal organs, kidneys, (ECG, EMG, ultrasound, radiography, CT, etc.) were not detected. Markers of infectious diseases (viral hepatitis, HIV, syphilis, chlamydial and mycoplasmal infection) are negative.

The global and stimulated of electroneuromyography indicators were normal. In the motor sphere, pathology was not found. Taste and tactile sensitivity were maintained.

Special attention was paid to the fact that during the injection and other medical manipulations the child did not react to pain. This played a crucial role in the diagnosis of pain insensitivity syndrome with anhidrosis. The differential diagnosis allowed us to exclude hereditary sensory and autonomic neuropathies, ectoder-

mal growth diseases, Fabry sphingolipidosis, familial dysautonomy, Riley-Day syndrome. Thus, the absence of impaired coordination, the absence of lacrimation, the absence of mushroom papillae on the tongue, difficulty in swallowing, bouts of vomiting, dysfunction of the gastrointestinal tract, recurrent pneumonia, characteristic of hereditary sensory and autonomic neuropathy type 3 (familial dizavtonomiya, Riley-Day syndrome) were not identified. +The disease in our patient was not accompanied by hearing loss and the development of trophic ulcers, which is characteristic of hereditary sensory and autonomic neuropathy type 1.

Follow-up observation of the child over the next 3 years allowed us to confirm the diagnosis we made: there were defects in the formation of teeth with loss of 8 teeth (Fig.1.2), aseptic necrosis of the distal sections of the fingers (Fig.3) and deformation of toenails, thickening of the skin on the palms. The pronounced delay in psychomotor development was combined with hyper-motor behavior and emotional instability. At 3 y.o., the boy does not speak.

Conclusion. Thus, on the basis of anamnesis data and results of a clinical and laboratory-instrumental examination, the child was diagnosed for the first time at the age of 4 months: congenital insensitivity to pain syndrome with anhidrosis. This is the earliest time for making a correct diagnosis, of the cases described in the world literature that we studied.

It must be emphasized that early diagnosis is of great importance in the further fate of the child. Constant hyperthermia, involuntary self-mutilation and injuries affect not only the prognosis of this disease, but also the patient's life. Practice has shown that timely diagnosis and special education of parents of sick children to prevent accidental injury or self-healing ultimately has a positive effect on the condition of the children themselves. The child described in this report was able to avoid severe injuries, recurrent osteomyelitis.

Currently, specific methods for the treatment of congenital insensitivity pain syndrome with anhidrosis have not yet been developed. However, prenatal diagnosis of this pathology is possible using molecular genetic methods.

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Fig. 1. - *Defects of tooth formation with loss of 8 teeth.*

Fig. 2. *Defects of tooth formation with loss of 8 teeth.*

Fig. 3. - *Aseptic necrosis of the distal fingers of a 3-year-old child.*

危险因素在预防心血管疾病中的作用
THE ROLE OF RISK FACTORS IN THE PREVENTION OF CARDIOVASCULAR DISEASES

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It is important to engage in primary prevention of chronic diseases from childhood, as numerous studies have confirmed that the so-called “risk factors”, which are formed in childhood and adolescence, are “resistant” and subsequently pass into the lifestyle of an adult. The concept of “risk factors” is based on the results of prospective epidemiological studies and is currently the methodological basis for planning and organizing primary prevention of cardiovascular pathology [1, 2]. According to the concept, distinguish between modifiable and non-modifiable risk factors. Non-modifiable risk factors - age, gender, genetic predisposition - are used to develop a system for stratifying the risk of developing diseases. Such risk factors cannot be adjusted, but can only be taken into account when determining the degree of risk of developing diseases. Modified risk factors are subject to correction. They are divided into behavioral and biological risk factors. The behavioral risk factors include: smoking, unhealthy diet, low physical activity, excessive alcohol consumption, chronic psycho-emotional stress. These are the most frequently occurring behavioral risk factors in the lifestyle of a modern person, which contribute to the development of diseases. With prolonged exposure to behavioral risk factors on the human body, biological risk factors such as arterial hypertension (AH), dyslipidemia, overweight, obesity and diabetes mellitus, which are significant for the development of cardiovascular diseases, can form. In addition to identifying risk factors for developing diseases, effective prevention strategies are being developed. The following prevention strategies have been identified: population; high risk strategy; secondary prevention strategy. The population prevention strategy is aimed primarily at promoting healthy lifestyles

among members of society, at promoting awareness of maintaining health, at widespread informational work with the population, regardless of whether they have risk factors or chronic non-communicable diseases. The role of the family doctor in the implementation of the population prevention strategy is to actively inform and motivate the population to a healthy lifestyle and seek medical advice in the presence of risk factors. The leading role in carrying out a population strategy among medical specialists belongs to the Centers for Medical Prevention. The high risk strategy is aimed at identifying and correcting risk factors in patients. The leading role is assigned to specialists of primary health care, including family doctors. Recent programs - clinical examination of certain age groups of the population and preventive medical examinations are a good support for the implementation of high-risk prevention strategies. Secondary prevention is aimed at working with groups of patients with diseases in order to prevent the progression of diseases and the development of their complications. Secondary prevention is an integral part of the professional activity of the doctor. Cardiovascular risk assessment. Screening methods are used to identify risk factors. Since CVDs are considered as diseases with a multifactor etiology, and the potentiating effect of risk factors on their development is established, a scale of total cardiovascular risk has been developed, which is based on taking into account the combination of certain risk factors [3]. The determination of total cardiovascular risk is recommended for primary and secondary prevention of CVD, including during clinical examination of certain age groups of the population and preventive medical examinations. It was proposed to determine the total cardiovascular risk using the European SCORE scale, which is designed to assess the absolute risk of fatal cardiovascular complications in the next 10 years of life. Fatal cardiovascular complications include death from myocardial infarction, other forms of coronary heart disease (CHD) and stroke. It is important that any patient seeking medical care should be followed by an opportunistic screening to identify risk factors for developing cardiovascular diseases and determining the total cardiovascular risk of developing fatal complications in the next 10 years of this patient's life. The method for determining the total cardiovascular risk according to the European SCORE scale. When working with a scale, the following indicators should be considered: gender; age; smoking status (smoking / non-smoking); total cholesterol; systolic blood pressure. In the proposed table it is necessary, comparing the indicators horizontally and vertically in the corresponding blocks (by sex, age, smoking status), to determine the cell in which the percentage risk of fatal complications in the next 10 years is indicated. Total Cardiovascular Risk Levels: Low - less than 1% Medium - from 1% to 5% High - from 5% to 10% Very high - more than 10% The SCORE scale can also be used as a rough estimate of the overall risk of cardiovascular complications (fatal and non-fatal) in the next 10 years of life. The overall risk will be about 3 times higher than the number of fatal complications.

The purpose of our study was to evaluate the role of determining the total cardiovascular risk on the SCORE scale in primary care in the prevention of cardiovascular diseases (CVD).

Research methods. Surveyed 400 individuals aged 40 to 55 years who applied to the SVP of the Zharkurgan district of the Surkhandarya region. Risk factors were determined using a questionnaire and the risk of cardiovascular events was assessed according to the SCORE scale.

Results. To study the total cardiovascular risk on the SCORE scale, such risk factors as smoking were observed, which occurred in 226 (56.5%), hypercholesterolemia to determine the level of total cholesterol was found in 134 (33.5%) and hypertension was detected in 174 individuals (43.5%). The results of the study of the total cardiovascular risk on the SCORE scale revealed: low cardiovascular risk was detected in 82% of cases, the average - in 9.0%. Moderate risk in 4%, high in 4% and very high risk in 1% of patients. We also analyzed other risk factors of CVD: heredity - burdened by CVD was recorded in 274 (68.5%) of the surveyed. In the analysis of other risk factors, BMI> 24.9 kg / m2 had 314 (77.5%) patients, of which 151 were overweight (48%), grade 1 obesity was 84 (26.7%), grade 2 obesity 38 (12.1%). 165 has a visceral type of obesity. OT / OB was 1.3 ± 0.3. During questioning and active questioning, low physical activity was detected in 294 (74.0%) people (lifestyle features, habits, restriction due to the occurrence of pain or discomfort in the heart area, the appearance of inspiratory dyspnea during exercise). All participants were interviewed about the risk factors for cardiovascular diseases and their prevention.

Conclusion. Applying the SCORE scale in primary health care settings will help assess cardiovascular risk and develop preventive measures to combat major risk factors. According to the World Health Organization (WHO), more than 75% of deaths from CVD could be prevented by correcting risk factors and changing the lifestyle of these patients [4-7]. Considering that behavioral risk factors are more often formed during adolescence with subsequent consolidation in the adult lifestyle, preventive work should be started precisely from adolescence, informing adolescents about the harm of this or that harmful habit, motivating them to give up the habit life [8].

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UDC 616.24-002/303.425.6

对社区获得性肺炎患者的社会学调查分析结果

THE RESULTS OF THE ANALYSIS OF A SOCIOLOGICAL SURVEY OF PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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注解。肺炎是卡巴尔达 – 巴尔干半岛共和国的主要健康问题之一，在一般发病率结构中占有很大比例。该研究的目的是研究社区获得性肺炎患者的肖像。通过询问方法，我们采访了纳尔奇克国家预算卫生机构“共和临床医院”和国家预算卫生机构“城市临床医院1号”的67名患者。该研究发现，社区获得性肺炎的最大发病率属于45-54岁的患者类别。大多数受访者的人均收入在8到13千卢布之间。每月。分析的一个重要结果是确定诸如“自我治疗倾向”，“获得临时残疾状态的倾向”和“影响药品选择的因素”等参数对患者收入水平的依赖性。。因此，收入水平越低，患者制作临时残疾名单的次数越少，他们通常会采取流感和感冒的自我治疗，而且他们也更注重自己以前购买药物的经验。社区获得性肺炎患者行为的一个显着特征是决定开始使用抗菌药物（61.2%）。与此同时，只有四分之一的患者（24.4%）遵循药物使用说明书规定的疗程，而31.7%的患者仅在其健康状况有改善迹象之前服用药物，43.9%的患者服用药物。受访者发现很难确定药物治疗时间的标准。

关键词：社区获得性肺炎，病人肖像，卡巴尔达 – 巴尔卡尔共和国，社会学调查，药物，人均收入

Annotation*. Pneumonia is one of the major health problems of the Kabardino-Balkarian Republic and occupies a significant share in the structure of general morbidity. The purpose of the study was to study the portrait of a patient with community-acquired pneumonia. By the method of questioning, we interviewed 67 patients*

of the State Budgetary Health Institution "Republican Clinical Hospital" and State Budgetary Health Institution "City Clinical Hospital No. 1" in Nalchik. The study found that the maximum incidence of community-acquired pneumonia falls in the category of patients aged 45-54 years. Most of the respondents have an average per capita income of between 8 and 13 thousand rubles. per month. An important result of the analysis is the determination of the dependence of such parameters as "propensity to self-treatment", "propensity to obtain the status of temporary disability" and "factors influencing the choice of a medicinal product" on the patient's income level. Thus, the lower the level of income, the less often patients make out lists of temporary disability, more often they resort to self-treatment for the flu and cold, and they are also more focused on their own previous experience when buying medicines. A distinctive feature of the behavior of a patient with community-acquired pneumonia is the decision to initiate therapy with antibacterial drugs (61.2%). At the same time, only a quarter of patients (24.4%) follow the course of therapy prescribed by the instructions for use of the drug, while 31.7% of patients take medications only until signs of improvement in their health state, and 43.9% of respondents find it difficult to determine criteria for the duration of medication.

***Keywords**: community-acquired pneumonia, patient portrait, Kabardino-Balkarian Republic, sociological survey, drugs, per capita income*

Introduction

Pneumonia is a form of acute respiratory infection, taken under the control of WHO and UNICEF in order to increase the rate of control of it [1]. Among the subjects of the Russian Federation, the Kabardino-Balkarian Republic (KBR) is among the regions most affected by this disease. It should be emphasized that the incidence of pneumonia in the KBR is due not only to medical, but also to social and financial factors [3].

In order to detect and study these factors, the degree of their influence on the frequency of pneumonia, as well as to study the portrait of a patient with a diagnosis of pneumonia in the KBR, we conducted a sociological survey.

Materials and research methods

The materials of the study were the data obtained during a sociological survey conducted among 67 patients of the pulmonary departments of the Republican Clinical Hospital and the City Clinical Hospital No. 1 in Nalchik from February to July 2017. The number of respondents was calculated by us using the formula of a non-repetitive sample with a confidence level of 90% and a confidence interval of 10%. The parameter of the volume of inpatient medical care for the adult population in the compulsory health insurance system in accordance with the clinical and statistical groups for 2018 was set as the general population [4]. The research tool was a specially designed questionnaire filled out by patients voluntarily and anonymously.

The methods of research used methods of logical and mathematical analysis. Data processing was carried out using the mathematical and statistical functions of Microsoft Excel tables.

Results and discussion

The "most common" portrait of a patient with community-acquired pneumonia in KBR has been established: the maximum values for each studied trait are selected. By selecting the options that scored the maximum number of responses, a "typical patient" was identified. According to the data obtained, the most typical patient with community-acquired pneumonia is a married man aged 45 to 54 years old with a secondary special education and an average per capita income of 8 to 13 thousand rubles. per month for one family member.

Further analysis allowed in-depth study of the main trends among patients of the pulmonary departments who were hospitalized due to pneumonia. The gender ratio among patients was 58.2% to 41.8% (men and women, respectively). This ratio is not accidental: the reason for the higher incidence among men is associated with the specifics of their work in high-altitude climate, coupled with low air temperature, windiness, as well as unstable weather conditions.

In the framework of the Federal Standard of Medical Care for Patients with Pneumonia, this group is treated both in inpatient and outpatient settings. Moreover, if the patient's condition requires hospitalization, the list of medications is limited to those currently available at the hospital pharmacy and is provided at the expense of OMS funds [4]. However, in case of outpatient management, only medical treatment is covered at the expense of the OMS fund, and drugs are purchased by patients for their own money. In connection with this fact, the questionnaire included questions about the income per family member of the patient.

As a result of the analysis of the received answers, it was established that the majority of respondents (67%) have income per 1 family member in the range of 8 to 13 thousand rubles, which is close in value to the threshold of the subsistence minimum in KBR - 10553 rubles/month. [2]. One fifth of the respondents (20.9%) indicated the average per capita income in a family from 13 to 20 thousand rubles. The smallest categories are respondents with an income level of more than 20 thousand rubles. (4.5%) and less than 8 thousand rubles. - 7.5% per member of their family.

In addition, when analyzing responses by groups of respondents with the same level of income, general patterns are established. We have identified the relationship between income level, criteria when choosing a pharmacy, as well as a tendency to design sheets of temporary disability for cold symptoms, cough and flu. Answers of respondents depending on the level of income are presented in table 1.

Table 1. *Factors depending on the level of income of patients*

Questionnaire questions	Analyzed parameters				
	Income level, thousand rubles	**< 8 thousand roubles**	**8 – 13 thousand roubles**	**13 – 20 thousand roubles**	**>20 thousand roubles**
	Total number of respondents,%	**7**	**67**	**21**	**4**
What factors are decisive for you when choosing a pharmacy?	Convenient location, %	60	71	64	100
	Range width,%	40	33	29	33
	Pharmacy pricing policy,%	100	96	64	33
	Professionalism of pharmaceutical staff,%	20	18	14	67
Do you request medical sick-leave certificate for cough and cold?	Yes, %	0	38	57	67
	No, %	100	63	43	33
Do you treat yourself for flu and cold?	Yes, %	100	76	71	33
	No, %	0	24	29	67
What influences your choice of drug?	Recommendations of the attending physician,%	20	24	29	67
	Previous experience,%	60	53	43	33
	Recommendations of friends,%	40	16	14	0
	Pharmaceutical staff recommendations,%	80	62	71	67
	Advertising in the media,%	40	44	36	33
	Price%	100	84	71	0
	Producing country, %	20	9	7	0
	Release form,%	0	27	14	67
	Security, %	80	58	71	0

A direct dependence of the responses on the income level of patients with pneumonia was established for the following parameters:

1. The price of the drug as a factor influencing the choice of a pharmacy: respondents with an average per capita income of less than 8 thousand rubles noted this option in 100% of cases.

The importance of this parameter with increasing family affluence decreases and reaches 33% for patients with an income of more than 20 thousand rubles for one family member.

2. Propensity to request medical sick-leave certificate: the lower the income level, the lower the frequency of request medical sick-leave certificate. In the category of patients with an income level per 1 family member from 20 thousand rubles this figure is 67%.

3. A larger reference point in the treatment of previous personal experience, recommendations of pharmacy workers, price and country of origin.

According to the above data, the unwillingness of patients to draw up lists of temporary disability, the tendency to self-treatment, as well as the rationale for their own principles of choice of treatment tactics with average per capita incomes less than 8 thousand rubles associated with low financial security, since the registration of sheets of temporary disability, as well as consulting a doctor and taking prescribed medications incur certain cash costs.

An important feature in the regional situation on the epidemiology of community-acquired pneumonia is the high propensity of patients to receive antibiotics (61.2%) without a doctor's prescription (Figure 1).

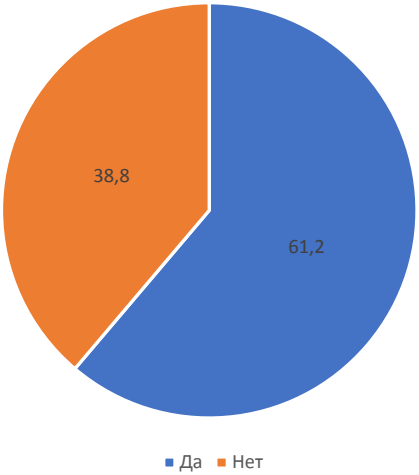

Figure 1 - *The tendency of patients to make independent decisions about taking antibacterial drugs,%*

In addition, a factor aggravating the situation is the unauthorized choice of dates for taking antibacterial drugs. It was revealed that 31.7% of patients take medications until the first signs of improvement in their health; 43.9% find it difficult to determine the criteria for the duration of medication, and only 24.4% of patients with pneumonia take medications according to the instructions.

This pattern of behavior of an average patient indicates the uncontrolled intake of antibacterial drugs, this can lead to resistance of pathogens, which may further worsen the prognosis of their health status. Thus, an analysis of a group of patients who had previously entered the inpatient unit with a diagnosis of pneumonia made it possible to establish that in 50% of cases they are prone to self-prescribing antibiotics, and patients in this group in 100% of cases take medications only before the first signs of improvement in their health.

Conclusion

Thus, the incidence of community-acquired pneumonia and socio-demographic environment are interrelated and should be taken into account when developing a rational scheme of drug provision for patients during inpatient and outpatient treatment, preparation of various information materials for doctors and pharmaceutical workers of pharmacy organizations that provide end-consumer counseling.

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植物酶的市场研究
MARKET RESEARCH OF DRUGS CONTAINING PLANTS ENZYMES

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注释。本文介绍了俄罗斯联邦的营销策略。值得注意的是，应该进行这项研究的结果。

关键词：营销研究，酶，药物。

Annotation*. In this paper, the actual aspects of marketing research of drugs containing enzymes of plant origin, presented in the pharmaceutical market of the Russian Federation. The results indicate the feasibility of further marketing research of the nomenclature of drugs to assess the prospects of creating new domestic drugs containing enzymes of plant origin.*

Keywords: *marketing research, enzymes, drugs.*

Introduction. Pharmaceutical preparations containing enzymes of plant origin, are widely used in modern medicine and pharmacy for the treatment and prevention of various diseases, mainly for treatment of diseases of the gastrointestinal tract and topically with the aim of purification and healing of purulent wounds, especially in the 1st phase of wound process [2, 3, 5, 6, 7]. Proteolytic enzymes are also used to produce mixtures of amino acids used for parenteral nutrition; for the treatment and prevention of diseases of the musculoskeletal system; in the food industry [2, 3, 4, 6, 7].

The main sources of plant enzyme production are the leaves and fruits of papaya (papain) and pineapple juice juice (bromine). Previously, Nigedaz was produced from Chernushka Damascus seeds and used as a lipolytic agent for the treatment of various gastrointestinal diseases [3, 5].

The purpose of the research is to conduct marketing research of the market of medicinal preparations containing the enzymes of plant production presented on the pharmaceutical market of the Russian Federation.

Materials and methods of research. The object of research is the nomenclature of medicinal preparations containing plant enzyme enzymes and included in the State Register of Medicinal Products of the Russian Federation.

In order to conduct marketing research of the market of medicinal products containing plant enzymes, a collection of data on registered medicinal products included in the State Register of Medicinal Products as of May 1, 2018 was carried out.

The methods of marketing, economic-statistical and content analysis were used in the research.

Research results and discussion. At present, 9 trade names of medicinal products containing plant enzymes are registered in the Russian Federation. The total number of drugs containing plant-derived enzymes, taking into account various forms, dosage and fastening - 14. In the pharmaceutical market of the Russian Federation mainly dominated by drugs containing enzymes of plant origin, imported (80%).

In accordance with the State register of medicines, all medicines containing enzymes of plant origin can be divided into pharmacotherapeutic groups: proteolytic agents (for external use), digestive enzyme agents, immunomodulatory agents, enzyme agents (systemic action), carminative agents, multivitamin agents and other drugs. The largest number of trade names of drugs containing enzymes of plant origin, noted in the pharmacotherapeutic group "Immunomodulatory agents" (40%). However, within each pharmacotherapeutic group, the number of trade names of drugs containing enzymes of plant origin, in percentage terms, is not more than 17% (proteolytic agents for external use).

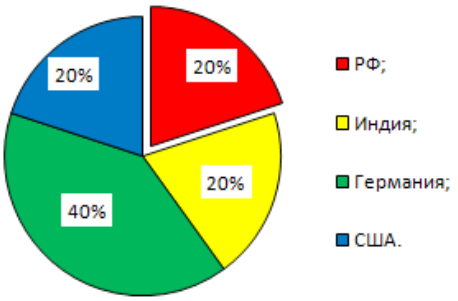

Fig.1. *Distribution of trade names of medicinal products containing enzymes of plant origin, by producing countries*

Fig. 2. *Distribution of trade names of medicinal preparations containing enzymes of plant origin, by pharmacotherapeutic groups*

During the analysis of the market of drugs containing enzymes of plant origin, it was found that the main type of dosage form for this group are coated tablets (Fig.4).

However, as a result of the analysis of the market by type of dosage forms of all pharmacotherapeutic groups, including drugs containing enzymes of plant origin, it was found: pharmacotherapeutic group "Proteolytic agents" is represented by only one type of dosage form-lyophilizates for the preparation of solutions and suspensions for intramuscular, intravenous and subcutaneous administration (100%); in the pharmacotherapeutic group "Digestive enzyme agents" dominated by dosage forms in the form of tablets, coated (51,61%); in the pharmacotherapeutic group "immunomodulatory agents" drugs predominate in the form of solutions for injections and infusions (30,91%); the predominant type of dosage forms in the pharmacotherapeutic group "Enzyme preparations" are lyophilizates for the preparation of solutions and suspensions for intramuscular, intravenous and subcutaneous injections (72,22%); in the pharmacotherapeutic group "Carminative agents" drugs predominate in the form of solutions (including drops), suspensions and emulsions for internal use (28.57%, Respectively); the main type of dosage form in the pharmacotherapeutic group "Multivitamin preparations and other means" are coated tablets (46.15%).

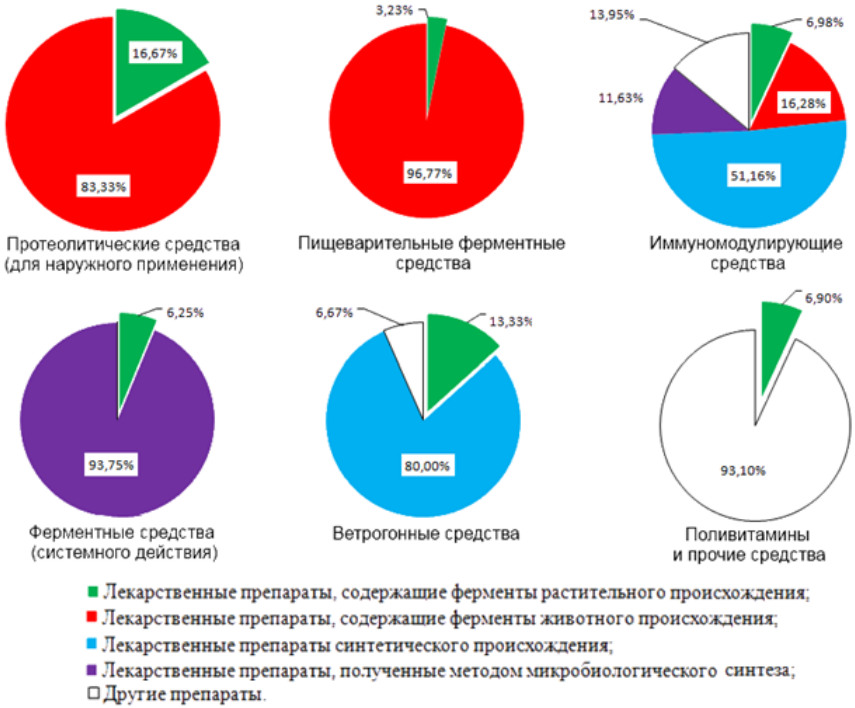

Fig. 3. *Analysis of the nomenclature of drugs pharmacotherapeutic groups, including drugs containing enzymes of plant origin, by origin*

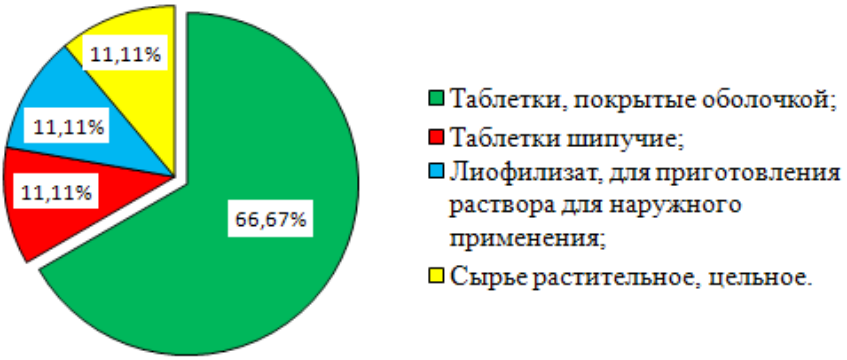

Fig. 4. *Analysis of the market of drugs containing enzymes of plant origin, by type of dosage forms*

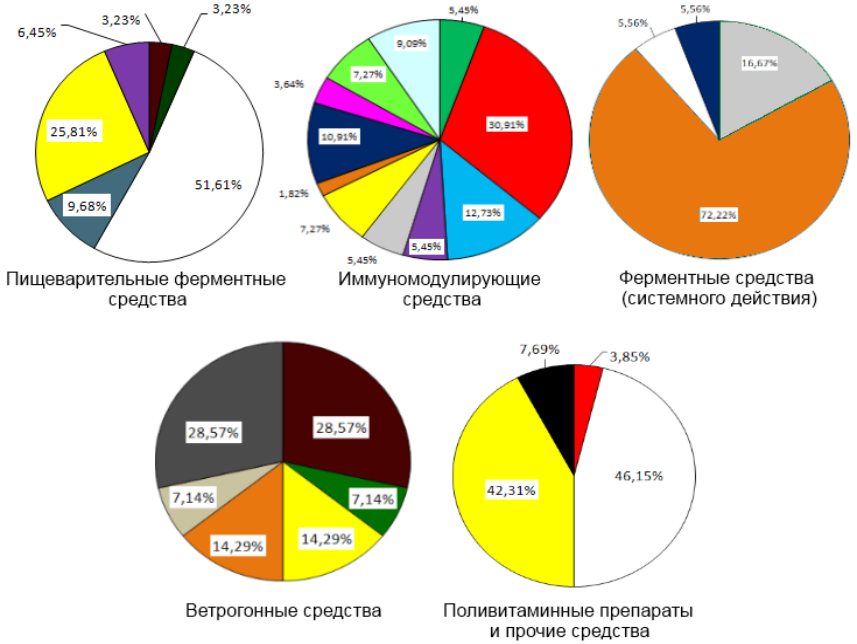

Fig. 5. *Analysis of the market of medicines by type of dosage form of each pharmacotherapeutic group, including drugs containing enzymes of plant origin*

Conclusion. In the course of marketing research on drugs containing enzymes of plant origin, it was revealed:

1. In the pharmaceutical market of the Russian Federation mainly dominated by drugs containing enzymes of plant origin, imported (80%).

2. Drugs containing enzymes of plant origin can be divided into pharmacotherapeutic groups: proteolytic agents (for external use), digestive enzymes, immunomodulatory agents, enzyme agents (systemic action), carminative agents, multivitamin agents and other drugs.

3. The largest number of trade names of drugs containing enzymes of plant origin is noted in the pharmacotherapeutic group "Immunomodulatory agents" (40%), but within each pharmacotherapeutic group their number does not exceed 17% (proteolytic agents).

4. The main type of dosage form of drugs containing enzymes of plant origin are coated tablets (66.67%).

5. The predominant type of dosage form among the drugs of pharmacotherapeutic groups "Proteolytic agents" and "Enzyme agents" are lyophilizates for the preparation of solutions and suspensions for intramuscular, intravenous and subcutaneous injections (100% and 72.22%, respectively). The pharmacotherapeutic group "Immunomodulatory agents" is dominated by drugs in the form of solutions for injections and infusions (30,91%). Pharmacotherapeutic group "Carminative agents" is represented mainly by liquid dosage forms for oral administration-solutions, suspensions and emulsions (28.57%, respectively), and in the pharmacotherapeutic groups "Digestive enzyme preparations" and "Multivitamin preparations and other means" are dominated by coated tablets (51.61% and 46.15%, respectively).

6. Liquid dosage forms for oral administration are practically absent in pharmacotherapeutic groups "Digestive enzyme preparations", which complicates their use in dysphagia.

7. In the pharmacotherapeutic group "Proteolytic agents" there are no mild dosage forms, which complicates their use among patients.

To assess the prospects of creating new domestic drugs, including drugs containing enzymes of plant origin, it is advisable to further market research of the range of drugs.

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从液体植物提取物中获取粉末散装材料的技术基础

SUBSTANTIATION OF TECHNOLOGY FOR OBTAINING POWDER BULK MATERIAL FROM LIQUID PLANT EXTRACT

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抽象。两种吸附剂（微晶纤维素和二氧化硅胶体）的比较研究为液体植物提取物（Matricaria chamomilla L.，Calendula officinalis L. flowers和Achillea millefolium L. herb）吸附进一步转化为颗粒状态并制造进行固体剂量药物治疗。考虑到直接压缩技术在固体剂型制造中的优点，使用SeDeM图解法进行粉末散装材料适用性的比较评估。

在微晶纤维素上吸附萃取物后，指标结果：压缩性（6.85〉 4.18），润滑性/稳定性（4.48〉 2.15），润滑性/剂量（5.76〉 3.50）表征所得质量与基于质量的最佳质量相比在胶体二氧化硅上。吸附后微晶纤维素的良好压制指数为5.09，对于二氧化硅胶体4.24，优选用于吸附液体植物提取物的微晶纤维素。

介绍。Matricaria chamomilla L.，Calendula officinalis L.和Achillea millefolium L. herb的水 - 醇植物提取物由俄罗斯的10多家制药企业生产。它具有广泛的药理作用。然而，它的使用通常需要用水稀释，这导致药物在家中的剂量不准确并给患者带来许多不便。此外，在水暴露时突然更换溶剂，这导致形成稳定的水不溶性胶体胶束，由生物活性物质组成。这可能反过来导致它们在组织和生物流体中的分布的异质性。

用液体植物提取物开发新的，均匀剂量的新药物是解决上述问题的一种方法[1]。

在用于口腔疾病治疗的抗炎药中，专家更喜欢剂型如锭剂。与输液，煎剂，酊剂，喷雾剂等相比，含片剂可准确配制活性成分，简单易用，对粘膜有长期作用，可提高治疗效果，缩短治疗时间。残疾[2]。

与药用植物的生物活性物质的热稳定性相关，为了保持其复杂性，使用提取物的吸附而没有热暴露的技术是有希望的，这使得可以获得粉末松散材料以在压制期间准确且均匀地定量给料[3]。

关键词：液体植物提取物，固体剂型，微晶纤维素，胶体二氧化硅，专家系统，SeDeM。

Abstract. *A comparative examination of two adsorbents (microcrystalline cellulose and silicon dioxide colloidal) for the liquid plant extracts (Matricaria chamomilla L., Calendula officinalis L. flowers and Achillea millefolium L. herb) adsorption for further transformation into a granular state and the manufacturing of a solid dosage medicine were performed. Taking into account the advantages of the direct compression technology in the manufacturing of solid dosage forms, a comparative assessment of the powder bulk material suitability was carried out using the SeDeM graphic method.*

After adsorption of the extract on microcrystalline cellulose, the results for the indicators: compressibility (6.85> 4.18), lubricity / stability (4.48> 2.15), lubricity / dosage (5.76> 3.50) characterize the resulting mass as optimal compared to the mass based on colloidal silicon dioxide. The index of good pressing of microcrystalline cellulose after adsorption was 5.09, and for silicon dioxide colloid 4.24, which is preferable to microcrystalline cellulose for adsorption of liquid plant extract.

Introduction.

Aqueous-alcoholic plant extracts of *Matricaria chamomilla L.*, *Calendula officinalis L.* and *Achillea millefolium L.* herb are produced by more than 10 pharmaceutical manufacturing enterprises in Russia. It has a wide range of pharmacological effect. However, its use, as a rule, requires dilution with water, which leads to inaccurate dosing of the drug at home and creates a number of inconveniences for patientsIn addition, there is abrupt replacement of the solvent while water exposure, which leads to the formation of stable water-insoluble colloidal micelles consisting of biologically active substances. This may in turn lead to heterogeneity of their distribution in tissues and biological fluids.

The development of new, sharply evenly-dosed drug forms with liquid plant extracts is one way to solve the above problems [1].

Among the anti-inflammatory drugs for the mouth diseases treatment, experts prefer a dosage form such as lozenges. In comparison with infusions, decoctions, tinctures, sprays, etc., lozenges allow an accurately dosage of active ingredients, simple and easy to use, have a long-term effect on the mucous membrane which increases the effectiveness of treatment and reduces the time of disability [2].

In connection with the thermolability of biologically active substances of medicinal plants, to preserve their complex, technology without thermal exposure using the adsorption of extract is promising, which makes it possible to obtain powder bulk material for accurate and uniform dosing during pressing [3].

Key words: *liquid plant extract, solid dosage form, адсорбция, microcrystalline cellulose, colloidal silicon dioxide, expert system, SeDeM.*

Materials and methods

Materials.

1) Combined liquid plant extract of *Matricaria chamomilla L.*, *Calendula officinalis L.* flowers and *Achillea millefolium L.* herb [4]; 2) colloidal silicon dioxide (QDC) (*Evonik*, Germany) (Ph. Eur.); 3) microcrystalline cellulose (MCC) (*DRE Pharma*, Germany) (Ph Eur).

Methods.

1. Adsorption of the extract on microcrystalline cellulose and colloidal silicon dioxide and drying at room temperature to a moisture content of 1.5 ± 0.3%.

2. Determination of the bulk density was carried out on the SWM 102 bulk density tester (*Erweka*, Germany) in accordance with the State Pharmacopoeia of the Russian Federation XIV Edition (SPRF XIV) [5], General Pharmacopoeia Article (GPA) 1.4.2.0016.15 "The degree of flowability of powders". The bulk density before compaction (Da), bulk density after compaction (Dc), Hausner index (IH), Carr index (IC), interparticle porosity (Ie) were calculated.

3. The determination of flowability (tn) and angle of repose (α) was carried out on an electronic GTB flow tester (*Erweka*, Germany) in accordance with the SPRF XIV and the GPA.1.4.2.0016.15. "The degree of flowability of powders". At least 3 definitions were executed.

4. Humidity (% LoD) was determined on a gravimetric moisture meter ML-50 (*A & D*, Japan) at 105 ° C to constant weight (the change in mass for 1 minute was less than 0.05%).

5. Hygroscopicity (% H) was determined in a desiccator at a relative humidity of> 75% generated by a saturated of potassium chloride solution for 24 hours.

6. Fractional composition was determined by the sieve method in accordance with the SPRF XIV edition of GPA.1.1.0015.15 "Sieve analysis" on the PSS sieve analysis unit (*Erweka*, Germany) with a set of pharmacopoeial sieves (cell size 0.5; 0.315; 0, 25; 0.1; 0.05) (Kraft LLC, Russia).

The number of particles passing through a 0.05-mm sieve (% Pf) was fixed and homogeneity (IΘ) was calculated.

7. Compressibility (Icd) was determined experimentally. Tablets were obtained on a Korsh single-punch tablet press (*Erweka*, Germany). The strength of the tablets was determined in accordance with the SPRF XIV edition according to the GPA.1.4.2.0011.15 “Crush Strength of Tablets” on a TBH 325 strength tester (*Erweka* GmbH, Germany).

8. Comparative evaluation of the results was carried out according to the graphic method SeDeM. To calculate the index of good compaction (GCI), it was taken into account that, when analyzing by 12 parameters, the reliability factor (f) is 0.952 [6].

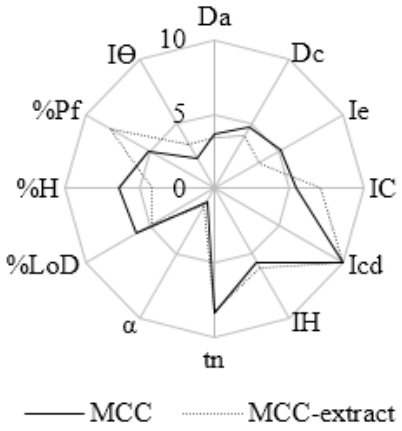
Results and discussions.

The extract was sorbed on microcrystalline cellulose in a ratio of 1.8 ml / 1.0 g, on colloidal silicon dioxide - 3.2 ml / 1.0 g.

A graphic image of the SeDeM diagrams for the compared samples is presented in Figure 1.

The experimental data obtained for microcrystalline cellulose and colloidal silicon dioxide before and after a liquid plant extract adsorption are presented in Table 1.

(a)



(b)

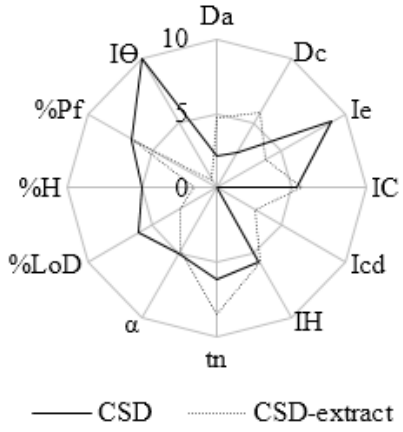


Figure 1. - *SeDeM diagrams for MCC / MCC-extract (a) and CSD / CSD-extract (b).*

Table 1

Experimental values of the studied substances

Incidence factor	Parameter	CSD	CSD-extract	MCC	MCC-extract
Dimension	Da, g/ml	0.213	0.468	0.365	0.349
	Dc, g/ml	0.275	0.592	0.471	0.409
Compressibility	Ie	1.071	0.450	0.619	0.418
	IC, %	22.78	21.05	22.58	14.58
	Icd, N	0.0	60	>200	>200
Flowability/ powder flow	IH	1.30	1.27	1.29	1.17
	t_n, s	19.43	7.91	8.18	9.03
	α, °	25.0	25.9	45.0	43.8
Lubricity/ stability	%LoD, %	1.0	1.8	1.0	1.3
	%H, %	10.08	17.03	7.28	11.69
Lubricity/ dosage	%Pf, %	17.40	18.13	24.74	9.92
	IΘ	>0.0200	0.0012	0.0048	0.0070

The experimental data obtained were processed by the SeDeM method (Tables 2 and 3).

Table 2

Radius value on the SeDeM diagram for MCC and MCC extract

Incidence factor	Parameter	Radius value on the SeDeM diagram, (r)			
		MCC	Aver. value	MCC-extract	Aver. value
Dimension	Da, g/ml	3.65	4.18	3.49	3.79
	Dc, g/ml	4.71		4.09	
Compressibility	Ie.	5.16	6.88	3.48	6.85
	IC, %	5.48		7.08	
	Icd, N	10.00		10.00	
Flowability/ powder flow	IH	5.69	5.02	6.10	5.18
	t_n, s	8.36		8.19	
	α, °	1.00		1.24	
Lubricity/ stability humidity	%LoD, %	6.00	6.18	4.80	4.48
	%H, %	6.36		4.16	
Lubricity/ dosage	%Pf, %	5.05	3.71	8.02	5.76
	IΘ	2.38		3.49	

The parametric profile index (IPP) of the MCC is 5.32 (> 5), for MCC-extract 5.34 (> 5). The GCI (good compaction index) for MCC is 5.07 (> 5), and for MCC-extract 5.09 (> 5).

Table 3

Radius value on the SeDeM diagram for CSD and CSD-extract

Incidence factor	Parameter	Radius value on the SeDeM diagram, (r)			
		CSD	average value	CSD-extract	average value
Dimension	Da, g/ml	2.13	2.44	4.68	5.30
	Dc, g/ml	2.75		5.92	
Compressibility	Ie	8.93	4.79	3.75	4.18
	IC, %	5.44		5.79	
	Icd, N	0.00		3.00	
Flowability/ powder flow	IH	5.68	5.60	5.78	6.34
	t_n, s	6.11		8.42	
	α, °	5.00		4.82	
Lubricity/ stability	%LoD, %	6.00	5.48	2.80	2.15
	%H, %	4.96		1.49	
Lubricity/ dosage	%Pf, %	6.52	8.26	6.37	3.50
	IΘ	10.00		0.62	

IPP CSD is 5.29 (> 5), for CSD-extract 4.45 (<5). The GCI for CSD is 5.04 (> 5), and for CSD-extract 4.24 (<5).

Experimental data show that the bulk material obtained by adsorption on microcrystalline cellulose of a liquid plant extract of *Matricaria chamomilla L*. flowers, *Calendula officinalis L.* and *Achillea millefolium L. grass*, has a better indicator than compressibility (6.85> 4.18), lubricity / stability (4.48> 2.15), lubricity / dosage (5.76> 3.50) and the general index of good compaction (5.09> 4.24) in comparison with similarly obtained bulk material during adsorption on colloidal silicon dioxide.

Conclusion.

To convert the liquid plant extract in the powder state by adsorption, it is advisable to use microcrystalline cellulose as an adsorbent.

Thanks.

The author is grateful to ZAO FPK PharmVILAR - the exclusive distributor of DFE Pharma and Evonik products in Russia for providing samples of excipients.

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在$Fe^{3+}/M^{2+}-H_2O-ROH$体系的作用下，苯胺的光催化氧化聚合（M^{2+} = CU^{2+}, NI^{2+}; R = ME, ET, I-PR, BN）

PHOTOCATALYTIC OXIDATIVE POLYMERIZATION OF ANILINE UNDER THE ACTION OF THE SYSTEM $FE^{3+}/M^{2+}-H_2O-ROH$ (M^{2+} = CU^{2+}, NI^{2+}; R = ME, ET, I-PR, BN)

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注解。 考虑在$Fe^{3+}/M^{2+}-H_2O-ROH$体系（M^{2+}=Cu^{2+}，Ni^{2+}; R=Me，Et，i-Pr，Bn）的作用下由苯胺合成聚苯胺的光催化方法。 当用Hg灯照射20分钟时，苯胺光聚合在室温和大气压下在温和的需氧条件下进行。 观察到$FeCl_3/Cu(NO_3)_2-H_2O$-EtOH光催化体系的最大苯胺转化率（>99%）。

关键词：聚苯胺，光催化，三氯化铁，促进

Annotation. *A photocatalytic method for the synthesis of polyaniline from aniline under the action of the system Fe^{3+} / M^{2+}-H_2O-ROH (M^{2+} = Cu^{2+}, Ni^{2+}; R = Me, Et, i-Pr, Bn) is considered. Aniline photopolymerization proceeds under mild, aerobic conditions at room temperature and atmospheric pressure when irradiated with a Hg lamp for 20 minutes. The maximum aniline conversion (> 99%) is observed for the $FeCl_3$ / Cu $(NO_3)_2$-H_2O-EtOH photocatalytic system.*

Keywords: *polyaniline, photocatalysis, iron trichloride, promotion*

The development of efficient and affordable methods for the synthesis of polyaniline (PANI) are becoming extremely important due to the intensive development of technological solutions associated with the expansion of the scope of PANI and interpolymer complexes based on it [1].

Classical methods for producing PANI are based on the direct chemical and electrochemical oxidation of aniline [2]. The chemical method of PANI synthesis proceeds at low temperatures (from -5 to + 5 ° C) using equimolar amounts with respect to ani-

line oxidizers (ammonium persulfate, sodium and potassium chlorate, hydrogen peroxide, potassium bichromate, etc.), which pollute the resulting polymer in during the reaction. In this respect, electrochemical synthesis on various inert electrode materials (Pt, Cu, Cr / Au, Sgrafit, etc.) is the "pure" method of obtaining PANI.

Our laboratory is developing a completely new, photocatalytic approach to the synthesis of PANI, combining the advantages of chemical (fast synthesis) and electrochemical (pure synthesis) methods. In addition, photocatalysis allows the synthesis of PANI in a mild, environmentally friendly environment without the use of corrosive strong acids.

This article discusses the experimental data of photocatalytic polymerization of aniline to PANI in an aqueous-alcoholic medium under the action of catalytic amounts of iron salts in the presence of promoting additives, nickel and copper salts. The approved alcohols are: methanol (MeOH), ethanol (EtOH), isopropanol (*i*-PrOH) and benzyl alcohol (BnOH). Symbol of photocatalytic system **Fe^{3+}/M^{2+}-H_2O-ROH (M^{2+} = Cu^{2+}, Ni^{2+}; R = Me, Et, *i*-Pr, Bn)**.

Experimental part

Source reagents: aniline («ЧДА» brand, Reakhim JSC), methanol (MeON, «ХЧ» brand, Vekton CJSC), ethanol (EtOH, «ХЧ» brand, ECOS-1 JSC), isopropanol (*i*-PrOH, «ЧДА» brand, ECOS-1 JSC), benzyl alcohol (BnOH, «ЧДА» brand, Reakhim JSC) were previously distilled before the experiments according to the methods [3].

Crystal hydrates: $FeCl_3 \cdot 6H_2O$ («Ч» brand, Brom JSC), $Fe(NO_3)_3 \cdot 9H_2O$, $FeSO_4 \cdot 7H_2O$, $Ni(NO_3)_2 \cdot 6H_2O$ and $NiCl_2 \cdot 6H_2O$ («Ч» bra, LenRefact JSC), $Cu(NO_3)_2 \cdot 3H_2O$ and $CuSO_4 \cdot 5H_2O$ («ЧДА» brand, LenReactive JSC) were not subjected to additional purification.

General methods of photocatalytic synthesis of PANI. Photocatalytic synthesis of PANI was carried out in a Photo Catalytic Reactor Lelesil Innovative Systems photocatalytic unit with a quartz reactor with a volume of 250 ml (a photo-reactor of the Stromayer type with a magnetic stirrer). 6.0 mmol of iron salt, (0.06-0.6) mmol of promoter, 1.0 mol of alcohol, 0.3 mol of aniline and 2.0 mol of water were added to the flask of the reactor. The loaded reactor was connected to the installation (according to the manufacturer's instructions), supplied with a reflux condenser and a bubbler to pass atmospheric air through the reaction medium. The radiation source was a medium pressure Hg-lamp with a power of 250 W. The spectral composition of the radiation by energy: 48% from the UV region, 43% from the visible region, and 9% from the IR region. Spectral range: 222 - 1368 nm. The luminous flux reached the reaction system, passing through the water layer, thermostatically controlled at a temperature of 25° C. The irradiation time is 20 minutes. After completion of the reaction, the PANI precipitate was separated from the solution, the yield was determined by a gravimetric method and its properties were studied.

Discussion of the results.

The Council of Scientific and Industrial Research has developed a method for synthesizing PANI from aniline using iron trichloride in an aqueous medium [4]. The molar ratio of the reactants is close to stoichiometric and is [$FeCl_3$]: [Aniline] = 1:2, therefore, the iron trichloride plays the role of a chemical oxidant. The aniline polymerization reaction proceeds for 24 hours at a temperature of 30 ° C with a PANI yield of up to 87.5% with a specific electrical conductivity equal to 1.48 · 10^{-4} Sm / sm.

Using atomic absorption spectrometry, we found an elevated content of iron compounds (up to 1.0 wt.%) In PANI obtained by the method [4]. The effect of additional PANI purification procedures on the content of residual amounts of iron compounds has not been studied by us. Thus, the reagent content of iron trichloride in the process of obtaining PANI, according to the well-known method [4], does not allow to obtain pure PANI.

During the work on photocatalytic and photoactivated synthesis of nitrogen-heterocyclic compounds, as well as in the process of photocatalytic conversion of CCl_4, we found the presence of PANI as a by-product [5-7]. Based on the search for the optimal photocatalytic system for the purposeful synthesis of PANI, a system was created Fe^{3+}/M^{2+}-H_2O-ROH (M^{2+} = Cu^{2+}, Ni^{2+}; R = Me, Et, *i*-Pr, Bn). The molar ratio of the catalyst with the reagent [Fe^{3+}]: [Aniline] is 1:50, the maximum promoter content (M^{2+}) with respect to the photocatalyst (Fe^{3+}) does not exceed 9.0 mol%. The polymerization reaction proceeds in a water-alcohol medium at room temperature for 20 minutes.

Influence of the nature of the photocatalyst and promoter of the photocatalytic system Fe^{3+}/M^{2+}-H_2O-EtOH, as well as the radiation source at the PANI output, was investigated in a water-ethanol environment. The results are presented in table 1.

Table 1. *The influence of the radiation source, the nature of the photocatalyst and the promoter on the output of PANI under the action of the system* Fe^{3+}/M^{2+}-H_2O-EtOH

№ exp.	Photocatalyst Fe^{3+}	Promoter M^{2+}; mol.%.	Radiation source *	PANI output, %
1	$FeCl_3$	-	*Hg*	35
2	-//-	$CuSO_4$; 1	*Hg*	73
3	-//-	$CuSO_4$; 2	*Hg*	88
4	-//-	$CuSO_4$; 5	*Hg*	88
5	-//-	$CuSO_4$; 9	*Hg*	88
6	-//-	$Ni(NO_3)_2$; 2	*Hg*	41
7	-//-	$NiCl_2$; 2	*Hg*	39
8	-//-	$Cu(NO_3)_2$; 2	*Hg*	>99
9	-//-	$Cu(NO_3)_2$; 2	*Xe*	3
10	-//-	$Cu(NO_3)_2$; 2	*Xe*	54 **
11	-//-	$Cu(NO_3)_2$; 2	*Solar*	62 **
12	-//-	$Cu(NO_3)_2$; 2	-	-
13	$Fe(NO_3)_3$	$Cu(NO_3)_2$; 2	*Hg*	97
14	$FeSO_4$	$Cu(NO_3)_2$; 2	*Hg*	12

Note:

* *Hg* – mercury lamp, λ <400 nm; *Xe* – xenon lamp, λ >400 nm, *Solar* – solar radiation;

** - reaction time 24 hours.

The maximum yield of PANI (> 99%) is observed for the system $FeCl_3$/$Cu(NO_3)_2$-H_2O-EtOH when the reaction mass was irradiated with Hg-lamp radiation for 20 min (no. of experiment 8, Table 1). Irradiation with a Xe-lamp is ineffective (Experiment No. 9, Table 1), however, with prolonged irradiation for 24 hours, the output of PANI increases significantly (Experiment No. 10, Table 1). A favorable effect was found on the irradiation of the system with sunlight (Experiment No. 11, Table 1). Synthesis of PANI without irradiation is not observed (Experiment No. 12, Table 1).

The photocatalyst based on Fe^{2+} (Experiment No 14, Table 1) is inactive. However, as a result of the partial oxidation of Fe^{2+} to Fe^{3+} with oxygen in the presence of $Cu(NO_3)_2$, aniline polymerization reaction is possible. Based on these data, a probable mechanism for the polymerization of aniline in PANI under the action of a photocatalytic system has been proposed. $FeCl_3$/$Cu(NO_3)_2$-H_2O-EtOH (scheme 1):

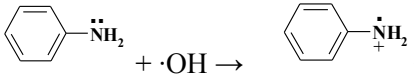
Scheme 1. *Probable mechanism of photocatalytic synthesis of PANI*

(1a) $FeCl_3 \cdot 2EtOH + \boldsymbol{hv} \rightarrow [FeCl_3 \cdot 2EtOH]^*$

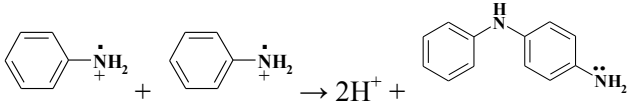
(1b) K_1 $[FeCl_3 \cdot 2EtOH]^* \rightarrow FeCl_2 \cdot EtOH + EtO\cdot + HCl$

(2) K_2 $Fe(H_2O)^{3+} + \boldsymbol{hv} \rightarrow Fe^{2+} + \cdot OH + H^+$

(3)



(4)



(5) $2Fe^{2+} + 0.5O_2 + 2H^+ + H_2O \rightarrow 2Fe(H_2O)^{3+}$

The photocatalyst in the system $FeCl_3/Cu(NO_3)_2$-H_2O-EtOH exists in two forms: aquacomplex $Fe(H_2O)^{3+}$ and the solvate complex $FeCl_3 \cdot 2EtOH$. Absorbing a quantum of actinic light, the complexes generate radical particles (Scheme 1, stages 1 and 2). In a water-alcohol medium, K2 >> K1, i.e. Stage 2 is more likely [8]. The interaction of aniline and hydroxyl radical leads to the emergence of a monomer radical cation (Scheme 1, stage 3) followed by their rapid head-to-tail recombination with the formation of dimers and the release of protons (Scheme 1, stage 4) into the reaction medium. The chain of polyaniline grows by a sequence of one-electron transfer with the formation of radical cations and their recombination [9].

The process of oxidizing Fe^{2+} to $Fe(H_2O)^{3+}$ by oxygen in the air is a slow act. However, the presence of the $Cu(NO_3)_2$ promoter makes it possible to accelerate the process of the aerobic oxidation of Fe^{2+} and, consequently, the rapid regeneration of the photocatalytically active form $Fe(H_2O)^{3+}$.

The alcohol component of the $FeCl_3/Cu(NO_3)_2$-H_2O-ROH system influences the PANI yield during aniline photopolymerization. MeOH, *i*-PrOH and BnOH were tested as alcohols, except for EtOH. The PANI yield decreases in the next row: EtOH ≈ MeOH> BnOH> i-PrOH.

Conclusion

Thus, the work presents the experimental data of photocatalytic polymerization of aniline to PANI in an aqueous-alcoholic medium under the action of catalytic amounts of iron salts in the presence of promoting additives, nickel and copper salts. The influence of various factors (the nature of the photocatalyst, the amount of the promoter, the radiation source, the time of the photopolymerization process, and the nature of the alcohol medium) on the PANI yield was revealed.

The maximum yield of PANI (> 99%) is observed for the $FeCl_3/Cu(NO_3)_2$-H_2O-EtOH system when the reaction mass is irradiated with *Hg*-lamp for 20 minutes. A probable mechanism for the synthesis of PANI from aniline under the action of the photocatalytic system $FeCl_3/Cu(NO_3)_2$-H_2O-EtOH is described.

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二次原料饲料技术的研究与开发
RESEARCH AND DEVELOPMENT OF TECHNOLOGY OF FEED FROM SECONDARY RAW MATERIALS

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注解。该文章的作者开发了基于植物产品加工副产品的饲料添加剂生产动物饲料的技术过程的科学基础，这可以提高其在畜牧业中的营养价值和效率。从各种农场动物的植物产品加工副产品开发出基于科学的饲料添加剂配方。配方包括来自葡萄渣的高达12.0%的饲料面粉和来自番茄加工废料的高达12%的饲料粉，高达10%的来自干土豆废料的饲料粉，高达14%的小麦胚芽，高达12%的玉米胚芽，高达15%的玉米麸质，高达37%的麦麸，高达4.0%的饲料沸石，高达6.0%的白垩饲料，高达3.0%的食盐和高达0.03%的益生菌制剂Biocons。配方中组分的比例决定了混合饲料的平衡添加剂，从副产物形成的资源开始，并创造了获得技术和稳定形式的饲料添加剂的条件。

关键词：饲料，二次原料，饲料添加剂，牲畜，食谱，技术。

Annotation*. The authors of the article have developed the scientific foundations of technological processes for the production of animal feed based on the feed additive of by-products of processing of plant products, which allows increasing the nutritional value and efficiency of their use in animal husbandry. Developed scientifically based recipes of feed additives from by-products of processing of plant products for various types of farm animals. Recipes include up to 12.0% of fodder flour from grape marc and up to 12% of fodder flour from tomato processing waste, up to 10% of fodder flour from dried potato waste, up to 14% of wheat germ, up to 12% of corn germ, up to 15% of corn gluten , up to 37% wheat bran, up to 4.0% feed zeolite, up to 6.0% chalk feed, up to 3.0% table salt and up to 0.03% of the probiotic preparation Biocons. The ratio of components in recipes determines the balancing additive of mixed feeds, proceeding from the resources*

of formation of by-products and creates the condition for obtaining a feed additive of a technological and stable form.

***Keywords**: feed, secondary raw materials, feed additive, livestock, recipes, technology.*

One of the most pressing problems of modern agrarian production is providing the population in sufficient quantity with quality animal products. Providing animals with complete nutrition, balanced nutritionally in accordance with the planned productivity is one of the decisive conditions for increasing production and improving the quality of animal products [1,2,3].

Feeding has a decisive influence on the course of metabolic processes in the organism of animals, its health and, as a result, on the quantity and quality of the products obtained. In livestock production, high-quality feed is the main limiting factor. One of the important ways to solve this problem is the use of non-traditional types of raw materials: by-products of oil and fat, food, grain processing, starch, fruit and vegetable, meat processing, fish and microbiological industries. As a mineral feed additive, you can also use natural minerals - bentonite, zeolite and shungite [4,5].

In agriculture, in many countries, when feeding animals, natural minerals are increasingly used. Zeolite is most effective in fodder production [6].

Studies have shown that the addition of mineral in feed in the amount of 2-3% increases the weight gain of animals and birds, at the same time reduces the consumption of feed, increases the safety of livestock.

Recently, cases of poisoning of farm animals with heavy metal salts have become widespread. Therefore, it is of interest to use zeolite as a good adsorbent when removing toxic and heavy metals from the body of animals.

The effect of zeolites on the microorganisms of the gastrointestinal tract, pH and ionic composition of chyme, on the activity and stability of digestive enzymes was also established. Zeolite in the composition of the feed when fed improves the quality of the products and reduces the incidence of animals [7].

Dried potatoes are a highly digestible, nutritious food for all farm animals. It contains a large amount of starch - over 60%.

100kg of dried potatoes with a moisture content of 16.5% contains feed units of 116.7 and digestible protein 4.4 kg. In 1 kg of dried potatoes with a moisture content of 8% sodium contains 4 g, potassium 38.4 g, calcium 1.5 g, and phosphorus 4.5 g. Potato protein contains lysine - 5.1%, tryptophan - 1.2%, methionine - 1.7%, arginine - 4.19% [8].

Dried potatoes can be used in all compound feeds and especially, it is recommended to include them in feed for fattening farm animals.

Due to the fact that dried potatoes are poor in protein, they are introduced into

compound feeds with high-protein components: legumes, corn gluten, oilcake, meal; mineral deficiencies in potatoes are compensated by adding zeolitic feed additives to the compound feed, in required quantities.

In the processing of grapes, as a production waste, grape marc are obtained, which can serve as an additional source of animal feed. The content of proteins and nitrogen-free extractive substances that determine the nutritional value of the marc is 46.66 - 56.50%, fiber - 14.2 - 30.7%, fat - 4.9 - 9.2%, calculated on the dry matter, respectively. 100 kg of fresh grape marc contains 9.85 feed units [9].

The best way to use grape marc for fodder purposes is to process them into flour on drying units. Properly cooked flour has a light brown color, a pleasant smell, humidity - 9-11% and can be stored for a long time. It contains crude protein - 9.4-13%, digestible protein - 5.64-7.41, fiber - 15-16.6, fat - 3.4-5.2, BEV - 52.8-53, 3, crude ash - 4.3-6.70, calcium - 0.30-0.54, phosphorus - 0.19-0.21, potassium - 1.15-1.45%. The nutritional value of 100 kg of feed meal is 11.82 feed units.

Feed flour from the pomace of tomato, in the content of nutrients, is not inferior to alfalfa flour or clover hay of average quality, and in terms of the content of microelements, fats and vitamins, even surpasses them.

On the basis of numerous zootechnical experiments, it has been established that the following indicative standards for feeding flour from tomato squeeze per head of farm animals per day can be recommended: young cattle under the age of 1 year old - 0.2 kg, aged 12-18 months. - 0.4, for fattening - 1-2, milk cows - 1.5-2, for fattening pigs - 0.2-0.5, wallah - 0.3, for bird - 0.2-0.3 kg. It can replace concentrated feeds in diets or introduce it into feed for cattle for fattening and cows in the amount of 12-17%, pigs for fattening - 10-15% for protein nutritional value [10,11].

Studies carried out in this direction indicate that with the correct application of technological methods, the feed value of these wastes can be increased.

Analysis of patent documentation on the research topic was carried out on the state examination of inventions fund of the following countries: Kazakhstan, Russia, Great Britain, Germany, USA, France, Japan for 2013-2018. In total, more than 400 patents on the topic under study were reviewed, more than 50 inventions were selected.

Competition in the feed market is constantly demanding a search for new ways to improve the quality of mixed feeds and reduce production costs. National programs are being developed and implemented to increase the production of feed protein based on their own resources - in France, for example, by increasing the yield of legumes and oilseeds. In countries with developed agriculture, great importance is attached to such sources of feed protein for the production of animal feed, such as corn and its products, rape and its products [11].

The byproducts of processing corn and wheat (germ, gluten) are used in the production of animal feed for various types of farm animals, poultry and fish. However, they are included in the composition of mixed feed in limited quantities (5-15%) due to the content of the hardly digestible substances contained in the products.

It should be noted that for many decades it is not possible to solve the problem of raw materials for the production of animal feed. Therefore, in a difficult feed situation, the use of all feed resources to improve the efficiency of animal husbandry is of particular importance. In these conditions, the search for local non-traditional and affordable feedstuffs, which would be close in their biological value to traditional feeds of animal and plant origin, is relevant.

In Kazakhstan, feed mills are located mainly in regional centers and cities. In these localities there are also various enterprises of the processing industry. First of all, these are grain processing enterprises (mills, groats plants) and enterprises of the food industry (meat processing, canning, oil and fat, dairy, alcohol, starch, etc.). The introduction of non-waste technologies at these enterprises with the production of additives suitable for input into compound feed will significantly expand the raw material base of the compound feed production.

This research work differs from other works by the fact that, based on the byproducts of the processing of plant products (grape and tomato mops, dried potato waste, wheat and maize germs, corn gluten) and natural zeolites, a highly efficient feed mixture is created, which allows to reduce to 25% of the consumption of grain products for the production of animal feed, create waste-free technology at processing plants, reduce production costs, increase the digestibility and quality of animal feed.

In the process of performing this work, we determined the physicomechanical properties and composition of the components of the feed additive:

- Feed meal from grape marc;
- Feed meal from waste processing tomatoes;
- Feed meal from dried potato waste;
- zeolites of the Chankaysky field of Almaty region;
- wheat and corn germ;
- corn gluten.

The physicomechanical properties of the components of the feed additive are presented in Table 1. From the data in the table it follows that the byproducts of the processing of crop products have unfavorable physicomechanical properties: the fodder meal from grape marc has the smallest bulk mass, the largest average particle size.

Table 1 - *Physical and mechanical properties of the components of the feed additive*

Indicators	By-products of processing of plant products					
	Grape marthe feed meal	Feed meal from waste processing tomatoes	Feed flour from dried potatoes	Wheat germ	Corn	
					germ	gluten
1	2	3	4	5	6	7
Humidity,%	9,82	9,77	6,22	11,20	11,74	10,76
Angle of repose, hail	40	42	38	43	42	44
Bulk mass, kg / m^3	410	420	480	510	500	520
Flowability	0,052	0,054	0,65	0,060	0,060	0,058
Average particle size, mm	2,32	2,02	1,76	2,02	1,98	1,96
Caking						
Acidity, pH	5,2	6,4	4,2	4,4	5,0	4,4

Compared to other components, fodder flour from tomato processing waste also has the worst physical properties, besides, as a result of storage for 4-6 days, the acidity of these products increases by 18-22%.

The chemical composition of the feed zeolite is presented in table 2.

Table 2 - *Chemical composition of feed zeolite*

Chemical elements, %	Chankanay deposit of Almaty region
Cu	0,023
Zn	0,11
Mn	0,22
Co	0,001
P	0,21
CaO	6,4
MgO	2,1
Fe_2O_3 opr.	6,7
Al_2O_3	9,2
SiO_2	61,8
Na_2O	0,36
K_2O	2,2
C opr.	9,7

From table 2 it follows that the zeolitic feed additive contains macro-and micronutrients necessary for the enrichment of the feed with mineral elements. The content of heavy metals in zeolite additives, mg / kg: mercury - not detected; cadmium - 0.001; lead - 0.5; fluorine - not detected; arsenic - traces; chromium - 0.04; radionuclide content, Bq / kg: cesium - 137 - not detected, strontium - 90-59.2.

From the data obtained it follows that the content of heavy metals and radionuclides does not exceed the maximum allowable rate of use of this mineral in the feeding of farm animals.

The chemical composition of by-products of processing of crop products are given in table 3.

Table 3 - *The chemical composition of by-products of processing of crop products*

Indicators	Grape marthe feed meal	Feed meal from waste processing tomatoes	Feed flour from dried potatoes	Wheat germ	Corn	
					germ	germ
Crude protein,%	9,82	8,77	6,22	12,20	14,74	16,76
Crude fat,%	2,12	2,02	1,14	4,12	3,84	2,78
Crude fiber,%	17,80	13,72	12,64	8,74	7,82	7,02
Content of total sugar,%	26,40	19,30	21,20	3,32	4,10	5,02
The content of dextrins,%	18,20	11,34	16,55	-	-	2,10
Exchange energy, MJ / kg	9,30	8,24	7,72	10,02	9,78	11,74

From the data presented in table 3 it can be seen that each type of by-products from the processing of plant products contains nutrients by which the feed value of the compound feed raw materials is evaluated, while the protein content in flour from grape marc - 9.82%, in flour from tomato processing waste - 8.77%, from dried potato waste - 6.22%, and high protein content - in wheat and corn germ and in corn gluten. Using these types of by-products from the processing of plant products (table 3.4), when forming the feed additive, all the nutrients present in them are taken into account, however, the by-products of processing grapes, tomatoes and dried potatoes contain a significant amount of fiber, which can cause a decrease in the absorption of nutrients substances formed feed additives.

For the preparation of the feed additive, the following recipes have been compiled: for cattle (horses), horses and pigs, differing in the ratio of feed flour from grape marc, feed flour from tomato processing waste, feed flour from dried potato waste, wheat and corn germ, corn gluten and wheat bran, and the content of zeolite feed, chalk and salt table remains constant (table 4).

Table 4 - *Recipes feed additives based on by-products of processing of crop products*

Components	Recipes,% for:					
	Cattle		pigs		horses	
	1	2	3	4	5	6
Grape marthe feed meal	12,0	15,0	10,0	15,0	8,0	10,0
Feed meal from waste processing tomatoes	10,0	15,0	12,0	15,0	7,0	10,0
Feed flour from dried potatoes	8,0	10,0	10,0	12,0	5,0	10,0
Wheat potatoes	11,0	15,0	14,0	10,0	10,0	7,0
Corn germ	10,0	8,0	12,0	8,0	8,0	5,0
Corn Gluten	13,0	10,0	15,0	10,0	12,0	8,0
Wheat bran	23,0	14,0	14,0	17,0	37,0	37,0
Zeolite feed	4,0	4,0	4,0	4,0	4,0	4,0
Chalk feed	6,0	6,0	6,0	6,0	6,0	6,0
Salt	3,0	3,0	3,0	3,0	3,0	3,0
Total	100,0	100,0	100,0	100,0	100,0	100,0

The physico-chemical composition and nutritional value of the feed additive are presented in table 5.

Table 5 - *Physico-chemical composition and nutritional value of feed additives*

Indicators	Recipes for:					
	Cattle		pigs		horses	
	1	2	3	4	5	6
1	2	3	4	5	6	7
Humidity,%	11,70	12,25	11,22	11,84	10,75	11,22
Crude protein,%	18,02	17,64	19,10	18,20	17,70	17,45
Crude fat,%	4,52	4,02	4,84	4,36	4,22	4,02
Crude fiber,%	16,06	16,24	15,80	16,10	19,20	19,44
Crude ash,%	7,14	7,66	8,01	8,52	8,44	8,76
BEV,%	45,82	46,02	47,68	46,92	48,05	48,10
Dry matter,%	88,30	87,75	88,78	88,16	89,25	88,78
Total acidity, grad.T	17,50	17,70	18,10	18,40	17,20	17,10
pH	5,20	5,30	5,40	5,50	5,10	5,10
Content of vitamin C, g / 1t	0,75	0,70	0,90	0,95	0,45	0,45
Total sugar,%	17,20	17,10	19,30	18,70	14,80	15,00
Content of carotene, g / 1t	3,15	3,10	4,25	4,00	2,35	2,40
The content of pectin,%	0,75	0,70	0,81	0,70	0,64	0,75
Exchange energy, mJ / kg	11,38	10,80	11,72	11,02	10,25	9,80
Feed unit per 100 g feed	102,60	100,20	103,24	98,80	89,95	82,70

From table 5 it can be seen that the moisture content in the feed additive is within 10.75 ... 12.25%, this level of moisture is low. The share of crude protein accounts for 17.45 ... 19.10% and this depended on the input of corn gluten. The amount of fat in the feed additive is 4.02 ... 4.84%, depending on the recipe. The amount of raw ash in the dry product was 7.14 ... 8.76 and depended on the input of feed meal from grape marc. The amount of raw fiber ranged from 15.80 ... 19.44% and depended on the input of wheat bran. The content of pectin and carotene in the feed additive depended on the input of flour from the processing waste of tomato and flour from the waste of dried potatoes.

Studies of pilot batches of feed additives, according to the developed recipes showed that the input of feed flour from grape marc and from tomato processing waste over 12% is undesirable, as there is a decrease in protein, fat and an increase in fiber and ash. In feed additives, where the content of flour from grape marc and from tomato processing waste reaches over 15%, there is a deterioration in organoleptic characteristics, a decrease in technological properties. Therefore, entering them into the feed additive should be limited to 12%, and flour from dried potato waste to 10%, which ensures the optimal nutritional value of the feed additive with other components.

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UDC 504.3.054

国家对城市大气的监测
克拉斯诺亚尔斯克
STATE MONITORING OF ATMOSPHERIC AIR IN THE CITY OF KRASNOYARSK

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注解。 文章讨论了克拉斯诺亚尔斯克市的环境状况，提供了空气污染统计数据，区域中心污染增加特征，确定了主要污染物及其结构。 注意到区域和联邦项目和方案中规定的旨在解决环境问题的主要活动。

关键词：生态学，监测污染物，大气。

Annotation. *The article discusses the environmental situation in the city of Krasnoyarsk, provides statistical data on air pollution, features of pollution increase characteristic of the regional center, identifies the main pollutants and their structure. The main activities aimed at solving environmental problems, provided for in regional and federal projects and programs, are noted.*

Keywords: e*cology, monitoring pollutant, atmospheric air.*

The city of Krasnoyarsk is the administrative center of the Krasnoyarsk Territory, the most eastern million-plus city and the center of the East-Siberian economic region. Krasnoyarsk belongs to large industrial and transport cities, the ecological situation of the city is in a very tense state. High rates of environmental pollution are complicated by a combination of climatic factors, the scale and structure of man-made impacts on the urban environment, the specificity of the intra-quarter location of the main industrial objects. Krasnoyarsk belongs to cities characterized by ultrahigh levels of pollution of the atmospheric layers by pollutants of I and II hazard class [8].

The justified anxiety of residents causes the deterioration of the ecological situation in the regional center. Krasnoyarsk encountered typical causes of large industrial cities for air pollution. At the same time, the urgent task of increasing the accuracy and continuity of monitoring the state of atmospheric air in the regional center requires solving.

Currently, air pollution in the city is an urgent problem. The level of pollution has been kept at "very high" for four years now.

According to experts - ecologists for the city are characteristic:

- air pollution by industrial facilities, enterprises of power system and road transport;
- increased dust generation and pollution of water sources as a result of deficiencies of storm sewers and the work of municipal services of the city;
- deficiencies in the capacity of the city sewage treatment plant for the treatment of polluted effluents and disinfection of wastewater discharged into the Yenisei floodplain;
- the formation of unauthorized dumps and the predominance of the disposal of production and consumption wastes;
- increase in the duration of cycles of adverse meteorological conditions in the city.

In order to improve and normalize the environmental situation, it is necessary to have accurate data that reflects the real state of the state of the atmospheric air; to this end, environmental monitoring systems are being developed and applied [1].

To assess the level of air pollution, the recorded amount of harmful impurities in the atmosphere is compared with the approved standards (MPC) [2].

In the atmospheric air of Krasnoyarsk, two hundred forty eight items of pollutants are emitted, having standards for maximum permissible concentration and an approximate safe level of exposure (MPC or ASLE) for atmospheric air in populated areas.

Of these, the main mass (96.9%) of annual emissions into the atmospheric air of Krasnoyarsk is nine ingredients (Fig. 1).

Atmospheric Pollution Index (API) is the main indicator of atmospheric air quality. API5 is an index of air pollution by the 5 most priority substances. The dynamics of API5 for the period 2015-2017. presented in Fig. 2 [3,4,5].

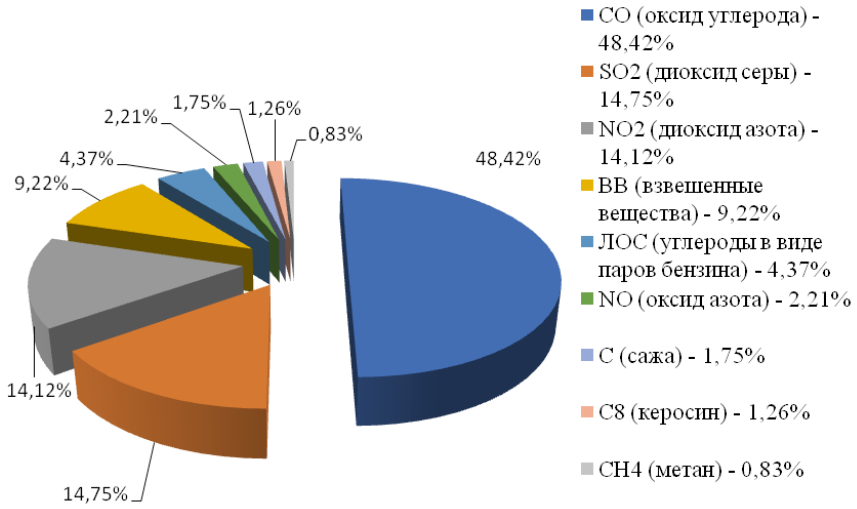

Figure 1. *The main emissions of pollutants,%*

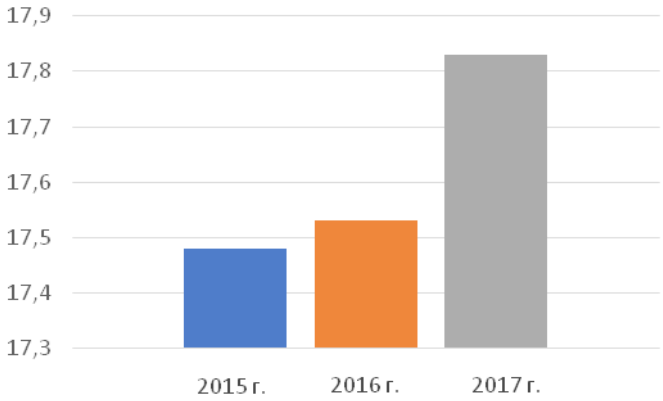

Figure 2 - *Dynamics API5 for the city of Krasnoyarsk in 2015-2017*

The situation with the five priority pollutants for the three analyzed years has deteriorated by 2%.

General dynamics of pollutant emissions from stationary sources for the period in 2015-2017 presented in Figure 3 [3,4,5].

The increase in pollutant emissions was about 7.7% over the past three years (or 10 thousand tons).

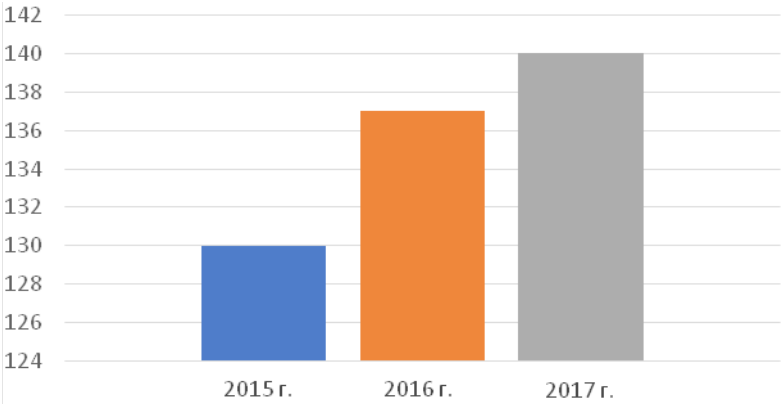

Figure 3 - *Dynamics of pollutant emissions from stationary sources, thousand tons / year*

The number of days of adverse weather conditions increased by 10.4%. Dynamics of days of adverse weather conditions in the city of Krasnoyarsk for the period 2015-2017 presented in Fig.4.

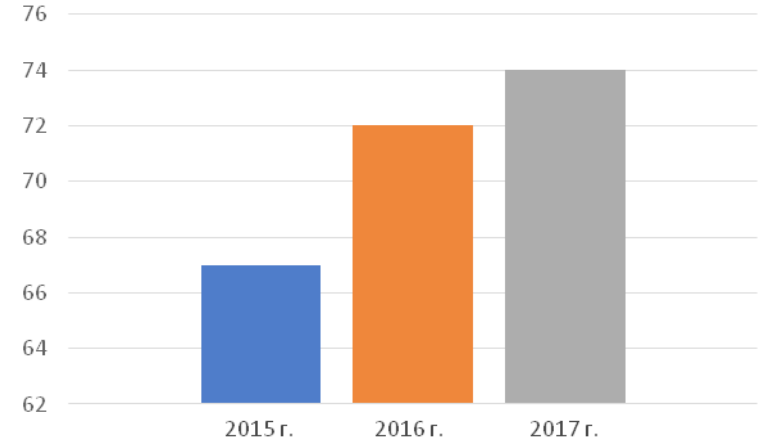

Figure 4 - *Dynamics of the number of days of adverse weather conditions, days*

The structure of gross emissions in 2017 is presented in Figure 5.

One of the main sources of pollution is motor transport (38%). In general, over the past fifteen years, the number of cars in the city has doubled: in 2002 there were a little more than 215 thousand, in 2017 - more than 420 thousand. However, since 2014, when 437832 cars were registered in the city, the reduction began .

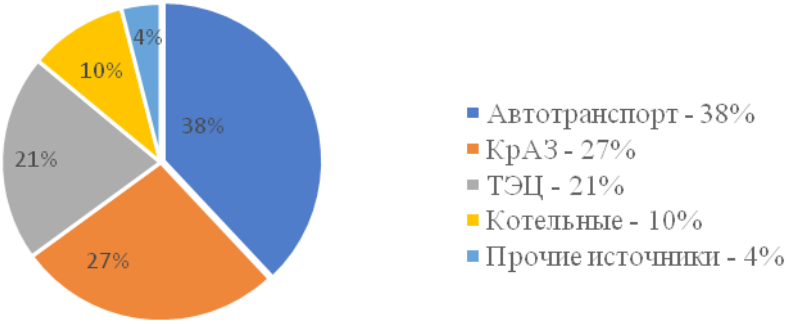

Figure 5 - *Structure of gross emissions in Krasnoyarsk for 2017*

By 26 thousand registered cars decreased in 2015, by another 3.1 thousand - in 2016. For 2017, their number increased by 5.5 thousand and amounted to 420432 units [6].

The monitoring system existing in the city of Krasnoyarsk includes five automated observation posts (AOP), which monitor in five districts of the city. The location of the operating AOP does not fully meet the location conditions to ensure effective monitoring of air pollution.

It should be noted that the active residents of the city created an Internet project, established and used private air monitoring points, so that Krasnoyarsk citizens could “easily and reliably" obtain information about the state of the air in the city and factors affecting it.

The city needs drastic measures to tackle the problem of air pollution, which cannot be postponed and must be addressed urgently.

The national project “Ecology” is being implemented within the framework of the “May” Presidential Decree on national goals and strategic objectives of the development of the Russian Federation for the period until 2024. The global goal of the national project is to change the environmental impact by 2024. One of the federal programs is "Clean Air".

Within this federal program, the number of cities with high and very high levels of air pollution is 8, these include: Bratsk, Krasnoyarsk, Lipetsk, Magnitogorsk, Mednogorsk, Nizhny Tagil, Novokuznetsk, Norilsk, Omsk, Chelyabinsk, Cherepovets and Chita.

The implementation of measures planned under the federal project “Clean Air” will make it possible by 2024 to reduce the total amount of harmful emissions into the air in large industrial centers by more than 20% of 2017 (4074, 84 thousand tons). The implementation of measures involves additional funding from the federal budget in the amount of 95.75 billion rubles, extra-budgetary funding will be more than 372 billion rubles [7].

The federal program includes measures for the closure of inefficient boiler houses in accordance with the updated heat supply scheme, as well as reduced periods for the demolition of dilapidated housing with stove heating. Large enterprises of the city will continue to implement equipment modernization programs, switch to environmentally friendly technologies and reduce emissions. A separate unit - reducing the negative impact of transport on the atmospheric air of Krasnoyarsk. First of all, the plan takes into account the renewal of the fleet of buses, trolley buses and trams. An increase in the number of gas-engine vehicles in the municipal structure, the resumption of the construction of the metro and the development of the urban ring railway are also considered promising.

It is planned to create an effective system for monitoring and controlling the quality of atmospheric air. The re-equipment will affect the state network of observations of the Central Siberian Hydrometeorology and Environmental Monitoring Department and the territorial monitoring network. It is also planned to integrate enterprise monitoring data into the system.

Thus, we can conclude that the situation associated with air pollution in Krasnoyarsk remains very difficult. Harmful emissions to the atmosphere adversely affect the health of those who live in the area of distribution of these substances. Among the population of the city of Krasnoyarsk, diseases associated with exposure to environmental factors are more often recorded. In Krasnoyarsk, there is a direct strong correlation between the API and diseases of the nervous system, respiratory organs, neoplasms, with diseases of the blood and blood-forming organs, the endocrine system.

Implementation of program measures to reduce the technogenic load on the environment by the enterprises of OJSC «RUSAL Krasnoyarsk», Krasnoyarskaya TEC-1 of OJSC «Yeniseyskaya TGK (TGK-13)» and LLC «Krasnoyarsk Cement» will reduce emissions of pollutants into the city's atmosphere and improve environmental situation due to the achievement of maximum permissible standards. Implementation of measures to maintain a favorable environment, ensure environmental safety and environmental education at the expense of budget funds along with measures to reduce the man-made burden on the city's natural components undertaken by the largest Krasnoyarsk enterprises will provide an opportunity to improve the environmental quality of the city and lead to the normalization of the ecological situation.

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基本交通流量图作为系统管理道路状况的工作模型 – 交通流量
BASIC TRAFFIC FLOW CHART AS A WORKING MODEL OF SYSTEM MANAGEMENT ROAD CONDITIONS - TRAFFIC FLOWS

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注解。 管理“道路管理 – 交通流量”系统的过程被认为是理论上应该在实际条件下分析交通流量的工作模型。 这意味着该模型应考虑改变道路参数，交通流量，气象条件以及控制措施的可能性。

关键词：道路管理 – 交通流量，驾驶员，汽车，道路，环境。

Annotation*. The process of managing the "road management - traffic flows" system, a working model that should theoretically analyze the traffic flow in real conditions, is considered. This means that the model should take into account the possibility of changing the parameters of the road, traffic flow, meteorological conditions, as well as control actions.*

Keywords*: road management - traffic flows, driver, car, road, environment.*

Management in the system of "road management - traffic flows" (RM-TF) can be considered an "operation" in the sense in which this concept is interpreted in the mathematical theory of research [3]. The peculiarity of this study as an operating-theoretic is determined by the nature of the proposed model of the operation being studied - traffic flow patterns along the road under the influence of the environment and controls, and the environment influences the road conditions and the nature of the interaction of the traffic flow and road conditions (driving mode) (picture 1). The main advantage of the proposed model is that the interaction of the RM-TF system can be described by the main traffic flow diagram, which links together road and meteorological conditions, controls and traffic flow patterns, i.e. input and output parameters of the «*driver-car- road-environment*» complex (DCRE).

The basic traffic flow diagram is meant as the set of traffic flow conditions possible under given road and meteorological conditions, i.e. three parameters:λ – intensity, ρ – density, V – traffic rate [1].

The distribution of the desired vehicle speeds is determined by the composition of the movement, the performance characteristics of the automobiles and the psycho-physiological state of the drivers. The desired speed here is not associated with a specific section of the road, it characterizes the capabilities of the vehicle and the driver's intentions.

Depending on the distribution of the desired speeds and the indications given by the controls, one of the available modes, in the modes of this diagram of movement patterns on this section of the highway, is formed [6]. The mode of movement is characterized by the flux density at the site and the distribution function of the actual, i.e. forced speeds. The mode of movement depends on the intensity of the flow entering the section, which forms the density of the flow in this area and, in turn, forms the intensity of the flow at the exit from the section.

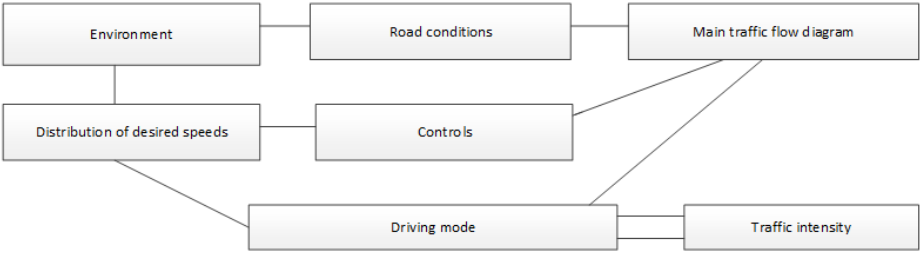

Figure 1. *Diagram of internal connections to the RM-TF system*

Controls are the management of signs and signals, multi-position speed indicators, entry control devices — in one word, the entire set of means that the governing body will have. In broad terms, these include all control actions that can be taken in the design and operation of roads [4, 6]. On existing roads and controls include the ability of road maintenance organizations to change variables and road conditions.

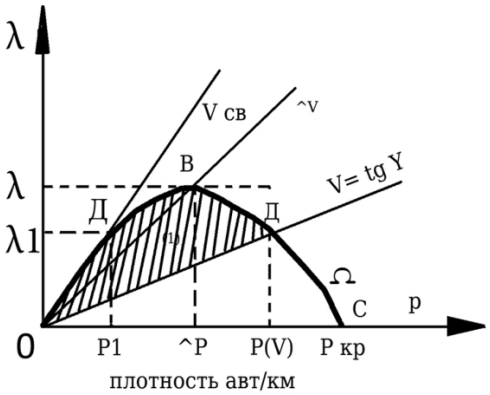

Figure 2. *Main traffic dynamics*

It is advisable to use the basic traffic flow diagram to determine the boundaries of changes in traffic flow patterns with changing road conditions and meteorological conditions and to select on this basis the optimal control capabilities. Considering the main traffic flow diagram in Figure 2, Figure 3 as a set of combinations of parameters {λ, ρ, V}, It can be noted that the boundary of the region of admissible states can be given by the function λ= λ (ρ). Then this area itself will be noted int Ω. The tangent to the curve Ω at zero sets the speed of free movement in those conditions for which the diagram is constructed.

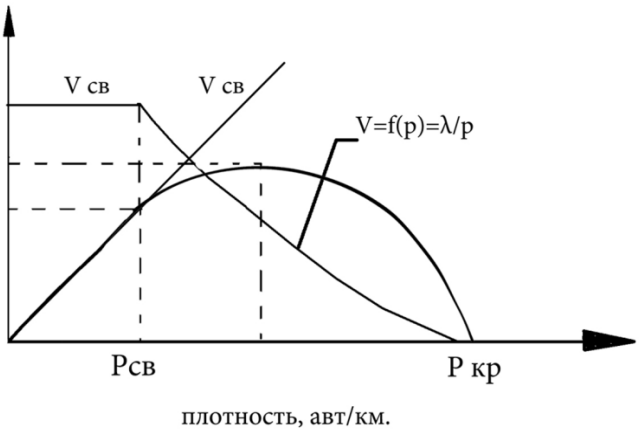

Figure 3. *Relationships of the dynamics of the transport stream with the derived diagram*
(1 - dangerous zone with $V_{доп}$*=V= tg φ)*

The value of ρ is not equal to 0 for which λ (ρ) = 0 (point C) is the critical flux density. The projection of the intersection point Ω in the straight line V = const (point D) on the abscissa axis represents the maximum flux density ρ (V) for which this speed can at least theoretically be achieved.

$$V_{св} = \lim_{\rho \to 0} \frac{\lambda(\rho)}{\rho} = \lambda'(0) \quad (1)$$

The horizontal tangent to the curve Ω at point B is usually interpreted as a line of the level of theoretical capacity [5, 6]. This interpretation is correct only if the distribution function of the desired and actual velocities is concentrated in the interval v> V^. If the desired or actual speeds are concentrated below V^, for example, transportation of fragile or oversized cargo, the speed limit due to the unevenness of the coating and other, throughput can not be achieved even theoretically.

Typically, a traffic flow diagram is depicted as the envelope of the density and intensity points at average transport flow rates. However, the actual speeds, even with the reference state of the road and meteorological conditions, vary widely, but the greater the density, the smaller the swing range [2, 4].

This property explains another feature of the traffic flow: if there is any restriction on speed or density, the possibility of movement with speeds or densities above (or below) the established limits is not excluded. For example, since speed is limited to V = tg$^{\varphi}$ (Figure 2), individual cars can move at high speed, although risk is allowed. In this case, the main zone can determine the main zone or zone of possible exceedances of the established limits.

In addition to the main one, a derived traffic flow diagram can be constructed, which is a velocity graph at a given density ρ (Figure 3), if the main diagram is given by the function λ = λ (ρ), then the derived diagram is defined by the function V (ρ) = λ (ρ) / ρ.

Thus, the derived diagram V = ρ expresses the nature of the change in velocity with a change in density under given conditions of motion. It is interesting to note that when the density of the traffic flow is less than the density of the associated traffic, the average speed does not depend on the density, therefore, an important issue is determining the interval at which the mutual influence of cars begins to be noticeably felt. The value of the specified interval ranges from 5 to 10 seconds [3]. On the basis of the studies performed and the generalization of the available data, the dependence of the decrease in average speeds of movement with a decrease in the intervals between cars, as well as the characteristic features of the traffic flow, was established. Under reference conditions, free movement of cars is observed at intervals of more than 9-10 seconds, i.e. when the intensity of the movement is less than 360 aut./h. This means that, under reference conditions, the free movement

of a homogeneous traffic flow on two-lane roads, taking into account the uneven hourly hours and seasons. The irregularity coefficient (1.3-1.8) can be achieved at a traffic intensity of no more than 4000-6000 cars / day.

Road conditions affect not only the speed of free movement: factors such as a narrowing of the carriageway, deterioration of adhesion and others change the whole set of possible traffic flow conditions, i.e. change the shape of the main traffic flow diagram [1, 5]. The change in the Ω diagram depends on the exposure time of the vector x = x (t), i.e. Ω changes in time can be described by a differential equation. The specific form of the function F can only be determined on the basis of a thorough analysis of experimentally obtained traffic flow diagrams in various conditions.

$$\frac{d\Omega}{dt} = F(\Omega, x) \qquad (2)$$

However, we can note the particular dependences of Ω on X, which are of significant practical importance. Let the experimental dependence of the speed of free movement on one of the factors x_i with an immediate effect $V = \mu(x_i)$ be known. If the Ω diagram for a given value of X is given by the equation $\lambda = \lambda(x_i \rho)$, then $\frac{d\lambda}{dp} = \mu(x_i)$ (figure 4).

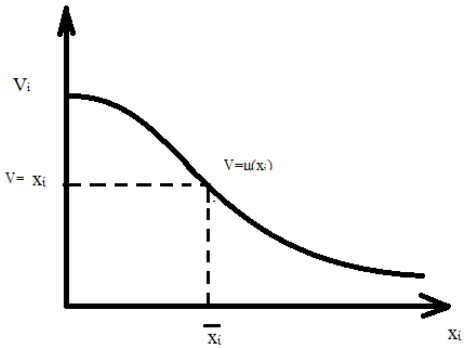

Figure 4. *Deformation of the main traffic flow diagram (free motion speed V = μ (xi))*

When is $X_i = \overline{X}_i$ the corresponding maximum allowable speed $V(\overline{X}_i)$, i.e. The Ω diagram under the condition X_i should lie in the shaded area (Figure 5).

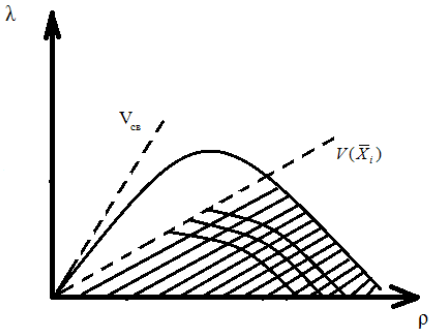

Figure 5. *Deformation of the main traffic flow diagram (influence of the factor restricting the speed of free movement)*

Let the experimental dependence of the critical density $\rho_{кр}$ on the parameter x_j (for example, on the sliveriness of the coating) $\rho_{кр} = \mu_i (x_j)$ be known. Then the traffic flow diagram for the given conditions $\bar{x}_j$ should differ from the diagram constructed for the reference conditions by shifting the critical density point i.e. $\rho_{кр}(\bar{x}_j)$ should lie in the shaded area (Figure 6).

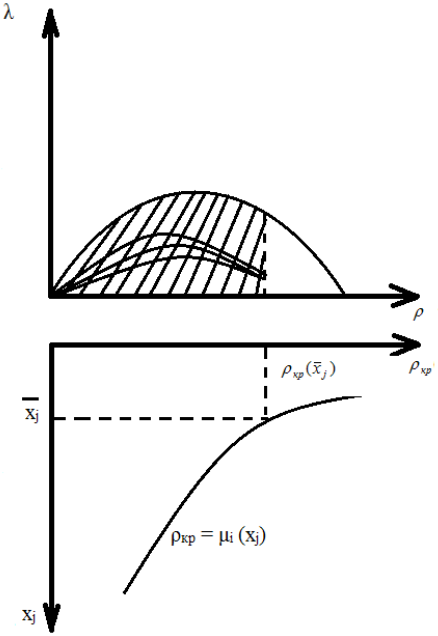

Figure 6. *The deformation of the main transport flow pattern (influence of the factor limiting the permissible density)*

The most difficult will be the case when the combined action of two or more factors (road parameters or meteorological elements x_i, x_j) will lead to a decrease in the speed of movement and an increase in intervals [4]. In this case, the critical density decreases in accordance with the graph $\rho = \mu, (x_j)$, and the speed of free movement in accordance with the dependence $V = \mu (x_i)$. Under these conditions, the set of permissible combinations of triples of the parameters λ, V, ρ should lie in the area bounded above and to the right (Figure 7).

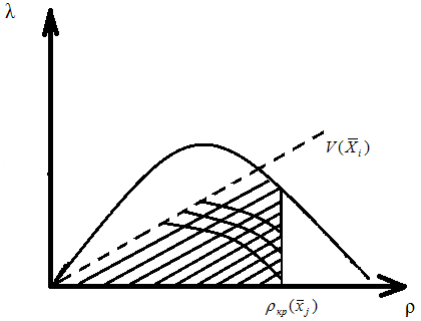

Figure 7. *Deformation of the main traffic flow diagram (the combined effect of two factors)*

Thus, with changes in the condition of roads and meteorological conditions, the shape and parameters of the main traffic flow diagram change, including the most important indicators - density, throughput, speed of movement. This means that the optimal values of the basic parameters established for the reference conditions are not optimal for driving conditions during unfavorable periods of the year. Consequently, each condition of the roads and meteorological conditions correspond to their optimum values of the main parameters within the framework of the main traffic flow diagram, i.e. in each case, the deformation of the main traffic flow diagram occurs, as a result of which the number of permissible combinations of parameters of the RM-TF system (triples λ, ρ, v) is significantly reduced.

Thus, on the same part of the logging road, there can be many different states of the main traffic flow diagram and many values of the initial parameters of the DCRE system.

As can be seen from the analysis of the main traffic flow diagram, the carrying capacity of forest roads is limited by two restrictions: density (restriction of the 2nd type) and allowable speed of movement (restriction of the 1st type). This implies the need to study these parameters and, above all, the permissible speed and density of the traffic flow under various road conditions and meteorological conditions to control the DCRE system. This makes it possible, depending on strategic objectives, to choose one or another impact.

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检测到文件服务器的信息安全威胁时系统组件的效用函数的分析表达式
ANALYTICAL EXPRESSION OF THE UTILITY FUNCTION OF THE SYSTEM COMPONENT WHEN INFORMATION SECURITY THREATS OF THE FILE SERVER ARE DETECTED

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注解。文件服务器是专用服务器，用于执行文件I / O操作和存储任何类型的文件。通常，它具有大量磁盘空间，以RAID阵列的形式实现，以确保不间断的操作和提高写入和读取数据的速度。文件服务器是其他类型服务器的基础，因此它的要求非常重要。在将文件服务器视为不利影响的对象时，有必要了解其在分布式信息系统结构中的重要性，因为该组件的连续性取决于系统中存储的信息的相关性，完整性和机密性。针对文件服务器效率的任何类型的威胁的实施可能在经济上和信息上都带来不可再生的损失。因此，对文件服务器的可行性进行评估和管理是现代信息系统稳定运行的重要任务。研究的主题是文件服务器生存的风险评估。

关键词。信息安全，DDoS攻击，文件服务器。

Annotation. *A file server is a dedicated server for performing file I / O operations and storing files of any type. As a rule, it has a large amount of disk space, implemented in the form of a RAID array to ensure uninterrupted operation and increased speed of writing and reading data. The file server is basic for other types of servers, so its requirements are so important. When considering a file server as an object of adverse impacts, it is necessary to understand its importance in the structure of distributed information systems, since the continuity of this component depends on the relevance, integrity and confidentiality of information stored in the system. The implementation of any kind of threats aimed at the efficiency of the file server may entail non-renewable losses, both economically and informationally. Therefore, the assessment and management of the viability of the file server is an important task for modern information systems, in terms of their stable operation. The subject of the research is the risk-assessment of file server survival.*

Keywords. *Information security, DDoS-attack, file server.*

File servers and their services are most often subjected to the following types of threats: threats associated with disabling certain services that are publicly available (denial of service, violation of the integrity of information); threats associated with the inability to access the file server (DoS-attacks); threats associated with the destruction, violation of confidentiality and distortion of information [1, 3]. When considering a file server as a component of an automated information system, it is necessary to identify the main threats to information security, the implementation of which can lead to the loss of its performance.

DDoS attack is a distributed denial of service attack, which is one of the most common and dangerous network attacks. As a result, the attack disrupts or completely blocks service to legitimate users, networks, systems, and other resources.

Figure 1 shows a graph of the utility function and the probability distribution function of a successful attack [2]:

$\tau_а$ - inflection point of accumulated probability *F (t)* of attack success;

$\propto$ - steepness parameters of the considered probability function;

$\beta_в$, $\beta_з$, - the steepness parameters of the “dumps” of the productivity function (the amount of benefit produced per unit time);

$\tau_в$, $\tau_з$, - the position of the "edge" for periods of "sunrise" and "sunset" of the life cycle in the characteristic of utility $\bar{\omega}(t)$;

η- the level of "edge" function performance $\bar{\omega}(t)$.

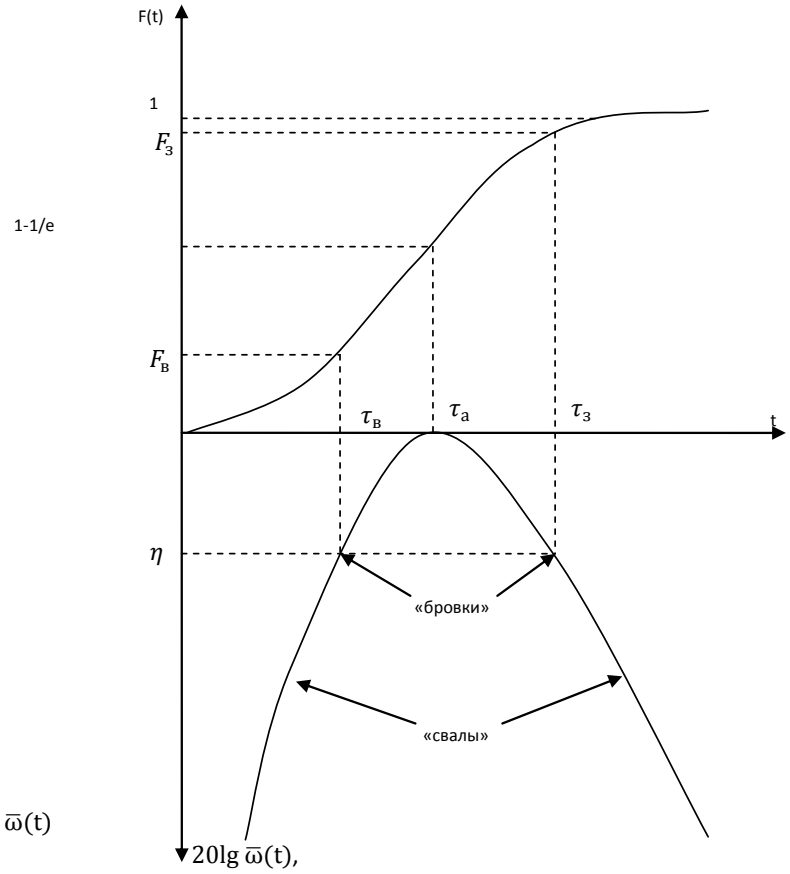

Figure 1. *The distribution functions of the probability of attack success and performance (utility), depending on the current time*

Such an estimate is appropriate for the exponential utility function:

$$\bar{\omega}(t) = \left\{1 - \exp\left[-\left(\frac{t}{\tau_в}\right)\right]\right\} \exp\left[-\left(\frac{t}{\tau_з}\right)\right] \quad (1)$$

A more complex utility function can also be used.

$$\bar{\omega}(t) = \left\{1 - \exp\left[-\left(\frac{t}{\tau_в}\right)^{\beta_в}\right]\right\} \exp\left[-\left(\frac{t}{\tau_з}\right)^{\beta_з}\right] \quad (2)$$

where the dumps steepness increases with increasing $\beta_в$, $\beta_з$ (usually they are natural numbers) [5].

In Figure 1, a single-stage utility function is considered, but in real life of systems and their components, the performance function is obviously multi-step [4, 6].

The situation is somewhat different in the implementation of fatal threats to an automated information system. Here, the recovery duration exceeds the permissible limits of the "clinical death" of the component of the automated information system.

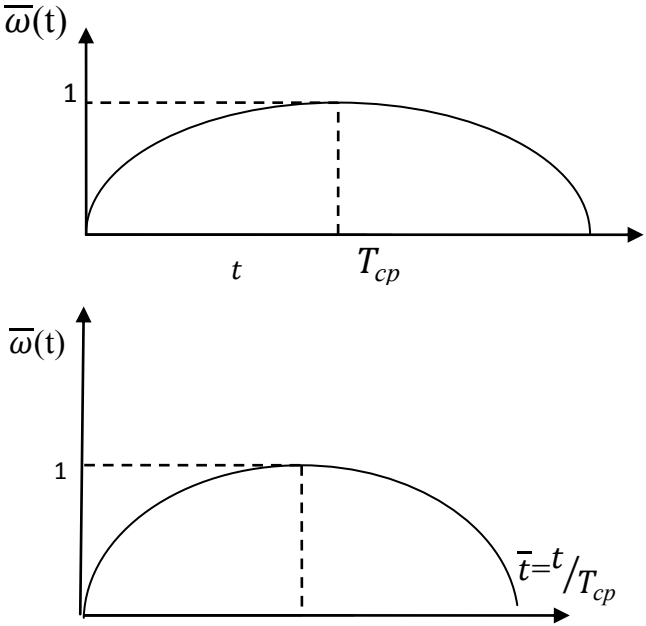

Figure 2 - *Approximate utility functions in assessing fatal threats*

In this case, the utility function can be defined by the following expression (Figure 2):

$$\bar{\omega}(t) = \sqrt[\beta_b]{\frac{t}{\tau_b}}\left(1 - \left(\frac{t}{T_{cp}}\right)^{\beta_\varepsilon}\right) \quad (3)$$

where T_{cp} – average life expectancy.

In the normalized form, the situation of such an approximation is illustrated in Figure 2. However, it is even more simplified, when the region of short times is neglected. In this case, the following performance features can be used:

$$\bar{\omega}(t) = \left[1 - e^{-\left(\frac{T_{cp} - t}{\tau_з}\right)}\right]^{\frac{1}{\beta_з}} \quad (4)$$

where T_{cp} – average life expectancy of components, $\tau_з$ – the start time of the "decline" of the life cycle of the components, $\beta_з$ – utility function decay slope parameter [2, 5].

The obtained utility function allows you to build a risk model for the file server, and further develop new methods for managing risks, as well as methods for analyzing the system's survival, allowing you to create more efficient and universal management techniques.

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森林道路状况在一年中的不利时期提供便利和交通安全的作用
THE ROLE OF THE STATE OF FOREST ROADS IN PROVIDING CONVENIENCE AND TRAFFIC SAFETY DURING ADVERSE PERIODS OF THE YEAR

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注解。该国是一个不断提高机动化水平的过程。汽车产量和汽车运输的货物周转量越来越大，硬路面的道路网络长度和交通速度越来越快，运输成本也越来越低。然而，该国道路网的发展速度和质量改善不符合自动化的要求，因此道路拥堵增加，行驶速度降低，道路交通事故数量增加。特别是冬季和秋季及春季期间森林道路交通状况明显恶化，气象现象不利。在这些交通困难时期，整个汽车 - 道路系统的运行可靠性，首先是道路设计和运输过程组织的质量，道路维护和交通管理的水平进行了测试。

关键词：森林道路，追踪，道路状况。

Annotation*. The country is a continuous process of increasing the level of motorization. The output of automobiles and the freight turnover of motor transport are growing, the length of the network of roads with hard pavements and the speed of traffic is increasing, and the cost of transportation is decreasing. However, the pace of development and qualitative improvement of the road network in the country does not meet the increased requirements for automobilization, as a result of which road congestion increases, driving speeds decrease, the number of road accidents increases. Especially noticeable deterioration of traffic conditions on forest roads with adverse meteorological phenomena in the winter and autumn and spring periods of the year. During these difficult periods for traffic, the reliability of the functioning of the entire automobile-road system and, first of all, the quality of road design and organization of the transport process, the level of road maintenance and traffic management is tested.*

Keywords*: forest roads, tracing, road conditions.*

For timely clearing of snow and elimination of ice on the roads, according to the standards, 11 thousand combined road machinery KDM-130 and 3 thousand rotary snowcleaners are required. In fact, road organizations have 2 thousand KDM-130 (19% of demand) and 700 pcs. rotary snowcleaners (23% of demand). The annual supply of new cars is not enough even to replace old, end-of-life cars, although the network of roads with hard surfaces increases every year by tens of thousands of kilometers [2].

The widening gap between needs and the availability of road maintenance machines is one of the main reasons for the decline in road transport during unfavorable periods.

Breaks in motion and speed reduction are not an exception, but are observed on the roads systematically, which indicates significant shortcomings in the design of roads and the organization of their maintenance [5].

Of course, first of all, it is necessary to improve the level of organization of road maintenance work on road maintenance and to provide road organizations with the necessary number of machines and mechanisms [6, 8]. However, it is impossible not to take into account the real prospects in addressing this issue and the fact that most of these machines are used only in winter, and the rest of the year is idle.

Under these conditions, the importance of the problem of designing and building snow-free roads, the installation of snow protection structures, the organization of winter maintenance and traffic control in difficult weather conditions is increasing. The underestimation of the whole complex of these measures at the design stage is one of the main reasons for the decrease in the transport and operational characteristics of roads, reduction of speeds and breaks in winter.

Solving this problem requires, at the design stage, analyzing and comparing the costs of improving the transport and operational characteristics of forest roads and annual losses from reduced speeds and traffic interruptions, taking into account the cost of maintaining roads.

A significant cost of motorization are traffic accidents. In solving the problem of ensuring traffic safety, a large role is also played by the development and improvement of the road network and improvement of their condition. For this purpose, road organizations annually carry out a whole range of activities. However, the number of road accidents in the country remains high, which indicates the need to look for new ways to improve traffic safety [3].

The theoretical basis for solving this problem is the study of the influence of road conditions on traffic safety. There is a hypothesis about the significant influence of weather and climatic conditions (abbreviated "environment") on the interaction of the systems of the driver-car-road complex, which primarily affects the state of roads, mode and traffic safety. To test this hypothesis, crash statistics

in logging areas were studied [1, 7]. The main objectives of the analysis of these statistics were identified total number of accidents committed on forest roads, the role of road conditions, weather conditions and meteorological phenomena, the nature of the distribution of accidents and their structure by periods of the year.

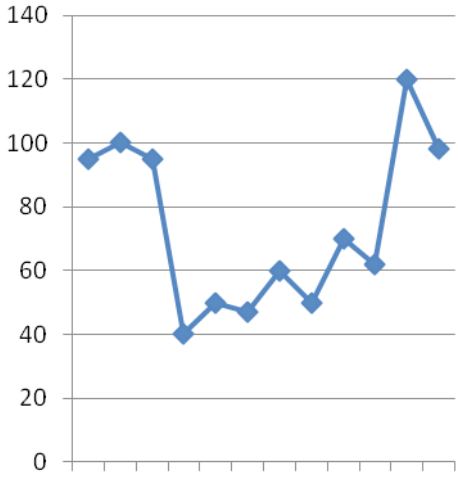
The generalization of the performed research led to the conclusion that the characteristics of the road network and the state of the roads are the most important reasons for reducing convenience and safety:

- the lag in the rate of development of the main road network of the highest categories and the low-level road network with hard surfaces from the growth rate of the vehicle fleet and their performance;

- inconsistency of the technical level of the existing forest roads, their engineering equipment and equipment, as well as the level of up-to-date traffic requirements, as a result of which they are not provided during adverse periods of the year;

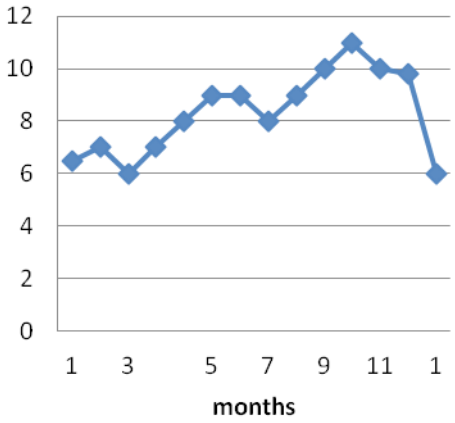
-low level of organization and management of road traffic and the functioning of roads, especially in difficult weather conditions.

Changes in the condition of roads and traffic conditions, occurring under the influence of weather and climate factors, lead to changes in the structure of accidents, the study of which allows to identify the main causes of accidents and to identify measures for their elimination. There are certain patterns in the distribution of the number of accidents and the severity of their consequences over the seasons of the year [4, 6].



On forest roads of Russia, the minimum number of accidents is observed in the winter, in the spring an increase in the number of accidents begins, which lasts all summer and reaches a maxim in the autumn when high traffic is combined with adverse weather conditions [3]. The movement of timber trucks in the autumn period occurs on a wet, often contaminated coating with low grip qualities (Figure 1, Figure 2, Figure 3).

Figure 1. *The number of victims of accidents depending on the time of year*



The influence of weather conditions on traffic accidents is determined by the number of accidents per 1 million car-km run. Such an assessment was carried out with comprehensive road surveys in various climatic conditions, which confirmed the hypothesis of an increase in the danger of traffic during adverse periods of the year [2, 4].

Figure 2. *The distribution of the number of accidents by months of the year*

It has been established that in different periods of the year not only the degree of danger of movement on the whole along the road changes, but also sections of roads with different degrees of danger.

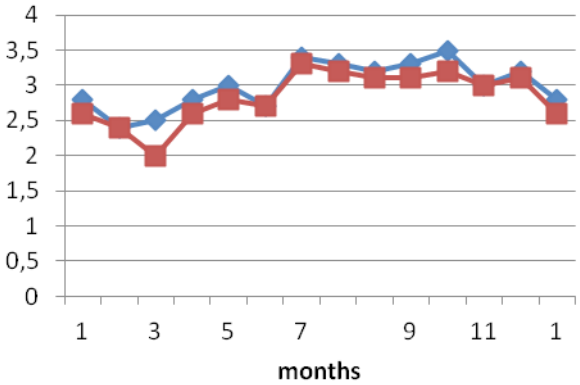


Figure 3. Distribution of accidents depending on the time of year.

The nature of the influence of the seasonal condition of roads and weather conditions on accidents can be judged by the structure of the severity of accidents: in autumn and spring, the severity is higher than in summer and winter (Figure 4). Under unfavorable weather conditions, at any time of the year there is a great deal of severity of the consequences of road accidents.

The greatest number of collisions in winter and autumn is due to the formation of narrowing of the carriageway due to snow deposits and edge contamination, as well as a decrease in the adhesion qualities of the coatings. In the summer, the effectively used width of the carriageway and shoulders increases, the number of bottlenecks is reduced, the adhesion qualities of coatings increase, as a result of which the number of collisions is reduced. However, in spring and summer, the speed of movement increases, which contributes to an increase in the number of rollovers.

Of all the characteristics of road conditions on the mode and traffic safety is most influenced by the condition of the surface of the forest road. The main share of road transport is carried out with a dry and clean roadway. Accordingly, the majority of road accidents occur with dry and clean coverage. However, the frequency of accidents and the severity of the consequences during periods of unfavorable road conditions is much higher, and road conditions more often serve as the main cause of accidents.

The number of accidents in unfavorable condition of roads caused by the action of street meteorological factors varies widely and depends on climate, as well as on the technical level and level of road maintenance (Table 1). On the roads of Italy, USA, France, England, this number ranges from 16 to 35% of the Saratov and Rostov regions to 41-59% [1, 5].

Table 1

Roads	**Number of accidents, under conditions of road surfaces, %**				
	dry	**wet, dirty, slippery**	**snow knurled**	**icy**	**other**
Roads of Italy (2011-2016)	83,7	15,0	0,8	0,5	-
Roads of the Komi Republic	80,4	16,5	1,2	1,9	-
Including bypass Syktyvkar	64,3	28,6	-	7,1	-
Roads of the Nizhny Novgorod region	83,1	7,7	4,2	5,0	-

On roads of high categories, the condition of coverage has a greater impact on the number of accidents than on roads of low categories, where accidents are more likely to occur due to poor geometric parameters.

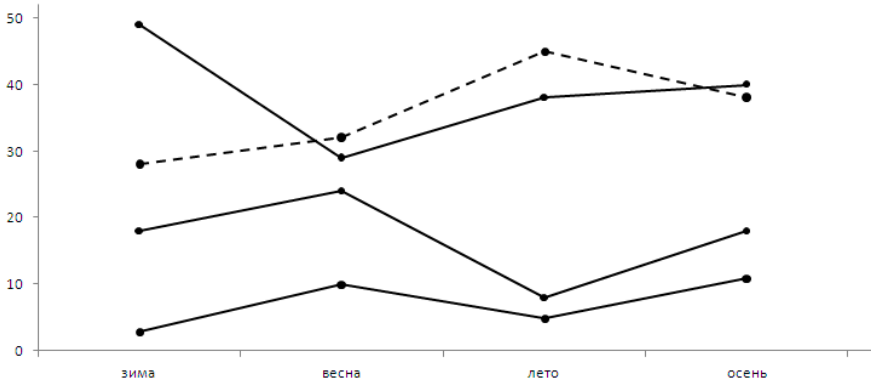


Figure 4. *Changes in the structure of road accidents by seasons: 1 - collisions; 2 - tipping; 3 - hit a pedestrian; 4 - hitting obstacles*

To identify the nature of the relationship between weather and climate conditions, road conditions and traffic safety on the roads in 9 areas of the central part of the country, located approximately at the same latitude from north to south of the country.

For each region, the duration of winter, the number of road accidents, dead and wounded during the winter period in various states of the roads are determined.

Of interest is the presence of a fracture on the curves depending on the number of accidents and their consequences in the winter period on the length of winter. When the winter lasts over 30-35% of the year, there is a significant increase in the growth rates of all indicators of road accidents. This is due to the accumulation of the effects of weather and meteorological phenomena on the road and the decrease in their transport and operational characteristics (the formation of snow shafts, the narrowing of the carriageway, the formation of a snow run, etc.) [3].

The presence of the inflection point on the curves indicates the possibility of zoning the country according to traffic conditions.

In various literature there is a lot of information about traffic accidents that occur not only at the time of meteorological phenomena, but some time later. It is proposed to call this phenomenon a consequence. The extent of the impact on the number of accidents can be judged by comparing the data in columns 7 and 8 of table 2.

Table 2

Roads	Number of accidents,% of annual, under various weather conditions					Total under adverse weather conditions	All in all, with poor road conditions due to weather conditions.
	clear	rain	snowfall	Fog, haze, overcast	Strong wind, storm		
Roads of France	32,7	13,2	1,4	1,6	1,1	17,3	24,5
Roads of Canada	81,0	12,0	2,0	3,0	2,0	19,0	20,0
Roads of Russia	79,8	4,9	1,9	13,4	-	20,2	26,6
Roads of the Komi Republic	69,8	8,5	5,2	16, 5	-	30,2	34,6
Roads of the Nizhny Novgorod region	82,0	6,2	0,3	11,4	0,1	18,0	19,6
Bypass Syktyvkar	66,7	26,6	1,5	4,9	-	33,3	35,7

Weather and climate conditions worsen traffic conditions and reduce the transport and operational qualities of any road; however, the degree of reduction depends on the technical level of the road and its maintenance by the service department. For example, on canadian forest roads, under adverse weather conditions, 19% of road accidents occur, and if they are unsatisfactory, 20% of road accidents occur under the influence of these conditions. At the same time, on local roads of Canada, the technical level of which is significantly lower, under adverse weather conditions, 17.4% of road accidents occur, and if the roads are unsatisfactory, 28% of road accidents. Approximately the same ratios on the roads of Russia, where the weather and climate conditions are incomparably more difficult than in Canada [5, 8]. This suggests the need to better take into account the influence of meteorological conditions on the mode and traffic safety when improving the road network.

The solution to this problem is seen in the triune direction: increasing the requirements for the geometrical parameters and the transport and operational characteristics of the roads, taking into account weather and climatic conditions, maintaining these parameters during operation and operational management of traffic flow, based on the actual condition of the road and meteorological conditions.

Analysis of the statistics of accidents shows that the most dangerous are the conditions of movement during rain, snowfall, with limited visibility (fog, overcast) and under the action of strong wind.

The increase in the speed of traffic on forest roads, is due to the improvement of the dynamic qualities of rolling stock, geometric parameters and transport and operational characteristics of roads lead to an increase in the influence of meteorological phenomena on traffic safety and it can be assumed that in the future this effect will not only decrease, but vice versa will increase.

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UDC 621.01

基于运动柔性电路的新机构和新机器。 新型土壤处理机的创新驱动
NEW MECHANISMS AND MACHINES BASED ON KINEMATIC FLEXIBLE CIRCUITS. INNOVATIVE DRIVE OF NEW SOIL-PROCESSING MACHINE

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注解。 新型耕作机的创新，灵活机制可以无间隙地工作，同时降低成对的动态负载水平。 柔性连接的低横向刚度显着降低了金属强度，以及机构对零件制造中的不准确性的敏感性。 因此，减少关节上的动态载荷增加了它们的耐用性。

在闭合预应力回路中基于运动链和柔性联轴器的自调节机构是通用机构。基于柔性运动链的机构和机器的结构是自对准的。

关键词：柔性连杆自对准机构，弹性闭环，柔性连杆，无冗余连杆机构，三重平行四边形机构，机构连杆自对准，耕作机械，工作机构传动机构动力学模型。

Annotation*. An innovative, flexible mechanism for a new tillage machine works as backlash-free, while reducing the level of dynamic loads in pairs. Low transverse stiffness of the flexible connections significantly reduces the metal intensity, as well as the mechanism's sensitivity to inaccuracies in the manufacture of parts. Accordingly, the reduction of dynamic loads on the joints increases their durability.*

Self-adjusting mechanisms based on kinematic chains with flexible couplings in a closed pre-stressed loop are general-purpose mechanisms. The structure of mechanisms and machines based on flexible kinematic chains is self-aligning.

Keywords: *self-aligning mechanisms with flexible links, elastic closed loop, flexible links, mechanisms without redundant links, triple parallelogram mechanism, self-alignment of links of the mechanism, tillage machine, dynamic model of the transmission mechanism of the drive of working bodies.*

Introduction

The study of self-adjusting mechanisms and machines based on kinematic chains with flexible couplings is related to a particular section of the theory of mechanisms and machines, which has been developing relatively recently until recently. The history of the development of mechanisms and machines with flexible connections counts its beginning from the invention in the era of the Paleolithic bow and arrow. Meanwhile, today not a single industry can do without this type of devices, mechanisms and machines. However, due to the imperfections of the calculation and theoretical apparatus, their well-deserved application and service life are narrowed due to the predominance of deficiencies over specific merits.

Introduction to the structure of flexible coupling mechanisms automatically makes the kinematic chains of the mechanisms self-aligning, cost-free, and practically low-wear.

It is well known that conventional flat hinge mechanisms cannot be created without redundant links. Any imposition on the system of common bonds leads to its redundancy [1 - 10]. Flexible links, or, more precisely, the transformation of some rigid links in a bond, eliminates redundancy, since any mechanism in this case becomes spatially non-redundant [1-10].

Self-adjusting mechanisms with flexible connections and an elastic closed prestressed contour require special research methods to eliminate the nature of their movement depending on the structural ratio (mass, stiffness) and operating parameters [1 - 10]. Thus, in the kinematic chain of self-aligning mechanisms, flexible couplings in combination with rigid links form a closed pre-stressed contour. The stable equilibrium of the kinematic chain relative to the initial position of the mechanism and the absence of redundant bonds ensures the self-alignment of its links.

Self-adjusting mechanisms with flexible connections are primarily mechanisms without redundant connections that satisfy the conditions for assembling the mechanism without forcing (tension) in the initial position of the mechanism corresponding to the minimum potential energy of a closed loop [1 - 10].

The initial position of the mechanism corresponds to the condition of balancing the moments acting on the leading link from the side of the flexible elastic connections of the contour. In the initial position of the mechanism, the elastic resistance to movement is zero. Freed from external loads, the mechanism always tends to an initial equilibrium position, in which the circuit has a minimum of

potential energy relative to the rack. A very valuable property of the proposed mechanisms is the self-installability of the links, that is, the links under the influence of the load themselves occupy positions corresponding to the actual errors of manufacture and installation. The effect of self-reproducibility of links of the mechanism is activated by the presence of an elastic closed loop. Unlike self-adjusting mechanisms with rigid links [1-10], the assembly and disassembly of the proposed mechanisms without coercion (tension) is carried out only in the position of the mechanism corresponding to the minimum potential energy of a closed loop. New self-adjusting mechanisms are distinguished by low metal consumption, noiseless operation, and backlash-free design. The structure of the mechanism is formed from the basic mechanism (the mechanism of the first class) and the statically definable structural groups attached to it. Redundant links are absent both in the basic mechanism and in the attached structural groups [1–10].

1. Drives of machines based on parallelogram mechanisms with flexible connections

In general, the mechanism of the triple parallelogram with rigid rods is known [1 - 9]. Flexible rods make it possible to release it almost completely from redundant connections. The diagram shows the mechanism with flexible connections in the form of closed endless loops. In the branches of each of the loops, the tension is always the same, and on the eccentric a peculiar kinematic pair is formed, in which the rigid and flexible elements roll relative to each other without sliding. It is possible to perform flexible rods in the form of a stretched string with ordinary fifth-grade pairs at the ends. The mechanism transmits rotation over considerable distances with a gear ratio of one. Its load capacity is very high due to the possibility to develop the dimensions of kinematic pairs and create favorable conditions for their lubrication. When transmitting torque from one shaft to another, flexible rods alternately fall into the stretching zone. In order for the flexible rod, which is outside the zone of force transmission, not to relax, all flexible rods must be pre-stretched when assembling the mechanism. The mechanism can be advantageously used in the construction of real machines.

The problem of increasing the reliability of many tillage machines for preparing soil for grain crops is currently particularly relevant. In agricultural engineering there are tillage machines for pre-sowing tillage with power knife rotors, in which the torque for driving the rotor shaft is transmitted through an onboard gear, made in the form of a multi-stage cylindrical gearbox, either in the form of a chain gear, or in the form of a gear mechanism with rigid connecting rods [1 - 10].

The disadvantage of drives of known tillage machines is either a very complex structural solution, or insufficient reliability and durability of individual parts and assemblies due to the shock application of the forces inherent in the design of the drive itself. The quality indicators of these machines are largely dependent on the

perfection of the drive mechanism of the working bodies.

Created in recent years, milling cultivator type КФГ-3,6; combined units of types КА-3,6; АКР-3.6 and CFS-3.6 contain the same drive mechanisms. The main design flaw of these machines also lies in the low reliability of the transmission mechanism. The structural mass of the drive mechanism of these machines is approximately 500 kg. The results of research and operation of these machines showed that due to the destruction and wear of cardan gears and other drive mechanisms, spare parts for them weighing 50kg or more are required annually [1-10]. During the period of operation of the machines, the total mass of these mechanisms reaches 700-900 kg. Reduced productivity due to downtime during their breakdown and repair leads to significant material losses.

The foregoing allows us to conclude that special requirements are placed on the drive mechanisms of such tillage machines operating in difficult conditions: simplicity and reliability in operation, the possibility of easy adjustment and quick replacement of parts during repairs. Such requirements are quite natural, since the reliability of the machine as a whole is determined by the reliability of its executive mechanisms. A more detailed analysis of the work of these tillage machines and observation of them during operation confirmed the above considerations. Further development of research results in this direction led to the invention of a new tillage machine [1, A.S. No. 1353332 (USSR). Tillage machine. - Publ. in BI, 1987, №43 / Nauryzbaev R.K.)].

The machine (Fig. 1) is designed for pre-sowing tillage for various crops to a depth of 18 cm.

The drive of the working bodies of the machine includes a new transmission mechanism. This mechanism has a number of significant advantages - high reliability in operation, simplicity of design, installation and maintenance; low weight; high load and compensating ability.

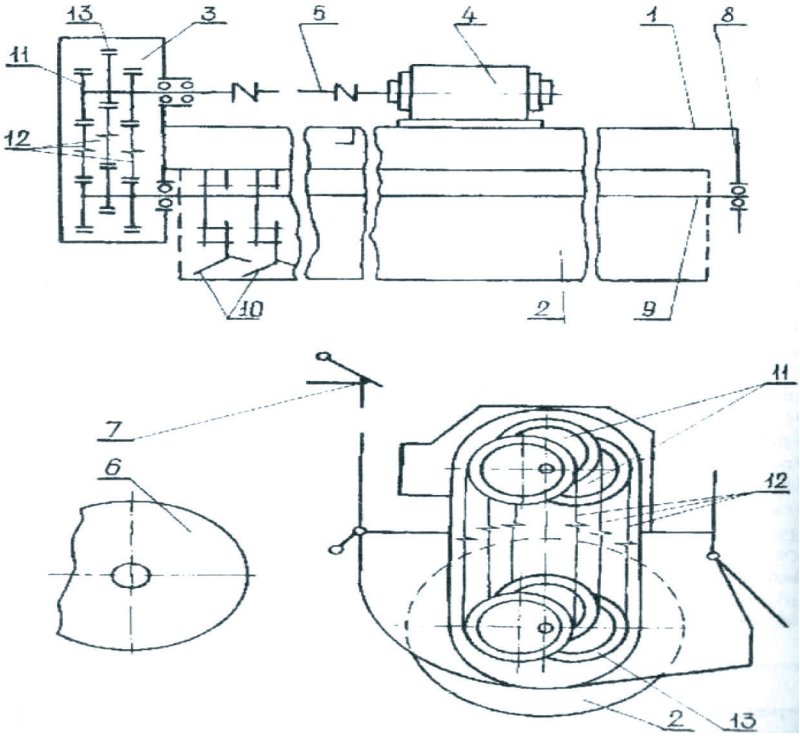

Fig. 1. *Tillage machine*

The transmission mechanism 3 of the machine receives the drive from the mechanism 4, through the shaft 5. The frame 1 has a hinged device 7, sidewalls 8, front and rear aprons, an anvil wheel 6. The milling machine 2 has a horizontal shaft 9 mounted on bearings and knives 10. The transmission mechanism the machine consists of a frezbaraban 2 fixed on the output shaft 5 and shaft 9, eccentrics 11, the opposing ones of which are pairwise interconnected by flexible pre-stressed links 12, forming parallelogram mechanisms with synchronous movements of their ex entrikov. The figure shows the execution of the transmission mechanism 3 with the eccentrics 11, the sleeves 13.

The use of flexible links in the kinematic chain provides one-way contact of the elements of kinematic pairs. The transmission mechanism works as a gapless one, thus reducing the level of dynamic loads in pairs. Low transverse stiffness of the flexible connections significantly reduces the metal intensity, as well as the mechanism's sensitivity to inaccuracies in the manufacture of parts. Accordingly,

the reduction of dynamic loads on the joints increases their durability.

The proposed technical solution is most effective for use in rotary tillage machines, in which airborne gears with an intercenter distance between the driving and driven shafts of 500 mm and more are used to transmit torque to the rotor shaft. The use of the invention is recommended when upgrading a cultivator milling deep-ripper type КФГ-3,6; mills seeders of the type КФС-3.6 and others, containing 4-speed bead gears (with five spur gears); it is advisable when finalizing a rotary plow of the type ПР-2.7.

The mechanisms of the considered type work practically without lubrication, are resistant to the action of abrasive and aggressive media, with the right choice of structure they work flawlessly and can transmit movements over long distances.

2. Dynamic model of the transmission mechanism of the drive of the working bodies of the tillage machine and the characteristics of its main parameters.

The dynamics for the transmission mechanism - a self-installing triple parallelogram with three flexible connections in a closed pre-stressed contour is the main issue for ensuring its operability. Note that in the framework of the classical theory of mechanisms and machines up to a certain period, the constructive realization was followed by the calculation of the kinematic and power parameters of the machine, the selection of the drive and the experimental studies of the machine. Now, an increase in the quick availability of machines, their complexity and loading has led to the need to study the kinematic and force parameters in the dynamics at the stage of creating or improving the design. Indeed, a review and analysis showed that dynamic studies of machines and mechanisms have been widely distributed in recent times, due to the rapidly increasing availability of machines. The works of Kolovsky M.Z., Vulfson I.I., Weitsa V.L., Kolgarov M.S., Frolov K.V., Bessonov A.P., Kozhevnikov S.N., Dzholdasbekov U.A. , Kazykhanov Kh.R., Dzhomartov A.Sh., Rakhimov E.R., Ualiev G.U., Nauryzbaev R.K., Isakov K.A., Kazykhanov E.Kh. and etc.

About gear – a self-establishing triple parallelogram with three flexible connections in a closed pre-stressed contour (see Fig. 1). The assembly mechanism is carried out in the initial position corresponding to the minimum potential energy of a closed pre-stressed kinematic chain. According to its design features, it occupies a middle position between a parallelogram with three rigid connecting rods and geometric closure, and a triple parallelogram with three elastic connecting rods, which ensures a wide area of their possible use. The developed dynamic model of the mechanism under study in the nonlinear formulation of the problem has the following form (see Fig. 2).

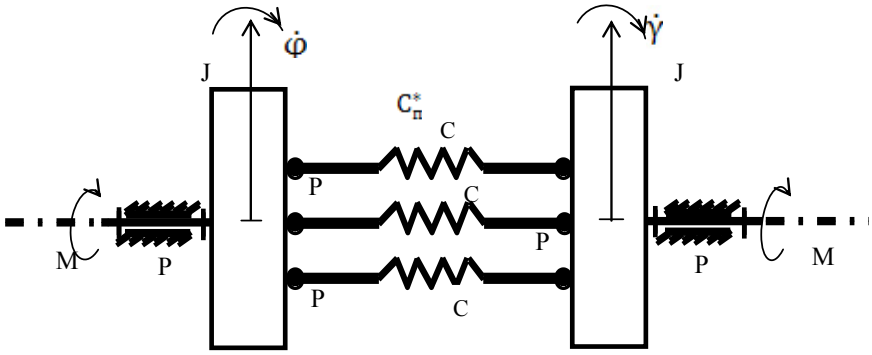

Fig. 2. *Two mass dynamic model of the triple parallelogram mechanism with three flexible connections in a closed pre-stressed contour*

The main parameters of the two-mass dynamic model of the studied transmission mechanism:

φ – the angle of rotation of the leading (n_1) crank 1 of a self-vanishing mechanism of the triple parallelogram with three flexible connections in a closed pre-stressed contour, [rad] (see Fig. 2);

γ – the angle of rotation of the slave (n) crank 2 self-aligning mechanism of the triple parallelogram by three flexible connections in a closed pre-stressed contour, [rad], (see fig.2).

ρ_1 - kinematic pair of the fifth class, single-motion and rotational;

J_1 – reduced to the axis of rotation of the kinematic pair (ρ_1) crank 1 moment of inertia of the moving parts of the mechanism [kg*m^2];

J_2 – reduced to the axis of rotation of the rocker arm 2 moment of inertia of the moving parts of the kinematic chain of the mechanism [kg*m^2];

d – gear rack size, [m];

l_0 – initial length of the flexible coupling P, [m];

R – crank radius size, [m];

P_5 – thread, flexible, kinematic pair of the first class, two-mobile, pre-stressed;

M_1 – torque on the drive shaft of the triple parallelogram mechanism with flexible rods, [N*m];

M_2 – the magnitude of the torque on the driven shaft mechanism of the triple parallelogram with flexible rods, [N*m];

C_1 – the longitudinal stiffness of the first flexible connection, working on tensile deformation,

$\frac{H}{M}$; C_2 – the longitudinal stiffness of the second flexible connection, working on tensile deformation, $\left[\frac{H}{M}\right]$.

C_3 – the longitudinal stiffness of the third bond, working on tensile strain, $\left[\frac{H}{M}\right]$.;

$C^*_{\text{пр}}$ – the reduced stiffness coefficient of the kinematic chain of the triple parallelogram self-resetting mechanism with three flexible connections in a closed pre-stressed contour, [N*m]:

$$C^*_{\text{пр}} = \int(\varphi, \gamma, C_1, C_2, C_3, R, d, E_0). \quad (1)$$

Thus, the reduced stiffness coefficient of the kinematic chain of the gear mechanism under study is a nonlinear function of generalized coordinates (φ, γ) dynamic model of the mechanism, longitudinal stiffness (C_1, C_2, C_3) flexible connections, geometric parameters of the circuit (*R, d*), the values of the prestressing of flexible connections (E_0).

In the general case, we have a function of the form: $C^*_{\text{пр.}} = \frac{\partial \Pi}{\partial\varphi \cdot \partial\gamma}, [H \cdot M]$ (2)

where: *П* is a non-linear function of the potential energy of a moving self-aligning kinematic chain of the triple parallelogram mechanism with three flexible and tight connections of its closed contour, [N*m]

Consequently, the dynamic model of the transmission mechanism of the drive of the working bodies of the new (AS No. 1353332 USSR) tillage machine consists of two links 1 (n_1) and 2 (n) cranks (see Fig. 1) with inertia moments I_1 and I_2 (see Fig.2), connected by flexible connections (rods) in a closed pre-stressed circuit.

Conclusions.

Self-adjusting mechanisms based on kinematic chains with flexible couplings in a closed pre-stressed loop are general-purpose mechanisms. Due to the relatively high traction ability and KPD (efficiency) of their application can be quite wide - from the mechanisms of precise mechanics to power transmissions with high power density. The use of these mechanisms in the construction of machines with leading and driven shafts spaced apart over long distances allows the drive to be carried out quite compactly, while ensuring noiseless and backlash-free structures, the transfer of large loads. Transmissions based on them have large gear ratios, they are able to synchronize the movement of the input and output links, they are easy to operate, they are characterized by low metal consumption and high adaptability properties. The structure of mechanisms and machines based on flexible kinematic chains is self-aligning.

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中国交通走廊“新丝绸之路”的发展
DEVELOPMENT OF THE TRANSPORT CORRIDOR "THE NEW SILK ROAD" IN CHINA

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注释。 它可以带来协同效应。
关键词：运输物流，新丝绸之路，经济走廊，货运管理。
Annotation. *The "Economic Corridor" makes it possible to bring the partnership of China and Russia to a qualitatively new level, opening new opportunities between the countries and providing a synergetic effect from their fruitful cooperation.*
Keywords: *transport logistics, New Silk Road, economic corridor, freight traffic management.*

Since the inception of the idea of creating international corridors, three Pan-European Conferences have been devoted to this issue in 1991, 1994 and 1997, later the geography of the corridors was expanded and the Eurasian Conferences were already gathered in 1998, 2000 and 2003, and at the Second Eurasian Conference after considering all possible ground options routes to South Asia via China, Afghanistan, Pakistan and Iran, as well as the sea sections of the route - via the Caspian Sea, the Persian Gulf and the Indian Ocean the North-South corridor as an offshoot of the international transcontinental corridor No. 9 in the direction of Moscow - Volgograd - Astrakhan with access to the Caspian Sea, which meets Russia's interests in the field of international transit.

Globalization in the 21st century has become an integral regional part of the economic and socio-cultural life of the entire world community. In the context of globalization, transport is the most important lever of integration processes.

The Russian Federation has a huge transport potential and is able to realize the national transit resource and the needs of Eurasian countries in the transport of goods and passengers by any kind of message: having a developed system of seaports (Baltic Sea Port, Caspian Sea Port, Azov-Black Sea Basin, Far Eastern and Northern Basins), having a developed network of railways and inland shipping

routes, there is also a long road network and a developed system of international airports on the territory of Russia including air routes over the entire country.

In the long run, it is assumed that transport infrastructure, population and cargo mobility will grow at a faster pace than GDP growth.

Automobile transport, in market conditions, is the most widespread mode of transport for the transport of passengers and goods. Analysis of the structure of the market for commercial freight traffic in Russia showed that more than 50% is accounted for by road transport [1, 3]. In terms of freight traffic, road transport accounts for 68.1% of the Russian cargo turnover market. The revenue of the largest freight forwarding companies in Russia operating in the segment of road freight transport is more than $ 1.5 billion, the value of commercial road freight is $ 1 trillion. Doll.; the share of commercial freight transportation in the total freight transportation by road in 2030. It should double and reach 60-70%.

Of great importance in modern conditions of development of Russia is the expansion and deepening of international cooperation. Russia, according to the Ministry of Transport of Russia, taking a more active part in the creation of an international transport system, will be able to provide revenue growth for transport enterprises and transport operators by 2020 in the amount of up to $ 15 billion a year. Characteristics and indicators of the market for international road transport of goods are presented in Table 1 [4].

Table 1 - *Characteristics of the state of the Russian market for international road transport of goods (IRTG)*

№	Name of the indicator	Показатель
11	Share in the country's foreign trade	26%
22.	Share in the foreign trade turnover of Russian trade with the CIS countries	20%
33	Market volume	$ 7 billion
44	The cost of foreign trade goods	$ 130 billion in year
55.	The share of Russian international road carriers in the maintenance of foreign trade turnover of the Russian Federation	40% of the total traffic
66	Number of carriers in IRTG	more than 9 thousand
77.	The number of carriers that are members of ASMAP	more than 4.5 thousand
88.	Number of people employed in the IRTG sector	More than 200 thousand people.
99.	Share in the total volume of cargo transportation by road	40%
10.	The average annual income of the transport company from the provision of services for the delivery of goods in international traffic (for 1 road train)	80 000 Euro
111.	Ummah of tax payments internal, paid by the ATO IRTG per 1 road train per year	more than 250 thousand rubles
112.	Foreign currency receipts to various budgets of the Russian Federation per year	more than $ 300 million
113.	The average cost of foreign trade goods transported in the country by road	1500 dollars for 1 ton

The geopolitical position of Russia between the two dynamically developing world poles of business activity - Europe and Asia, predetermines its special role in ensuring Euro-Asian ties.

Based on objective assessments, Russia, with its special Eurasian geographical position, gigantic scale of the territory, an extensive coastline, overlooking three oceans, a multi-profile transport network, connected by its highways and waterways to regional transport networks of Europe, the Near and Middle East, Central Asia already represents a unique transport and distribution center of Eurasia.

At the same time, the pan-European international transport corridors that cover Central and Eastern Europe, which are part of the western (European) section of the Eurasian transport system, organically fit into the central (Russian) Eurasian part of the mainland transport system. Similarly, they fit organically into the border transport space of Russia and its neighboring Asian countries. [5].

By virtue of its rapid development, China, with the proper formulation of the case, is becoming one of the main and optimal partners for Eastern Siberia and the

Far East. At the same time, cooperation can develop in many areas, including fuel and energy, infrastructure and transit. And the international transport corridor of the ITC "West-East" should play an important role in the development of transport and logistics cooperation between the regions of Siberia and the Far East and the northeast provinces of the PRC. Before the collapse of the USSR, the northern corridor of the Trans-Asian Railway (hereinafter - TAR) was considered as an additional branch of the Trans-Siberian Railway. And today Transsib and TAR simultaneously compete and complement each other. The route of the northern corridor TAR, connecting East Asia through the territory of Kazakhstan, Russia, Ukraine / Belarus with Western Europe and Eurasian, has a length of about 11 thousand km. The corridor runs from the Chinese port of Lianyungang to the European port of Rotterdam.

For transportation of goods along the northern TAR corridor through the territories of Kazakhstan and Russia, Transsib is used. The Trans-Siberian Railway can also be used to transport cargo from Russian Far Eastern ports to the countries of Central Asia, but for this it is necessary to solve several problems: to simplify customs procedures and increase capacity. Because of these problems, many deliveries to the Urals are carried out by the Chinese side through Finland and Germany. In the strategic plan of Russia, it is advantageous for Chinese goods to go along the Trans-Siberian Railway and transship in the new port in the Crimea or Novorossiysk.

ITC North-South can be demanded for transportation of goods from Asia to Europe and for serving regional cargo traffic. The prospective volume of cargo transportation by 2018. The estimated amount is 25-26 million tons.

Theoretical, methodological and applied aspects of analyzing the role of transport corridors in modern world politics set Russia the task of developing specialized approaches to the development of international cooperation in this area and, above all, developing a developed position on ITC passing through its territory. Based on international experience, the effectiveness of Russian approaches will be determined by the art of combining medium-term and long-term goals of increasing the level of national security and competitiveness of the country's economy.

“Silk Road” as a historical and actual definition of a route connecting East Asia with the Mediterranean, is widely known in modern discourse. It is an attempt to establish direct communication between Europe, the Caucasus and Asia.

China is increasingly developing its transport corridor project through the Central Asian region. The beginning of this project is considered to be the opening in 1992 of the development of traffic along the Trans-China Route (Lianyungang-Rotterdam), which is called the “Eurasian Transcontinental Bridge”. The total length of the route is 10,800 km, which is 1,300 km shorter than Transsib. The highway starts at the Chinese port of Lianyungang and through the border cross-

ing Alashankou-Friendship passes through the territory of Kazakhstan. Further, through the territory of Russia, it goes to Europe. The most serious competitor to Transsib is the Trans-Asian Mainline. However, due to the lack of transport rail networks in China, this route may be overloaded with Chinese goods.

At present, China is becoming more and more one of the most significant trading partners and investors for the countries of Central Asia.

The Chinese project, the Silk Road Economic Belt, geographically encompassing Central Asia, South Asia and West Asia, can be viewed as a competitor to the Eurasian Economic Union.

To organize a new trade corridor between transport China and Europe, Prime Minister L. Keqiang visited Bucharest at the end of November 2013, where he met with representatives of Central and Eastern Europe. Following the negotiations, a program was signed between the countries. Chinese companies have already begun to invest in the railway between Hungary and Serbia, which will connect the capitals of these countries. The speed of movement of trains in some sections will reach 300 km / h. In addition, L. Keqiang announced the joint construction of large objects in Romania. In addition to Europe, China intends to improve trade relations with the SCO member states.

China is increasingly discussing the creation of the transcontinental Eurasia highway, most of which will pass through the territory of Kazakhstan, bypassing Russia. Such a highway becomes a serious competitor to the Trans-Siberian Railway. Eurasia can become the main transport corridor for the movement of goods from China to Russia and further to Europe. Russia and the PRC are competitors both in the APR and in Central Asia. The project to create the Silk Road Economic Belt allows China to solve two problems at once - to strengthen the Chinese Eurasian position in Central Asia and create its own trans-Eurasian transport corridor.

A $ 40 billion Silk Road Fund has been established as a financial platform for the project with a focus on infrastructure investments. The founders of the fund are the Central Bank of China (65%), China Investment Corporation (15%), Export-Import Bank of China (15%), China Development Bank (5%). The Fund operates in accordance with Chinese law, foreign investors may participate in its projects. The Asian Infrastructure Investment Bank ($ 100 billion) and the Bank of BRICS (potentially $ 100 billion) can also be attracted to finance projects.

It is planned to create a fund to support enterprises, which will export Chinese industrial goods along the Silk Road. The Chinese Investment Corporation will create a mechanism to support more than 40 billion dollars. It is planned to adapt the China Development Bank, Exim Bank of China and the Agricultural Bank of China for deeper participation in the project. Individual provinces can also create funds to support provincial companies involved in the project or using its infrastructure [8].

The railway industry has been selected as the main export industry, which can become the engine of China's economic development. As in the case of the Japanese concept of "Flying Geese", Chinese railways will be followed by hardware, software, engineering and other service providers, as well as banks, insurance and other companies. It is planned that the construction of conventional and high-speed railways abroad will load excess capacity, give impetus to the development of high-tech production, will increase the demand for Chinese industrial products, software, engineering services, service, etc. for a long time to come. To implement large-scale projects and increase competitiveness in foreign markets, in 2014, two Chinese railway corporations China CNR Corporation Ltd. merged. and CSR Corporation Ltd [10].

The Silk Road Economic Belt is a non-institutionalized process aimed at achieving the following objectives:

- supporting the economic development of the inner regions of China (first of all, the Xinjiang Uygur Autonomous Region and Inner Mongolia);
- creating a market for Chinese goods;
- support the expansion of Chinese capital in the countries of Central Asia, Central and Eastern Europe, and Transcaucasia, ensuring the demand for overcapacity products outside China;
- an increase in the production of high-tech products by the national segment of the Chinese economy and an increase in its share in the total volume of Chinese exports.

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评估轮对轮直径差对汽车安全性的影响
EVALUATION OF THE INFLUENCE OF THE DIAMETER DIFFERENCE OF THE WHEEL PAIR WHEELS ON THE SAFETY OF THE CAR

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注解。 该工作致力于研究测量仪宽度对货车运动安全参数和轮轨系统磨损特性的影响。 通过多变量计算机模拟生成，评估车轮直径差异对车轮对的轴线对交通安全的影响。 根据建模数据分析的结果，获得了根据车轮直径和标距宽度的差异的安全运动速度范围，这将有可能提供关于货物运行齿轮内容标准的建议。 汽车。

关键词：货车，脱轨安全性，数学模型，标距宽度，“车轮 - 轨道”系统

Annotation. *The work is devoted to the study of the influence of the width of the gauge on the safety parameters of the movement of a freight car and the characteristics of wear in the wheel-rail system. Produced by multivariate computer simulation with an assessment of the influence of the difference in the diameter of the wheels on the same axis of the wheel pair of the car on traffic safety. According to the results of the analysis of modeling data, the ranges of safe speeds of movement depending on the difference in wheel diameters and gauge width were obtained, which will make it possible to offer recommendations on the standards for the contents of running gears of freight cars.*

Keywords**:** *freight wagon, derailment security, mathematical model, gauge width, «wheel -rail» system*

Introduction.

The choice of a rational track gauge in straight and curved sections of the track, as well as broadening in steep curves, is largely determined by the conflicting requirements of ensuring traffic safety and reducing wear on wheel tires [1]. Computer modeling of complex interaction processes in curves and straight sections

of the route of empty and loaded freight cars with various deviations of the technical contents of their running gears allows determining the main parameters of interaction [2]. As the main indicator for assessing the safety of movement can be used the value of the stability of the wheel against the derailment of the rail [3].

1. Parameters and conditions for numerical computer simulation experiments.

The objects of modeling were an empty tank wagon and a tank wagon loaded to full capacity. All cars are installed on trolleys model 18-100. The initial wear state of the crew chassis was assumed to be network average.

Railway factors:

- track gauge: calculations were carried out at the gauges in the straight line - 1510, 1520 and 1530 mm; in the curve of the radius of 650 m - 1520, 1530 and 1540 mm, in the curve of the radius of 350 m - 1530, 1540 and 1550 mm;
- movement speed: in a straight line - up to 120 km/h; in a curve of radius of 350 meters - up to 60 km/h; in a curve of radius 650m - up to 90 km/h;
- Unevenness of the track in the study of the safety of the movement of empty cars: an unfavorable combination of single local deterministic vertical and horizontal irregularities of railroad threads in accordance with РД 32.68-96;
- coefficients of sliding friction in the wheel-rail contacts are assumed to be 0.25.

The permissible standard value of the difference in wheel diameters on one axle of the wheel set for a model 18-100 bogie when released from depot repair is 1 mm. In the study, the difference in wheel diameters on each axle varies in an unfavorable ratio with respect to the direction of the curve for all wheelsets of the examined car from 0 to 10 mm with a step of 1 mm.

It is necessary to determine the maximum permissible normative value of the difference of the wheels on one axis of the wheel pair in operation on the road network.

2. Assessment of the dynamic characteristics of the loaded tank

An example of the calculation of the dependence of the minimum value of the wheel safety factors of stability against derailment from the difference in wheel diameters when moving in straight sections of track with a track width of 1510, 1520 and 1530 mm with a difference in wheel diameters from 0 to 10 mm with speeds of 40-120 km/h is shown in Figure 1 and Table 1.

Analysis of the obtained data on the factor of stability of wheels for a loaded tank showed that:

- in straight sections of the track with a track width of 1510, 1520 and 1530 mm with a difference in wheel diameters from 0 to 10 mm, driving safety is ensured in the speed range up to 110 km/h;
- in curves of a radius of 350 m with an elevation of 100 mm with a track width of 1530, 1540 and 1550 mm with a difference in wheel diameters from 0 to 10 mm, traffic safety is ensured throughout the entire speed range;
- in curves of radius 650m with an elevation of 100 mm with a track width of 1520, 1530 and 1540 mm with a difference in wheel diameters from 0 to 10 mm, traffic safety is ensured in the speed range up to 110 km/h.

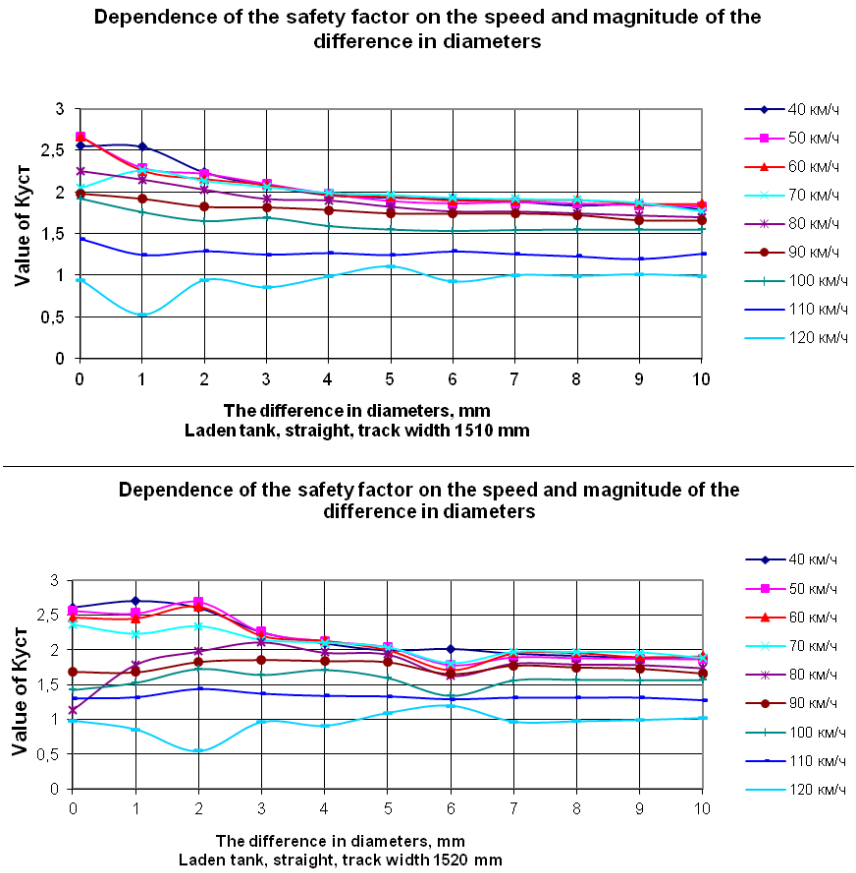


Fig. 1. *The dependence of the minimum value of the safety factors of wheel stability against derailing from the difference in wheel diameters (straight, loaded)*

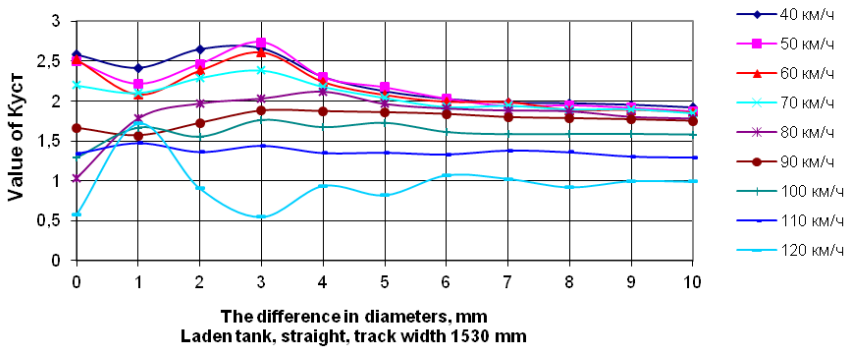


Table 1 *– Laden tank, straight track width 1510 mm:*

Speed, km/h	Wheel diameter difference										
	0 mm	**1mm**	**2mm**	**3mm**	**4mm**	**5mm**	**6mm**	**7mm**	**8mm**	**9mm**	**10mm**
40	2.55	2.55	2.24	2.08	1.96	1.93	1.92	1.89	1.84	1.86	1.79
50	2.66	2.29	2.22	2.09	1.98	1.89	1.86	1.88	1.86	1.84	1.82
60	2.66	2.26	2.16	2.09	1.97	1.95	1.9	1.9	1.91	1.86	1.86
70	2.05	2.26	2.13	2.06	1.99	1.97	1.93	1.92	1.91	1.87	1.77
80	2.25	2.15	2.03	1.92	1.9	1.82	1.77	1.77	1.74	1.72	1.7
90	1.98	1.92	1.82	1.81	1.78	1.74	1.74	1.74	1.72	1.66	1.66
100	1.92	1.76	1.65	1.69	1.59	1.55	1.53	1.55	1.55	1.55	1.55
110	1.44	1.25	1.29	1.25	1.27	1.25	1.29	1.26	1.23	1.2	1.26
120	**0.94**	**0.53**	**0.94**	**0.85**	**0.99**	1.1	**0.92**	**1**	**0.99**	1.01	**0.99**

track width 1520 mm:

Speed, km/h	Wheel diameter difference										
	0 mm	**1mm**	**2mm**	**3mm**	**4mm**	**5mm**	**6mm**	**7mm**	**8mm**	**9mm**	**10mm**
40	2.61	2.7	2.6	2.25	2.09	1.99	2.01	1.94	1.91	1.89	1.9
50	2.56	2.53	2.69	2.26	2.13	2.04	1.79	1.9	1.89	1.87	1.87
60	2.46	2.45	2.62	2.2	2.13	2	1.71	1.95	1.96	1.9	1.91
70	2.36	2.23	2.34	2.14	2.1	2.03	1.8	1.96	1.96	1.96	1.88
80	1.14	1.79	1.98	2.11	1.96	1.94	1.63	1.81	1.79	1.78	1.74
90	1.69	1.68	1.82	1.85	1.84	1.82	1.66	1.77	1.75	1.73	1.66
100	1.42	1.53	1.72	1.64	1.71	1.59	1.34	1.56	1.57	1.56	1.57
110	1.3	1.32	1.44	1.37	1.34	1.33	1.29	1.31	1.31	1.31	1.27
120	**0.98**	**0.86**	**0.55**	**0.96**	**0.91**	1.09	1.19	**0.97**	**0.97**	**0.99**	1.02

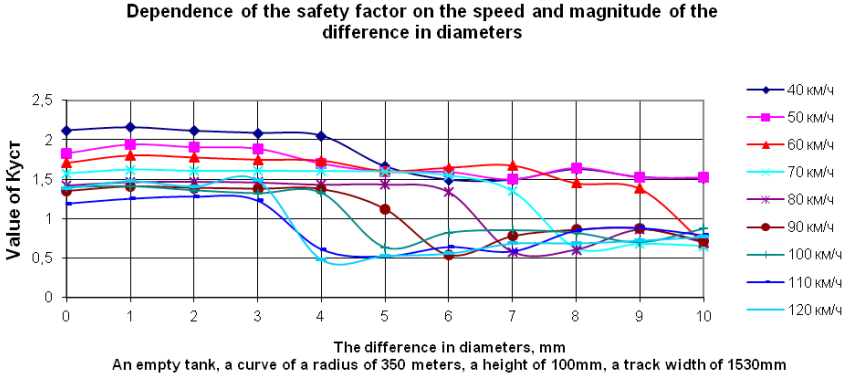
track width 1530 mm:

Speed, km/h	Wheel diameter difference										
	0 mm	**1mm**	**2mm**	**3mm**	**4mm**	**5mm**	**6mm**	**7mm**	**8mm**	**9mm**	**10mm**
40	2.58	2.42	2.65	2.66	2.3	2.12	2.02	1.98	1.97	1.95	1.92
50	2.5	2.22	2.47	2.74	2.3	2.17	2.03	1.94	1.95	1.92	1.87
60	2.52	2.08	2.39	2.62	2.24	2.08	1.99	1.99	1.89	1.89	1.85
70	2.2	2.1	2.29	2.39	2.18	2.04	1.93	1.94	1.9	1.9	1.85
80	1.03	1.79	1.97	2.04	2.12	1.97	1.91	1.89	1.88	1.81	1.78
90	1.66	1.57	1.73	1.88	1.87	1.86	1.84	1.8	1.79	1.77	1.75
100	1.29	1.67	1.55	1.76	1.67	1.73	1.61	1.58	1.59	1.59	1.58
110	1.34	1.48	1.36	1.44	1.35	1.36	1.33	1.38	1.36	1.31	1.29
120	**0.58***	1.72	**0.91**	**0.55**	**0.94**	**0.82**	1.07	1.03	**0.92**	**1**	**0.99**

* - danger of vanishing ($K_y \leq 1$) at 120 km/h, in bold are indicated data at which there is a danger of vanishing or recorded exceeding the permissible values of the parameters.

3. Evaluation of the dynamic characteristics of an empty tank.

An example of the calculation of the dependence of the minimum value of the wheel safety factors of stability against derailment from the difference in wheel diameters when moving in curves of a radius of 350 m with an elevation of 100 mm with a track width of 1530, 1540 and 1550 mm is shown in Figure 2 and Table 2.



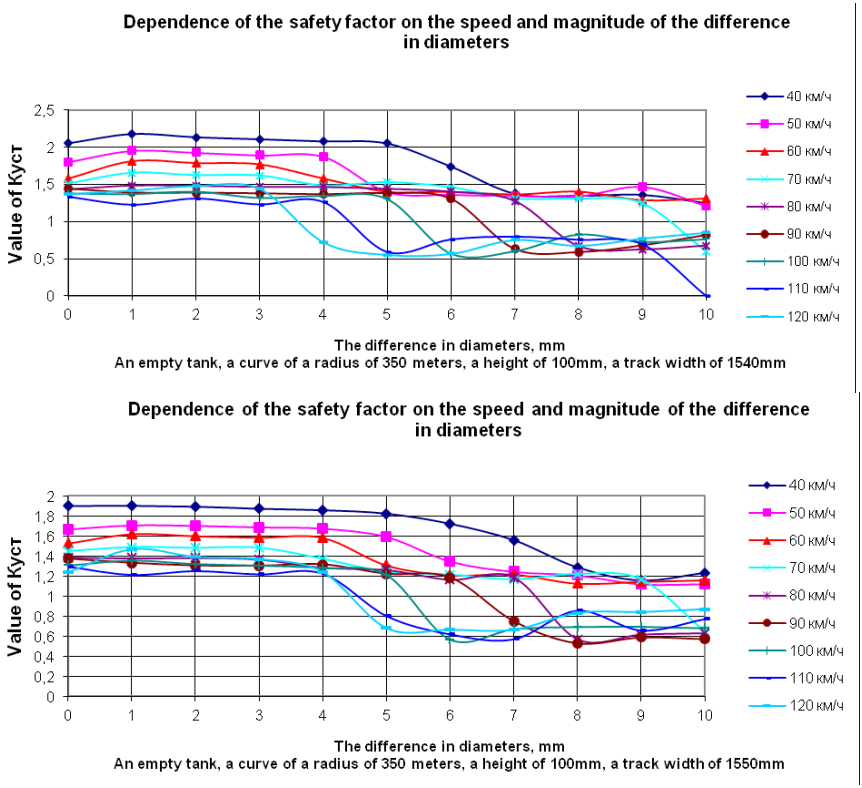


Fig. 2. *The dependence of the minimum value of the safety factors of wheel stability against derailment on the difference in wheel diameters (curve radius 350 m, empty)*

Table 2 - *Empty tank, 350 meter radius curve track width 1530 mm*

Speed, km/h	Wheel diameter difference										
	0 mm	1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm
40	2.12	2.16	2.11	2.09	2.05	1.66	1.49	1.49	1.63	1.53	1.51
50	1.83	1.94	1.91	1.89	1.7	1.6	1.59	1.5	1.64	1.53	1.52
60	1.71	1.8	1.78	1.75	1.74	1.61	1.65	1.67	1.45	**1.38**	**0.69**
70	1.57	1.62	1.61	1.61	1.6	1.6	1.55	1.35	**0.62**	**0.68**	**0.65**
80	1.42	1.47	1.47	1.46	1.43	1.44	1.34	**0.58**	**0.6**	**0.86**	**0.7**
90	1.35	1.4	1.39	1.38	1.37	1.12	**0.54**	**0.78**	**0.86**	**0.88**	**0.72**
100	1.4	1.41	1.36	1.32	1.32	**0.64**	**0.82**	**0.85**	0.82	0.7	**0.87**
110	1.19	1.26	1.28	1.23	**0.61**	**0.52**	**0.64**	**0.59**	**0.85**	**0.88**	**0.79**
120	1.39	1.48	1.41	1.49	**0.48**	**0.53**	**0.56**	**0.69**	**0.69**	**0.72**	**0.77**

track width 1540 mm

Speed, km/h	Wheel diameter difference										
	0 mm	**1mm**	**2mm**	**3mm**	**4mm**	**5mm**	**6mm**	**7mm**	**8mm**	**9mm**	**10mm**
40	2.05	2.18	2.13	2.11	2.08	2.05	1.74	1.38	1.35	1.36	1.25
50	1.8	1.95	1.93	1.89	1.87	1.4	1.36	1.34	1.34	1.47	1.21
60	1.58	1.81	1.79	1.77	1.58	1.4	1.4	1.36	1.4	1.28	1.31
70	1.51	1.65	1.62	1.62	1.48	1.53	1.46	1.31	1.31	1.25	**0.6**
80	1.43	1.48	1.48	1.47	1.47	1.44	1.4	1.28	**0.67**	**0.62**	**0.68**
90	1.44	1.39	1.39	1.38	1.36	1.38	1.3	**0.63**	**0.59**	**0.68**	**0.82**
100	1.38	1.37	1.4	1.32	1.35	1.3	**0.57**	**0.6**	**0.83**	**0.73**	**0.76**
110	1.33	1.23	1.31	1.23	**1.26**	**0.59**	**0.76**	**0.8**	**0.75**	**0.69**	**0**
120	1.37	1.42	1.48	1.44	**0.72**	**0.55**	**0.57**	**0.75**	**0.68**	**0.77**	**0.85**

track width 1550 mm

Speed, km/h	Wheel diameter difference										
	0 mm	**1mm**	**2mm**	**3mm**	**4mm**	**5mm**	**6mm**	**7mm**	**8mm**	**9mm**	**10mm**
40	1.9	1.9	1.9	1.87	1.86	1.83	1.72	1.56	1.28	1.15	1.23
50	1.67	1.71	1.7	1.69	1.67	1.59	1.35	1.25	1.21	1.12	1.12
60	1.53	1.62	1.6	1.58	1.58	1.31	1.21	1.22	1.13	1.14	1.16
70	1.45	1.49	1.48	1.48	1.37	1.24	1.21	1.17	1.22	1.17	**0.65**
80	1.39	1.38	1.38	1.37	1.29	1.26	1.17	1.19	**0.57**	**0.62**	**0.63**
90	1.37	1.33	1.3	1.3	1.32	1.22	1.19	**0.75**	**0.53**	**0.59**	**0.58**
100	1.31	1.36	1.32	1.31	1.28	1.21	**0.57**	**0.67**	**0.7**	**0.7**	**0.68**
110	1.3	1.21	1.25	1.22	1.23	**0.8**	**0.62**	**0.57**	**0.86**	**0.66**	**0.77**
120	1.24	1.47	1.39	1.37	1.24	**0.68**	**0.67**	**0.67**	**0.83**	**0.84**	0.87

* - жирным шрифтом обозначены данные, при которых есть опасность схода $K_y \leq 1$; подчеркнутым шрифтом обозначены данные, при которых зафиксировано превышение допустимых значений параметров $1 \leq K_y \leq 1{,}2$.

Analysis of data on the wheel safety factor shows that for an empty tank with a difference in wheel diameters from 0 to 9 mm in curves of a radius of 350 m with an elevation of 100 mm with a track width of 1530 mm, 1540 mm and 1550 mm, driving safety is ensured at once in the speed range up to 60 km/h. At a speed of 60 km/h with a track width of 1550 mm, the stability margin is below the allowable value of 1.2 when the difference in diameters is more than 7 mm, and at speeds of 40-50 km/h - more than 8 mm.

Results and discussion.

1. In straight sections of the track with a track width of 1510 mm with a difference in wheel diameters from 0 to 10 mm, traffic safety is ensured throughout the entire range of operating speeds. With a track width of 1520 mm at speeds up to 50 km/h - with a difference in wheel diameters from 0 to 10 mm, at speeds up to 60 km/h - up to 8 mm, at speeds up to 70 km/h - up to 6 mm, at speeds up to 80 km / - up to 5mm, at maximum operating speeds up to 90 km/h - up to 4 mm. Moreover, at a speed of 90 km/h, the stability margin is below the allowable value Ku = 1.2 when the difference in diameters is 0 ... 1 mm. With a track width of 1530 mm, driving safety at once at operating speeds of up to 90 km/h is ensured when the difference in diameters is up to 5 mm, at speeds of up to 80 km/h - up to 6 mm, 70 km/h - up to 7 mm. Moreover, at a speed of 90 km/h, the stability margin is below the allowable value of 1.2 when the difference in wheel diameters is 0 mm, 2 mm and 5 ... 10 mm, at a speed of 80 km/h - 2 mm.

2. In curves of a radius of 350 m with an elevation of 100 mm with a track width of 1530 mm, 1540 mm and 1550 mm, driving safety is ensured in the speed range up to 60 km/h with a difference in wheel diameters from 0 to 9 mm. Moreover, at a speed of 60 km/h with a track width of 1,550 mm, the stability margin is below the allowable value Ku = 1.2 with a difference in diameters of more than 7 mm, and at speeds of 40 ... 50 km/h - more than 8 mm.

3. In curves of a radius of 650 m with an elevation of 100 mm with a track width of 1520 mm and 1530 mm with a difference in wheel diameters from 0 to 10 mm, the safety of movement along the rails is provided in the speed range up to 50 km/h, with a track width of 1540 mm - up to 60km/h To ensure safety in the range of operating speeds up to 90 km/h with a track width of 1520 mm, 1530 mm and 1540 mm, the difference in wheel diameters should not exceed 4 mm. Moreover, with a track width of 1520 mm - 4 mm, with a track width of 1530 mm - 5 mm, with a track width of 1540 mm - 6 mm.

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从具有高含量粘土组分的矿石中提取金的前瞻性方向

PROSPECTIVE DIRECTIONS FOR THE EXTRACTION OF GOLD FROM ORES WITH A HIGH CONTENT OF CLAY COMPONENTS

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注解。本文研究了东西伯利亚一个矿床风化壳的耐火含金矿石的材料和矿物组成。据透露，根据结构和结构特征，矿石是多矿物的，并且在碎屑，颗粒材料和松散组分的组成方面具有显着差异。所有矿石都被铁氢氧化物和褐铁矿壳与粘土组分饱和。分析结果表明，大类含有微量的有价值成分。从-4 + 0mm尺寸开始注意到增加的金含量。在自由状态下约为3-5%。加工这些类型的原材料是一项相当复杂的任务。对富集方法的分析表明，使用贵金属的新溶剂及其随后的浓度是有希望的。实际感兴趣的是通过将硫溶解在氢氧化钙的水悬浮液中而获得的碱性溶液。该试剂无毒，环保。浸出在各种浓度的所用溶剂中进行。用于将有价值组分提取到滤液中的最佳溶剂浓度和浸出过程的持续时间确定为97-98％。蛋糕的化学分析表明，试剂不会与构成矿石的其他元素发生化学相互作用。转储饼中的元素硫含量平均为0.64％，也就是说，它相当于原料中的含量高达0.8％。同时，蛋糕对环境无害，可以存放在特殊的平台上。

关键词：含金，矿石，研究，金，溶剂，分析，粘土物质，大小，种类，浓度，氢氧化钙，硫，蛋糕，提取，最佳条件。

Annotation. *The article studies the material and mineralogical composition of the refractory gold-bearing ores of the weathering crust of one of the deposits in Eastern Siberia. It is revealed that, according to the textural and structural features, ores are multi-mineral and have significant differences in the composition of the detrital, granular material and the loose component. All ore is saturated with iron hydroxides and limonite crusts with clay components. The results of the analysis showed that large classes contain an insignificant amount of a valuable component. Increased gold content is noted starting from -4 + 0 mm size. In the free state are about 3-5%. Processing of these types of raw materials*

is a rather complicated task. Analysis of the enrichment methods showed that the use of new solvents of noble metals with their subsequent concentration is promising. Of practical interest are alkaline solutions obtained by dissolving sulfur in an aqueous suspension of calcium hydroxide. The reagent is non-toxic and environmentally friendly. Leaching was carried out in a wide range of concentrations of the solvent used. The optimum solvent concentrations and the duration of the leaching process for extracting the valuable component into the filtrate were determined to be 97–98%. Chemical analysis of cakes showed that the reagent does not enter into chemical interaction with other elements that make up the ore. As well as the content of elemental sulfur in dump cakes averages 0.64%, that is, it corresponds to a content in the raw material of up to 0.8%. At the same time, cakes are not environmentally harmful and can be stored on special platforms.

Keywords*: gold-bearing, ore, research, gold, solvents, analysis, clay substance, size, classes, concentration, calcium hydroxide, sulfur, cakes, extraction, optimal conditions.*

The main source of gold production is the primary gold-bearing ores, which are divided into oxidized and sulphide ores. For these types of ores, independent technological processing processes are formed, in particular, oxidized ores are processed by gold leaching with cyanic aqueous media, followed by sorption by sorbents. Oxidized quartz and sulphide ores are enriched by gravity and flotation methods with the production of appropriate concentrates suitable for further processing in the metallurgical process.

Recently, due to the depletion of rich and easily-rich gold-bearing ores, there have been trends in the development of technological schemes for the processing of mineral raw materials and the commissioning of new deposits with refractory ores with a finely dispersed phase and a low content of valuable components, as well as a high content of clay components.

The purpose of these studies is the development of technology for processing these types of ores and its introduction into operation in the existing areas of the processing plants. In this regard, the study presents the ore from one of the fields in Eastern Siberia. The analysis of methods for enrichment of these types of ores revealed the advantages of using the most promising effective solvents of noble metals with their subsequent leaching [The purpose of these studies is the development of technology for processing these types of ores and its introduction into operation in the existing areas of the processing plants. In this regard, the study presents the ore from one of the fields in Eastern Siberia. The analysis of methods for enrichment of these types of ores revealed the advantages of using the most promising effective solvents of noble metals with their subsequent leaching [1].

Gold ores presented for the study are colored brownish-gray in color and con-

sist of fragments of rocks and minerals (~ 70%) and a sandy-clay component (~ 30%). The structure of the ore is determined by the size of detrital grains - from coarse-grained (debris size from 2 to 85-100 mm) to pelitic (<0.01 mm), there are also fragments of psamlita and aleuritic structures (with fragments from 1-2 mm to 0.01 mm).

Fragments of rocks are mainly represented by quartzites (18–70 mm), marbled limestones (30–50 mm and core fragments 86 mm), weathered sandstones and shale (1-2 mm to 3 42 mm), single fragments of amphibolites and granites (24-32 mm), large pebbles of limonite (86 mm) and small (23 mm) of its nodules, small pebbles of goethite (~ 10 mm) and rounded fragments of quartz of a granular structure (42 mm).

The composition of the multi-mineral ore. It contains the minerals quartz: plagioclase, potassium feldspar, limonite, hornblende, biotite, muscovite, ilmenite, pranate, tourmaline, zircon, apatite, genite, finely dispersed clay matter.

As a result of selective weathering from the surface, debris is predominantly weathered with an abundance of cells, grooves, pores filled with clay. All ore is impregnated with iron hydroxides, especially the clay part.

Clay with a particle size of 0.01-0.001 mm was analyzed by thermal method. The analysis of the thermogram shows that the bulk of the clays according to the composition is kaolin-hydromica with the presence of 0.5-1% impurity of quartz and calcite, as well as iron hydroxides.

Scintillation analysis of clay shows that the maximum amount of gold is at the first level of discrimination, i.e. gold size ranges from 3 to 15 mm.

Chemical analysis of gold-containing ores showed an increased content of silicates (SiO2 up to 66-81%), aluminum oxide (Al2O3-11.5%), iron oxide (Fe2O3-12.5%), and also K2O-2%, Na2O-0,9%.

Spectral analysis of impurity elements indicates their insignificant content.

From the jointly encountered impurities, their content does not exceed: MnO-0.09%, Mg-1.14%. Gold content averages up to 3 g / t.

The granulometric analysis of the source ores showed that the content of coarse material, represented by a set of different rocks, is 25% of the class -60 + 4 mm, with an average gold content of 0.009 g / t. In the granular part of the 40% grade -4 + 0.074 mm with an average gold grade of 0.2 g / t. The highest content of clay components is up to 35%, the gold content is on average up to 2.8 g / t.

The results of the sieve analysis show that large classes contain an insignificant amount of a valuable component in the granular material, starting with a grain size of 4 mm, the gold content increases. Increased gold content is noted in the grade -0.074 + 0 mm.

On the basis of the obtained results of material, particle-size and chemical analyzes of gold-bearing sands, it was established that gold is closely associated

with all the minerals represented by the fine phase. It is covered with a film of iron hydroxides, limonite crusts, and also cemented by limonite and clay components. About 3-5% of gold is in the free state, in the finely dispersed state it is mainly concentrated in small classes - 0.074 + 0 mm. Extraction of gold from these types of raw materials is a rather complicated task of [2].

The analysis of the enrichment of these types of gold-bearing raw materials showed that the most promising is the use of effective solvents of noble metals, followed by their concentration.

In world practice, cyanide compounds are used to isolate noble metals. But there are clay refractory ores that are practically not amenable to cyanidation.

Alternative cyanide compounds reagents, well proven in the extraction of gold, are used only on a pilot scale. The main advantages of cyanide compounds over other gold solvents are high selectivity with respect to noble metals, low consumption of reagents, high recovery of gold into the solution and its subsequent isolation from cyanide solutions, low corrosivity of the medium.

With undoubted advantages, the cyanation process is characterized by significant drawbacks. The main technological disadvantage of the cyanide process is its high leaching time. From the point of view of ecology, the disadvantages include the extremely high toxicity of cyanides of alkali metals, belonging to substances of the first class of hazard, and products of their interaction with ores. For a number of gold-producing regions, the high costs of environmental measures make the development of promising deposits unpromising. The problem of decontamination of wastewater processing plants is not fully resolved [3].

At present, a sufficiently wide range of solvents has been identified, which are considered as an alternative to cyanide salts in the processes of extracting gold from ore raw materials.

The search for and evaluation of noble metal solvents is made not only for environmental reasons, but also pursues other goals, for example, the possibility of processing gold-bearing ores that are difficult to leach to cyanide. In relation to this type of ore of interest is lime-sulfur reagent. The reagent is non-toxic and environmentally friendly. Alkaline solutions are formed by the interaction of elemental sulfur with solutions of various hydroxides. These are multicomponent systems containing mono- and polysulfides in various ratios, metal thiosulfates, and free alkali. In the interaction of elemental sulfur with an aqueous suspension of calcium hydroxide, lime-sulfur decoction is formed. It is a cherry-red liquid containing hydrosulfide ion (HS^-), thiosulfate ion S_2O_3 polysulfide Sn^{2-}.

Sulfur and calcium hydroxide concentrations ranged from 25–200 g / l sulfur and from 50–200 g / l $Ca(OH)^2$. The leaching process was carried out at room temperature for 24 hours at a ratio T:Ж = 1:3 in bottle-type agitators. Class -4 + 0.074 mm was crushed to a particle size of -0.074 + 0 mm and combined with small classes of the original ore.

The results of the studies showed that the dissolution of gold with a alkaline solution proceeds over the entire range of concentrations of sulfur and calcium hydroxide. The optimal composition of this solvent is the concentration of sulfur from

50-100 g / l, calcium hydroxide from 100-200 g / l, depending on the composition of the processed raw materials. The duration of leaching ranged from 5-7 hours. With the increase in the duration of the process, the extraction efficiency of gold has not changed. The residual gold content in the cakes was 0.0006-0.001 g / t.

As studies have shown, with an increase in the alkali content in the serum alkaline solution, the extraction of gold in the filtrate decreases, since the concentration of the polysulfide ion Sn^{2-} and hydrosulfide ion HS^{-} decreases. With increasing sulfur concentration, the transition of gold into the filtrate also decreases, since in this case, along with polysulfide-Sn^{2-}, and hydrosulfide- HS-, thiosulfate- S_2O_3 ions, sulfate SO_4^{2-} and sulfide S^{2-} ions are formed, leading to the precipitation of slightly soluble sulfates and sulfides calcium.

Extraction of gold in the filtrate was 97-98%. Cakes were obtained with a residual gold content of up to 0.006-0.001 g / t.

Chemical analysis data on the material composition of cakes indicate the selective nature of the reagent's action on the original ore. The reagent dissolves the metal, without entering into chemical interaction with other elements in the original ore (sulfur, arsenic, titanium, etc.), which are transferred to dump cakes.

The analysis results show that with the content of elemental sulfur in the initial ore up to 0.8%, its content in dump cakes varies from 0.14 to 1.14%, averaging 0.64%, i.e. actually corresponds to the content in the feedstock.

From this it follows that in the leaching process there is no transfer of sulfur from the process reagent in the form of sulphate ions to dump cakes. Moreover, the cakes are not environmentally harmful and can be stored as substandard ores at specially prepared sites. According to the results of the research, the technological regulations for the extraction of gold from refractory ores have been drawn up [4].

Conclusion. The proposed gold leaching technology has an undoubted advantage over cyantechnology in both technological and environmental aspects, since it excludes such an element as storing and storing cyanide tails from the ore processing process, the need to develop special security measures when working with cyanides. In environmental terms, this technology is not dangerous to the environment and can be recommended for use in production.

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铁路轨道自动化

MACHINE LEARNING IN PROBLEMS OF AUTOMATION OF ULTRASOUND DIAGNOSTICS OF RAILWAY TRACKS

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注释。 本文代表了铁路轨迹缺陷图的实时解码。 该系统包括一组神经网络分类器，一个决策块。 已经发现可以完成该过程。 分类器建立在卷积神经网络上。 它可以有效地实现并行，包括张量处理器和GPU。

关键词：无损检测，神经网络，机器学习，运输安全

Annotation. *The article presents the system architecture for automatic decoding of railway track defectograms in real time. The system includes an ultrasound data preprocessing module, a set of neural network classifiers, a decision block. Preprocessing of data includes affine transformations of measurement information into a format suitable for the operation of a neural network, as well as a combination of information on measurement channels, depending on the type of defect being defined. The classifier is built on a convolutional neural network. The proposed solution can be effectively implemented on a modern elemental basis for performing parallel computing, including tensor processors and GPUs.*

Keywords: *non-destructive testing, neural networks, machine learning, transport safety*

Introduction

The increase in speed and intensity of movement of trains on the tracks, caused an increase in quality control requirements. At the same time, the time of the control, data processing, analysis and decision-making on the admission of the railway is reduced. Integrity monitoring includes the detection of any internal defects: cracks, voids, delamination, loss of integrity of connections, etc. It is crucial to prevent disasters and ensure the stability of rail transport.

In this regard, the development of automation systems, new models and meth-

ods for finding defects in real-time mode is relevant. One of the classic means of scanning railway rails is the use of ultrasound. Various methods are used to decipher ultrasonic defectograms of the rails. Starting from manual, methods based on the analysis of physical principles and ending with tools for analyzing various types of graphical presentation. This article discusses a method for analyzing and identifying defects using machine learning tools. A graphical representation of ultrasonic defectograms is considered as data for analysis.

Subject matter and system requirements

During the last 5 years, ultrasonic devices have appeared on the market that allow for high-speed testing of railway rails. Control systems include the detection and registration of defects in real time, as well as the complete recording of scanned data. These data can be used for periodic monitoring of the state of the railway, by identifying defects in the controlled object with the necessary accuracy and reliability.

With the manual method of decoding the visual appearance of defectograms obtained during ultrasound testing, experts are involved. In this case, the main disadvantages are the presence of factors that influence the results obtained. These factors can be: qualification, attentiveness, physical and mental state of a person, etc. Given the large volume and complexity of the visual presentation of data, manual processing performance is very low.

Moreover, in recent years, to facilitate the work of specialists, tools have been developed to facilitate the processing of large amounts of data, such as:

- data output in a convenient view.
- filtering noise signals, for a clearer visualization of areas that may contain defects.
- means of classification based on harsh conditions.

All these tools accelerate data processing, but in modern conditions do not meet the requirements:

- by definition time.
- by the percentage of defects detected.
- At the time of the decision.
- in automated systems, the presence of stringent conditions does not allow to determine all types of defects in the presence of various characteristics of defects.
- there is no possibility to conduct an analysis in the mode / speed of receipt of data from the flaw detector sensors.

These funds also do not allow for the full and for all identified and possible cases of comparative and periodic monitoring.

The level of development of machine learning systems, in particular, neural network algorithms and hardware, make it possible to organize their use for solv-

ing the above problem. Development of an automated identification system (AIS) based on a neural network, which will allow to solve the problem of identifying and classifying defects without imposing restrictions on the input data. Such a system allows to increase the efficiency of rail monitoring, to organize control in the mode of data entry into the system, as well as to increase the reliability and accuracy of the results obtained by minimizing the influence of subjective factors.

To achieve its goals, AIS must meet the following requirements:

- work with single-channel and multichannel ultrasound control systems;
- the ability to identify and classify all types of defects in the subject area;
- the computational complexity of the algorithms used should ensure that results are obtained in real time when implemented on modern hardware platforms (including parallel ones) with the speed of movement of scanning platforms up to 110 km/h;

System description

Scanning probes are located on a special mechanical skid on the front wheel pair (Fig. 1)

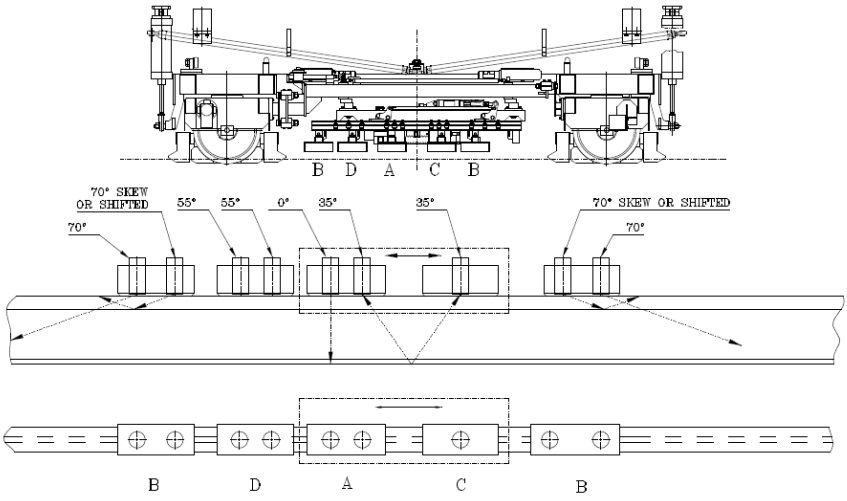

Fig.1 *Ultrasound diagnosis system*

When determining the location of the defect in the calculations, the position of each probe relative to the zero position of the system is taken. In this case, the angle of inclination of the sensor is not taken into account, therefore the indication of the depth of the defect and the real position along the scanning axes do not correspond to its actual location in the rail being diagnosed. This is done to simplify the identification of defects, as shown in Fig.2.

The indications existing in the railway can be divided into two large classes: technological and defects. To technological include: bolted joints, joints and welds. The defects are: horizontal crack of the rail head, delamination of the rail head, detachment of the rail bottom, cracks in the neck of the rail, emptiness in the weld, vertical crack of the rail, cracks in bolted joints (star cracks). Also, defects can be displaced not only in a vertical plane, but also have a horizontal displacement relative to the central axis in the rail head.

Each type of defect gives an indication not on all channels of the probes, but only at certain angles (Table 1). Using this feature allows you to combine information on the measuring channel in accordance with the type of defect, this can significantly reduce the amount of information supplied to the appropriate classifier and thereby significantly increase the overall speed of the system.

The proposed general scheme of the process of decoding a defectogram is shown in Fig.3. Its main stages are the stage of preliminary processing of ultrasound data, including sampling data from the sensors of the ultrasound system, bringing the amplitude values into a range and combining the data, as well as the stage of searching for defects and making a decision.

The stack of measurement information is used to select the source data. The data of each channel are recorded sequentially in the tensors of the same size.

In the next step, the data of individual channels that are included in the sample are combined into a single structure in accordance with Table 1, which can be used to search for signs of defects. Defects are searched for in parallel by specialized specialized classifiers.

Decisions of specialized classifiers are transmitted to the input of the decision-making module, which assesses the probability of correctness of decision making by the composition of classifiers, and in case of low level of confidence intervals, delegates this decision to an expert. The solutions specified by the expert are further used for the further training of neural networks of the classifier, thereby gradually improving the quality of the entire system.

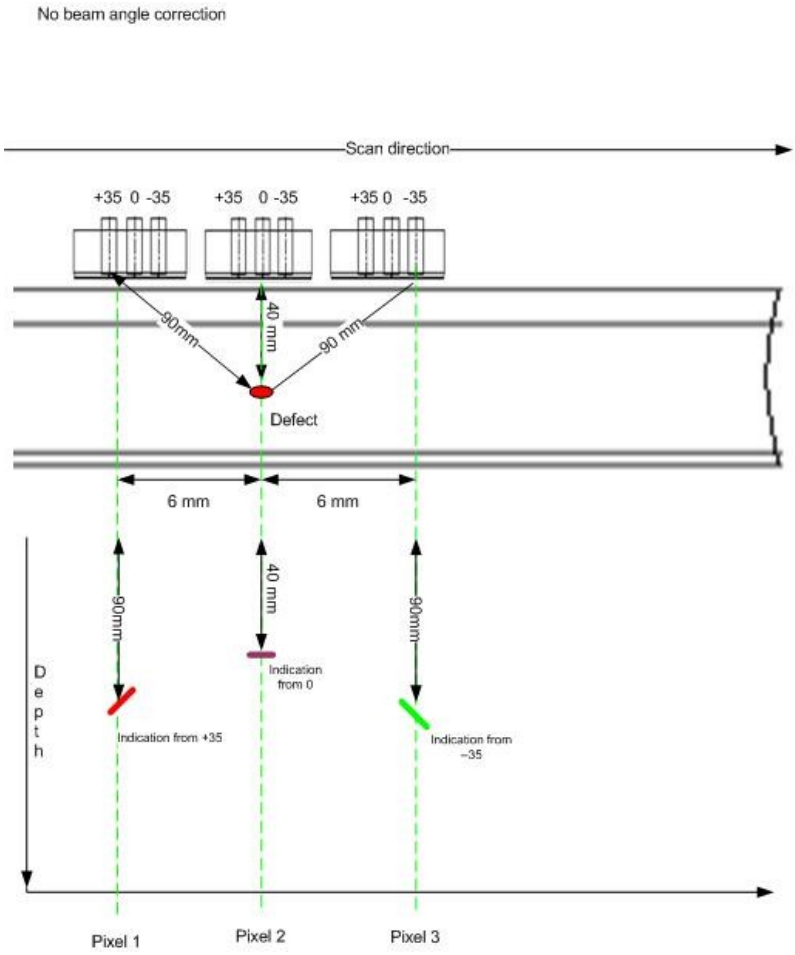

Fig.2 *Identification of defects*

Table.1 *Combining Sensor Data*

№	Sensor combination	Detectable defect types
1	0°	Horizontal cracks in the head, neck and foot rail
2	±70°	Transverse cracks in the head, neck and foot rail
3	0°, ±35°, ±70°	Bolt holes
4	0°, ±35°	Inclined cracks
5	±55°	Cracks in the head, neck and foot rail

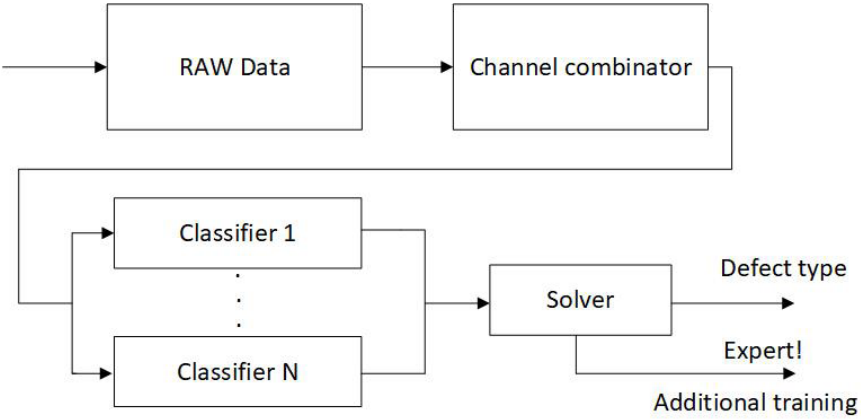

Fig.3. *Architecture of the automatic recognition system of railway bed defects*

To solve the problem associated with the detection and classification of defects as an object of technical diagnostics, convolutional neural networks (CNN) were used, which allowed:

1. Effectively parallelize computational processes, which made it possible to organize the work of the system in real time.
2. Implement a mechanism for further training classification.
3. To ensure high computational performance of the neural network due to the use of a much smaller number of parameters compared to other neural network architectures.
4. To provide resistance to turns and shifts of recognizable frames.

Conclusion

The development of systems that provide decoding of ultrasonic defectograms of railway rails in automatic mode at high scanning speeds is a difficult task. At the same time, the models used to solve this problem at present have a number of limitations that do not allow solving it completely.

The application of the proposed system of models in the development of an automated system for decoding ultrasonic defectograms will improve the efficiency of the rail monitoring process, the reliability of the results obtained and the safety of rail transport.

UDC 524 (023); 530.12:531.551.

生命在宇宙中
LIFE IN THE UNIVERSE

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注解。 在半经典近似中，考虑了银河系和仙女座星云的和解。 德雷克的公式已被修改。 超越银河系的技术可能性得到了证实。 由于Unruh效应，假设有关星系的加热。

关键词：能量，星系，熵，真空

Annotation. *In the semiclassical approximation the rapprochement of the Milky Way and the Andromeda nebula is considered. Drake's formula has been amended. The technical possibilities of going beyond the galaxy are substantiated. An assumption is made about the heating of galaxies due to the Unruh effect.*

Keywords: *energy, galaxy, entropy, vacuum*

Introduction. Immediate threats

After 13 billion years, the Sun will become about 100 times larger, its luminosity will increase 2,000 times. Oceans on Earth oceans evaporate, lead will melt. But after 7.5 billion years the Sun will become a red giant and expand to the intersection with the Earth's orbit.

In about 5 billion years, the radius of the lunar orbit will reach a maximum value of 463 thousand km, and the duration of the Earth day will increase to more than 18 days. Some species will disappear, others mutate. The first to adapt viruses, pathogenic bacteria.

The Andromeda nebula will collide with our galaxy in 4 billion years, the galaxies will merge. In the analysis using mathematical modeling, taking into account all the constituent parts of the galaxies. However, their value is in doubt. Thus, the size of the disk of the Milky Way can be 50% larger [10]. It turns out that our galaxy has a length of 38 kPk, and not 30 kPk, as previously thought. It is argued that it is not possible to definitively establish the size of the Milky Way [6]. Meanwhile, even rough models can give interesting information. The Hubble

law, which relates the galaxy removal rate to the magnitude of the removal, is: $v = H_0 r$. We use the non-relativistic law of Newton:

$$F = \gamma m_1 m_2 / r^2 ,$$

where m_1 and m_2 – the masses of two galaxies. We obtain a general view of the equation of motion of the Andromeda nebula in the approximation of the Tree Code:

$$r^2 \ddot{r} - H_0 r^2 \dot{r} - \beta m_2 = 0 \quad (1),$$

where $\beta = \gamma m_1 / H_0$, t - time, c – constant, m_1 – масса нашей галактики, m_2 – mass of the Andromeda nebula. The solution of equation (1) is not expressed in analytical functions and depends to a large extent on the initial conditions. When approaching at an initial zero velocity, the distance between the galaxies decreases according to a parabolic law with a small coefficient, i.e. the curve is close to a straight line, which corresponds to the observed data:

$$r = r_0 - at^2 ; \; a > 0 \quad (2)$$

With differences in the number of solutions, the distance between the galaxies increases linearly.

The radius at which the equality of the "force" of repulsion and the force of attraction is established

$$r = (3\beta t + c)^{1/3} \quad (3)$$

where c – constant integration. The distance at which the galaxy of the Andromeda nebula type may turn out to grow more slowly than the scattering of galaxies takes place. Thus, the probability of cosmic cataclysms of this magnitude decreases with time.

After 1-3 billion years, the continuous increase in solar radiation, caused by the accumulation of helium in the core of the sun, will lead to the disappearance of the oceans. After 1 billion years, the core of the Earth will cool. In 250-350 Ma, the continuing supercontinental plate tectonics cycle will lead to the formation of a supercontinent. The precession and nutation of the axis of rotation of the Earth will intensify. For 1.5–4.5 billion years, the tilt of the Earth's axis of rotation will begin to experience chaotic changes with a deviation of up to 90 °.

Oil on the planet will last for 40 years, gas for 60 years. Energy consumption on the planet after World War II doubles every 15-20 years. With cash reserves of uranium doubled growth time - only 200 years. The energy consumption per unit of time will be 5% of the power of the Sun reaching the Earth, the upper limit of the earth's energy. The average temperature of the earth's surface will increase by 3 degrees.

Possibility of survival

For analysis, it is natural to consider exoplanets. Here there are problems of communication with extraterrestrial civilizations, the Drake formula is needed, which determines the number of possible contacts:

$$N = R \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L,$$

where N - the number of intelligent civilizations ready to make contact;
R - the number of stars formed per year in our galaxy = 7; f_p - the proportion of stars with planets; Drake rated this factor at 0.5, but this is greatly underestimated.; n_e - the average number of planets (and satellites) with suitable conditions for the birth of a civilization> 0.014 (from what is currently known more than 3600 exo-planets, of which 52 are potentially inhabited); f_l - the probability of the origin of life on a planet with suitable conditions. (The conditions include the temperature on the planet and the presence of chemical elements necessary for biosynthesis. The temperature on the surface of the planet should range from 0 to 100 degrees Celsius, it depends on the radius of the orbit, around the stars emit a "zone of life." Shu Huang for habitable planets are suitable stars of the main sequence of spectral classes from F5 to K5, of which only second-generation stars, rich in carbon, oxygen, nitrogen, sulfur, phosphorus, are chosen. Also, the mass of the planet should be large enough to keep the atmosphere, etc. In 2002, Charles Lineweaver and Tamara Davis estimated f_l as> 0.13 for planets with more than 1 billion years of history based on Earth statistics. Lineweaver also determined that about 10% of stars in the galaxy are suitable for life in terms of the presence of heavy elements, distance from supernovae and fairly stable in structure [18]).

The probability of occurrence of rational life forms on a planet on which life is f_i is estimated by Drake as 0.01. f_c is the ratio of the number of planets whose reasonable inhabitants are capable of contacting and seeking it, to the number of planets on which there is intelligent life; rated by drake as 0.01. L is the lifetime of such a civilization. Drake's rating is 10^4 years. Total: R = 7/year, f_p = 0,5, n_e = 0,014, f_l = 0,13, f_i = 0,01, f_c = 0,01, and L = 10 000 years. We get: $N = 7 \times 0{,}5 \times 0{,}014 \times 0{,}13 \times 0{,}01 \times 0{,}01 \times 10\,000 = 0{,}00637$. $N < 1$, i.e. no contactors. But to assess the likelihood, you need to know what life is.

Life is the active form of organic protein-nucleic matter. The main attributes of living matter are metabolism, reproducibility, genetic information used for replication, evolution, self-preservation, feedback, developed in higher forms to sensation, perception and thinking.

Until the moment of comparison, the concept of "life" can only be defined by attribute. It is necessary to assess the likelihood of the emergence and development of living matter in favorable conditions before the advent of intelligent life forms. It must be taken on the order of 100, equal to one, i.e. 100 times more than Drake's estimate - from the position that life arises naturally. Therefore, the share of civilizations capable of establishing contact must also be taken equal to 100%, i.e. also 100 times the Drake rating.

3) Drake correctly estimated the probability of the birth of life in favorable conditions equal to one. But, referring to the so-called. alternative biochemistry, a

variety of life forms that may not exist on a carbon basis, for example, on the basis of arsenic or silicon, it is necessary to accept the average number of planets (and satellites) with suitable conditions for the birth of civilization more than an order of magnitude, i.e. $n_e > 0.14$. (Although the planet is with an arsenic-based life form or in ammonia instead of water or sulfuric acid, and even with mirror-symmetric *D*-amino acids and *L*-carbohydrates, it is clearly not suitable for life.) The factor f_l should also be taken equal to one.

4) Drake considers only the rate of birth of new stars, correlating with the time of contact attempts, he rejected the already existing stars. Other galaxies cannot be ruled out. Therefore, the parameter R must be increased by at least an order of magnitude.

5) The estimate of the parameter *L* is incorrect. This time should be increased by at least an order of magnitude. For the reason that sooner or later mankind will have to flee from Earth. Therefore, attempts to establish contact with humanity will be constantly engaged. At the same time, it is necessary to assess what the probability is that a civilization will remain under various cosmic cataclysms such as a collision with an exoplanet of a comet, an asteroid, another planet, a change of planet's poles, etc. If you take the Earth as a sample, you can count this probability equal to 0.01. Total number of contactees in the galaxy is about 10^4.

Now we begin to reduce the likelihood of contact. First, the solar system is quite remote from the center of the disk, not only for flying in a spacecraft, but also for radio communications. When moving with acceleration a to the middle of the path *s* and braking on the second segment of the path inside the rocket, time will pass [5] $t = 2c[\cosh^{-1}(1 + as / 2c^2)] / a$. 460 kiloparsecs to the Andromeda nebula will take away 30 million years by terrestrial time. So the contact radius for flights with returning is not that large on a cosmic scale. Accordingly, the possible number of civilizations decreases.

On Earth, summer replaces winter because the axis of rotation of the Earth is tilted with respect to the axis of the Earth's orbit around the Sun. Hence the additional condition - the eccentricity of the planet's orbit should be almost zero, i.e. the orbit should be almost circular. The difference between the semi-axes of the ellipse along which the planet moves around the star should be much smaller than the deviation of the axis of rotation of the planet from the axis of the orbit. Otherwise, the temperature difference in winter and summer will not allow the formation of stable molecular reproducible structures such as DNA.

It is accepted that the denaturation of two strands of DNA occurs at 900°, partial destruction occurs at 850°. However, DNA does not melt at a certain temperature, but in the temperature range, since different parts of the molecule melt at different temperatures. Already in the range from 65° to 72°, a number of peaks of heat absorption are observed, and already in this interval the DNA loses its abil-

ity to replicate. Proteins begin to denature at $T > 40^{o}$, at the same temperature, the first changes in DNA are observed. Thus, in the Drake's formula, it is necessary to introduce an additional temperature factor, f_t, which can reduce the number of possible habitable planets by several orders of magnitude. On the other hand, if we consider that in extremophilic bacteria or in a slug, ripped DNA can be stitched without changes, as well as the ability of proteins to renaturation, you can first carefully assess this factor to be equal to 0.1. Accordingly, the number of contactees is reduced to 10^3. Further, it is necessary that the motion of satellites around the planet be so balanced that the axis of rotation of the planet does not turn too often or that the magnetic poles do not change places too often. We will also carefully assess the new factor $f_s = 0{,}1$, and the number of contactees has decreased to 10^2.

The total number of exoplanets in our galaxy is estimated to be no less than 10^{11}. That is, planets orbiting around other stars. Of these, from 5^9 to 20^9 are Earth-like. On 23.4.2015, it was reliably confirmed the existence of 1915 exoplanets in 1210 planetary systems. Let us take the figure indicated above - 3600. Thus, the planet's selection factor appears, similarly to $f_v = 0{,}1$, the number of contactees is reduced to 10^1, which exactly coincides with the estimate [14] obtained from completely different arguments. Finally, the Drake formula takes the form:

$$N = R \cdot f_v \cdot f_s \cdot f_T \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L \qquad (4)$$

As we see, those facts that the Sun is a third generation star with an age of 4.5 billion years, and the duration of the evolution of life on Earth since its inception is 3.7 billion years, which is comparable to the age of the universe 14.5 billion years, not reflected in the formula (respectively, and the Kardashev – Kautsa scale, although in the publication Science and Technology of the USSR in 1917-1987, the Kardashev classification is indicated as one of the most important achievements of Soviet science in 1964. [8] questioning the need to identify the factor R with the number of new star births in a year and nature Avnivat factor L to 10^5, as Drake did.

Going beyond the galaxy

According to approximate estimates, in 10^5 years less than 5 billion people will be able to leave the Earth, with the condition that the entire planet will be built by spacecrafts, with modern labor productivity. Perhaps the optical method of communication with extraterrestrial civilizations [11] will help to find habitable planets. It would seem that sooner or later humanity will have to go beyond the galactic disk, which has a size of about 30 660 parsec. With a constant ratio of thrust to the mass of the rocket equal to 20 m / s^2, this distance can be covered in about 6 years by the clock inside the rocket (by the clock on Earth - about 10^5 years). To do this, you need to gain at least the 4th cosmic speed, 550 km / s. The question of whether there is enough fuel may be resolved with the implementa-

tion of the emDrive engine. The installation of the EmDrive was first proposed by engineer Roger Schoer. In 2013-2014, the Cannae Drive engine was tested in the NASA Eagleworks laboratory at the Y.Magarin Space Center. Johnson The work was carried out under the leadership of Harold White, an anomalous result was obtained - a thrust of about 0.0001 N [13]. In the *Eagleworks* experiment in 2016, anomalous thrust was also obtained, no errors were detected [16]. The government of the People's Republic of China has funded research on the engine since 2010, and EmDrive prototypes have been sent for testing in low-Earth orbit [22]. Obviously, the "violation" of the law of conservation of momentum in terrestrial conditions does not occur. It is suggested that the law is violated due to the Casimir effect. In 2001, a group of physicists from Bell Laboratories and Lucent Technologies (G. Chan and others) investigated the Casimir effect for platinum and hemispheres. The plate, placed on two parallel thin piezoelectrodes, could be tilted in both directions relative to the center, forming a torsion pendulum with a small amplitude, and the sphere was located above one of the wings of the plate. In 1997, M. Kardar (Massachusetts Institute of Technology) suggested that if two plates were made corrugated, the Casimir force could be made to act along the surface, the plates would not attract, but move. An experiment performed in the laboratory of Mohidin, confirmed this. Experimenters placed two corrugated gold plates in a vacuum at a distance of several hundred nanometers, combining their convexity and concavity. When the plates were slightly shifted, a force appeared that returned them to their original position. The longitudinal force of Casimir was several piconewtons, it rapidly decreases with distance, but Mohidin is sure that it can easily trigger nanomachines. It is assumed if we calculate the vacuum average of the energy-momentum tensor $< T_{ik} >$ The electromagnetic field for a truncated cone (see [2]) should result in a nonzero pulse, which coincides in order with that found in experiments with emDrive. In this case, the vacuum engine does not need a pumping of the microwave field by the magnetron at all. For an approximate assessment of the thrust force in a simplified problem with a square socket with a small angle α, we use [7]:

$$\varepsilon =< T_{00} >\approx -\frac{1}{720\pi^2\rho^4}(\frac{\pi^2}{\alpha^2}-1)(\frac{\pi^2}{\alpha^2}+11)$$

where ρ - selected line on the side of the corner. Since strength $F = -\partial\varepsilon / \partial\alpha$, a – the distance between the plates, we estimate the quadruple vertical component, which allows us to estimate the thrust force:

$$F \approx -\frac{4\alpha^4}{45\pi^2\Delta^5}(\frac{\pi^2}{\alpha^2}-1)(\frac{\pi^2}{\alpha^2}+11)\sin\alpha \qquad (5)$$

where Δ - the difference between the lower and upper sides of the socket.

Unlike the magnetization side of the angle of the socket, which does not lead to a change in momentum, the Casimir force acts perpendicular to the plane of the angle. Thus, the force acting on the vertical side of the angle is horizontal and does not compensate for the vertical component acting on the inclined side of the angle.

But landing on a planet suitable for life does not mean salvation. 1) If the planet is not yet inhabited by living organisms, it will be the death of earthlings. 2) If there is a higher level intelligent life on the planet, earthlings will exist only for the duration of their own life, the higher mind will not reproduce the lower one. 3) If the planet is inhabited by a lower mind, earthlings will have to destroy this lower mind in order to survive themselves. It will take a billion years - and it will be necessary again to leave the planet. Therefore, the aborigines will be used as a link in the "food chain": as slaves, as carrying organisms, etc. Similarly, all who will arrive on Earth will be occupied with the same. Those. the probability of contact decreases.

About the thermal death of the Universe

The popularizer of String Theory, Brown Green, claims that the Universe will grow larger, the density of matter and energy will fall until they are completely dispersed. So now there is a rather unusual period in the history of the Universe, when such a phenomenon as life can exist.

In 1997–1998, Sol Perlmutter, Brian Schmidt, and Adam Riess discovered that galaxies fly apart faster than billions of years ago, that is, the Universe expands with increasing acceleration. In the ΛCDM model, dark matter with negative pressure is introduced to explain the acceleration of the expansion of the Universe. It can be seen from equation (2) that if we assume the presence of matter with negative mass, then the hypothesis of dark matter is not required, the acceleration of the expansion of the Universe will be observed without it. You do not need to increase the Hubble constant. A substance with a negative gravitational or inert mass cannot annihilate with ordinary matter, since it will not be attracted, but repelled from it.

The possibility of the existence of negative mass was suggested by G. Bondi in 1957 [12]. He built models with different negative masses: inert, active and passive gravitational masses. Bondi and Forward have analyzed such exotic particles [17]

This is a negative gravitational mass, so there will be no contradiction with the Higgs models. It may be objected that the presence of a substance with a negative mass will significantly change the history of the early Universe. But the presence of dark matter also changes the history of the early Universe. Morris et al. [21] showed that the Casimir effect can be used to obtain a local region of space-time with negative mass. The forward also proposed the design of a spacecraft engine using negative mass, which does not require an influx of energy and working fluid to obtain arbitrarily large acceleration [19, 20].

At present, particles with a negative effective inert (but not gravitational) mass in the Bose – Einstein condensate have been obtained [15]. I. Banik discovered a giant ring of galaxies that scatter as at the moment of the Big Bang, their arrangement is similar to drops from a rotating umbrella, while the rotation of the ring is not observed [1]. These galaxies fly from the Milky Way at a much higher speed than that determined by the standard cosmological model. In the outer part of the spiral galaxy M81 there is a ring dominated by bright blue stars, and in the center there is a ball of more red stars, which are much older. In the gap between the core and the ring, another ring-shaped galaxy is visible, which is much further. If it is found that the velocities of the center of the rings and the rings themselves are significantly different from the Milky Way, this will be evidence in favor of the presence of negative masses.

The discovery of the hidden mass gave rise to the hope that the Universe would stop its expansion. But the collapse does not promise the best. Perhaps the collapse will stop the Casimir effect. If in cosmological models with expansion the vacuum elasticity is taken into account, then the 2nd law of thermodynamics $\partial S / \partial t \geq 0$ will be fulfilled only when the energy dominance is not violated [4]. However, we know that the violation of energy dominance in field models is not uncommon [3]. But the question of survival in a different plane. White dwarfs cool down to 1 K in 10^{17} years. In 10^{19} years, neutron stars cool to 30 K. In 10^{32} years, matter will decay into photons and neutrinos. The most massive black holes in the centers of galaxies evaporate over 10^{96} years.

They also propose a scenario of merging black holes into one, which will either be eternal or shrink to Planck density, which will create a new Big Bang. But this picture is inaccurate and incomplete.

1) Black holes will not be able to merge into one - by virtue of equation (3), with the expansion of the Universe, the collision of galaxies will stop. 2) Galaxies scatter with acceleration. During acceleration, the Unruh effect occurs, the production of pairs of particles from a vacuum. The Unruh temperature depends on the acceleration of the reference system *a* as follows: $T = \hbar a / 2\pi kc \approx 4 \cdot 10^{-21} a$. But the Milky Way is exactly the same as the other galaxies - it is also moving away with acceleration. When the acceleration of the Milky Way reaches a certain size, the galaxy will be penetrated by radiation, an additional source of energy. And, since the vacuum density does not change, it would be possible to draw this extra energy from it infinitely. In order to heat the system by 1 K, it is necessary to accelerate it to 10^{20} m / s^2, so even this degree would have to wait a time many times more than the age of the Universe. From the Hubble Act Acceleration $a = H^2 r$, $r = r_0 \exp(Ht)$, modern radius of the Universe $r = 10^{27}$, taking to estimate that the Hubble constant increased evenly over 7 billion years from zero to the present value of 10^{-18}, we can calculate when the acceleration reaches the

indicated level: $t^2 \exp(10^{-36} t) \geq 10^{64} c^2$, from where $t \geq 3 \cdot 10^{24}$ years. That is, after the cooling of white dwarfs and neutron stars, but long before the collapse of the substance of the galaxy will gradually heat up. At this point, life in the universe will remain only at the level of extremophil bacteria. The model of Linde-Starobinsky with the Universe, which is eternally reproducing itself, with a lot of bloated quantum fluctuations into Friedmann's hot universes, as well as M-theory, do not leave room for eternal life in our Universe.

Conclusion

The development of nature is an ascent from the lowest to the highest. This means that humanity has not yet gained enough knowledge, both experimental data and existing theoretical models, each of which predicts the death of life in our Universe.

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UDC 52.882

致宇宙发展的起源
TO THE ORIGINS OF THE DEVELOPMENT OF THE UNIVERSE

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注解。 本文提出了一个透明的逻辑和数学基础的宇宙诞生假设，在系统参数的急剧变化阶段。 显示了离心和线性（宇宙学）重力的激发机制。 考虑了内压影响下醚的加速宇宙学膨胀。 提出的结论是，宇宙创造者心灵的精神力量促成了宇宙中物理过程的出现。

关键词：空间；能源;阿米尔；宇宙惯性；宇宙天空引力；极端密度；极端速度；空气；宇宙的胚芽；空间；综合点差；当前的重力比。

Annotation*. The article proposes a transparent logically and mathematically grounded hypothesis of the universe's birth in the stages of a drastic change in the parameters of the system. The mechanism of excitation of centrifugal and linear (cosmological) gravitations is shown. The accelerated cosmological expansion of the Ether under the influence of internal pressure is considered. A conclusion is proposed that the spiritual forces of the Mind of the Creator of the Universe contributed to the appearance of physical processes in the Universe.*

Keywords*: Space; energy; Amer; cosmological inertia; cosmological sky gravity; extreme density; extreme speed; Air; Germ of the Universe; Space; integrated spreads; the current ratio of gravity.*

The Universe was born a black hole and today we live in a black hole - the Universe.

Here we briefly present the results of our research, which constitute the hypothesis of the birth of the universe. Revealing the secret of gravity, we established that the birth of the Universe could not have happened without intervention, more precisely, full control over all physical processes, the non-physical Creator of the Universe. We will present six stages in the development of the Universe, each subsequent of which is characterized by the birth of a new Space (Amer, Proton,

Germ, Ether and Cosmos), that is, an abrupt change in the parameters of the entire system. For greater clarity, all the parameters of the universe will be wrapped in figures that are firmly established by science or developed by us on their basis.

1. *The first stage* (before the birth of matter). It was the epoch (relative to the Universe), when, judging by its modern state, the Unborn Space reigned, which gave birth to six new Prostrances (Amer, Proton, Ether Nucleus, Star black holes, Ether and Cosmos). You can call it Zero-Space, because it has zero entropy, that is, it does not contain matter, and, therefore, it does not pass any fzicheskikh procyss. We have established that the first principle of the birth of the physical World is*: the physical Space cannot manifest without energy, energy cannot exist without Space, and both of them - without the non-physical Zero Space (Creator of the Universe), which gave birth to them*. What is it - below.

2. The second stage. At one moment (about 10^{-27} s) for an unknown reason (**first question**) a vortex of energy originated in Zero-Space, let's call it Amer (according by Democritus, later by Atsyukovsky). The basis of its appearance is the first law of the universe (the triune law of closed spaces):

- standard size: $R=G\ M/c^2$;
- standard energy (mass): $M=c^2R/G$;
- standard centrifugal gravity: $G=c^2R/M$.

It has properties similar to the physical parameters of a material particle: the radius is about 10^{-19} m, the mass is about 10^{-39} kg, it has a limiting density for the Universe - $2.3*10^{17}$ kg/cu.m and the maximum speed of rotation - ($3*10^8$ m/s). Amer holds the appropriate gravity from energy dissipation: $Gам=c^2Rам/Mам=10^{37}$ cu.m/s^2 kg. The formula for the constant centrifugal gravity coefficient of closed Spaces (closed black holes) is obtained from the inverse squares equation: $Gчд=c^2Rчд/Mчд$. All Amers (and behind them Protons) are identical. Why? Indeed, among the stars, for example, those born from a whirlwind, even two identical ones cannot be found. Maybe because closed-hole black holes are not born from a whirlwind? After all, they have a limiting speed of rotation and a limiting density. In addition, in supernovae, as in the center of galaxies, Black Holes are also formed not from a whirlwind, but in a shock way. And must also be identical. Nature did just that, creating stellar and galactic Black Holes. Calculations show that the excitation of centrifugal gravity (about 10^{37} for Amer, 10^{29} for Protna and $G = 6.67 * 10^{-11}$ m^3 / s^2 kg for a stellar Black Hole). It is possible that closed Black Holes are not physical Zero-Space, closed from the rest of Zero-Space by physical energy: Amer has about 10^{-23} J, proton - about 10^{-10} J, and stellar BH - about 10^{48} J. As further showed calculations, Amers appeared not as a result of the familiar process of mass growth, increasing the speed of rotation, etc. It seems that he appeared in the finished form with the specified parameters within 10^{-27} seconds (**second question**).

3. At the third stage, the Germ of the Universe develops - densely connected by gravity, new amers are avalanche-like. Its mass is growing, but it continues to rotate at the maximum speed according to the law of conservation of energy. Note that in this case, it had the form of the Limit ellipsoid of rotation open by us with the coefficient of asymmetry of the equatorial and polar radii equal to: Кпэв=2*$2^{1/2}$. Since Amers fill 74% of the volume of the Germ, its density is 74% of the limit (1.95 * 10^{17} kg / cu.m). Their number reaches 10^{92} units, and their mass to the mass of the Universe (10^{53} kg). The germ gravity coefficient is reduced to 10^{-26} m^3/s^2 kg. At the same time, the force of attraction between amers has increased.

4. *At the fourth stage*, the parameters of the system again change dramatically. After 2000 seconds, when about 10^{92} Amers already appeared (Rзар = 10^{12} m), under the influence of the internal pressure of Amers in Zarodysh, 74% of them merge into Protons (a larger number of Protons did not fit in the Germ). In fact, it was the appearance of the Cosmic Germ (the radius of the proton is about 10^{-15} m, its mass is about 10^{-27} kg). At the same time, in the same volume of Zarosh, in the interproton space, the remaining 26% remained after the merging of amers - the Ether Seed. **This is the third question:** why the merging of Amers into Protons has stopped at these parameters.

5. The fifth stage characterizes the birth of the Universe from the Germs of Ether and the Cosmos. What is the situation at this time? When the number of amers grew in the Embryo of the Universe, there were no physical laws capable of stopping their growth. And only thanks to the ever increasing internal pressure in the embryo, which exceeded the "ultimate strength" of amer, did they begin to merge into protons. But it is not clear why exactly 10^{12} amers merged into a proton? All eighteen parameters of amer and the same proton did not indicate this. Further calculations showed that if there were more of them in the proton, the Universe could not be born. And if it were less, then instead of the Universe, only fragments of its Germ would swim in the Zero-Space. The reason for this is that for the birth of the Universe it was necessary to have an internal pressure capable of breaking the powerful attraction between protons and amers. Obviously, this required an energy of 0.5 Mc^2. This energy was obtained as a result of the merging of amers into protons by reducing the total surface of protons. Since the “surface tension” energy released by amers depends on their size in order to obtain just such an amount of energy, it was precisely these actual values of the parameters of amers and protons that were necessary. After the merger of 74% of amers, the required energy of the “surface tension” of amers was released as a result of a 6000-fold reduction in the surface area of the protons relative to the area of the merged amers. Well, isn't that brilliant! In addition, at the confluence, about 26% of the volume of the Germ was released, which allowed free movement of Amer and protons at the maximum speed due to the new energy. As a result, Amers gave birth to Ether,

protons - Cosmos. The free movement of Amers created an internal pressure of about 10^{34} N/sq.m ($P = qc^2/3$), necessary for the birth of the Universe (separation by the ether Spread speed), and the free motion of protons created a temperature of up to $3 * 10^{12}$ K ($T = mc^2 / 3K$), necessary for the creation of neutrons, electrons, atoms and molecules. With the beginning of the expansion of the Germ of Ether, its form began to change from the open semiconductor we opened (the ratio of the semi-axes $R_П:R_Э = 1:2*2^{1/2}$) to the sphere. With that said, you can answer the well-known question: "Why is the Universe rapidly expanding?". First, it does not expand, but moves apart (expands integrally) with respect to each of its amers. Secondly, it is not the Universe that is moving apart, but the Ether consisting of amers moving in Zero-Space with the light speed, whose kinetic energy on atoms and molecules, by the way, is the source of the radiant energy of stars. Thirdly, the source of the energy of the expansion of the Ether is the pressure differential between the Ether (amers moving in Zero-Space) and the free Zero-Space. As long as this differential exists, the universe will expand.

6. *The sixth stage* began with the beginning of the accelerated expansion (integral expansion) of the Ether and continues to this day. It is characterized by a uniform growth with a limiting velocity of the radius of Ether with its constant mass and an increase in the current cosmological gravity coefficient ($G = 8n\, c^2 R_{ЭФ} / M_{ЭФ}$). Nowadays, it is about $6.7 * 10\ m^3/s^2$ kg. The physical essence of cosmological gravity consists in the reaction of more massive nucleons to the forces of the accelerated expansion of the mass of Amers of aether to the Law of Newton ($F = ma$). Thus, today the Universe is a spherical cloud expanding at a speed of $3*10^8$ m/s a gas-like mixture of Amers (the average distance between which is about $2*10^{-5}$ m) and protons (average distance between them is about 5 m) in a non-physical Zero-Space with zero entropy. In this gas-like mixture under the action of cosmological gravity, about 10^{12} galaxies consisting of stars "float". An important question can be answered: what is there outside the Universe? There, as here, the motionless Zero-Space (Creator of the Universe), since the Universe does not rotate all, but only Ether and Cosmos. Zero-Space that does not contain physical processes cannot rotate.

The question is not unimportant: why the Universe rotates? At first glance, from the standpoint of the law of the minimum energy of a physical system, the energy of rotation of the Universe, and even with a limiting speed, is superfluous. It could easily move apart without him. In fact, despite the light speed of rotation, due to the light speed of expansion, it is almost immobile. But at the beginning of the integral expansion of the Germ of the Universe (with a radius of about 10^{12} m), its rotation played a significant role. If the Universe did not rotate, and with extreme speed, then the Ether Germ would not have to rotate (from densely connected by centrifugal gravity of amers) before its expansion begins. So the Ether

Bud without rotation would have a spherical shape. And this means that at the beginning of its integral expansion (the birth of the Universe), the Embryo would not be able to create proto-galactic vortices - the germs of all structures of matter, because proto-galactic vortices of clusters would not appear due to pressure fluctuations, which appeared in its ellipsoid form due to rotation (the coefficient of asymmetry of semiaxes Кпэв=Rэ/Rп = $2*2^{1/2}$). So the whirlwinds of clusters of galaxies, galaxies, stars, planets, etc. could not arise, that is, structures of the Cosmos could not arise. That is, the Universe would consist of protons (about 74%) and amers (about 26%). It means that all these physical processes were led by the Creator of the Universe, as well as by the birth of amers, protons and the Germ of Ether, manifested before its birth. What is outside the Universe? The same infinite Zero-Space is the Creator of the Universe as inside it. Only it is impossible to reach the edge of the Universe, because for this it is necessary to have a superluminal speed.

Obviously, this harmonious system of the development of the Universe at the level of physical processes is quite acceptable, especially since all its transformations are confirmed by facts that are firmly established by science or by calculations based on them. But there are three questions that cannot be explained by physical processes. First, why did an organized physical energy vortex (amer) arise in a non-physical zero-space with zero entropy? We believe that this was the result of the spiritual influence of the Mind Zero-Space, that is, the Mind of the Creator of the Universe. Second, why does Amer have such parameters when there were no physical laws capable of influencing their magnitude? The answer is the same. Third, why exactly 10^{12} amers merge into one proton? Because other parameters of amers and protons would not allow obtaining the energy exactly necessary for the free movement of amers and protons ($0.5 * Mc^2$ J). We believe that if the physical result is obtained in the Zero-Space without the intervention of physical processes, then it is obtained under the influence of the spiritual forces (energy) of this Space. Who could have foreseen all this? The Creator of the Universe, which in the form of Zero-Space today occupies almost 100% of the volume of the Universe and continues to control the physical processes in it. This idea does not contradict the statement of scientists that the human mind (soul) is outside of its body and brain. From here: who has given birth to a particle, that and controls it. That is, the building blocks of the Mind (amers) were not only born before the building blocks of matter (substance), but also created them. And we are still in the cradle of the Creator of the Universe.

Our research has shown that all physical processes in the Universe take place under the complete control of the Creator of the Universe. This is evidenced by the facts of its evolution. This is especially evident at the birth of Amers and protons before the birth of the Universe itself. Some physical laws could not provide the

physical processes occurring in that era. This required the Mind of the Creator of the Universe. If we talk about people, man today cannot lift a finger without indicating his physical "living mind" (thoughts consisting of Amer structures of Ether), and processes in Nature without specifying the Creator of the Universe not also of physical Intelligence (also Amer structures), which and created the universe. It can be argued that all non-physical (rational) processes in the Universe are under the same control. If we talk about the worlds of the Universe, then there are probably three interconnected worlds: the first is not the physical world of Zero-Space (the Creator of the Universe), which controls all the physical processes in the Universe; the second is the physical world of Ether, consisting of Amers moving with sublight speed, who feed their study of stars with their kinetic energy and from which the Creator created the "living mind" of animals and people; the third is physically the world of the Cosmos, consisting of the structures of matter (of Amers and nucleons), which are controlled by the Creator of the Universe through a single force in the Universe, but in four ways, the Universe force - centrifugal and cosmological gravity.

The Universe was created by the Creator in three-dimensional Space, possessing a number of unique properties [5,6], including three fundamental ones, which ensured the birth of both the Embryo of the Universe and of itself:

- when two spheres merge, the surface area of the resulting sphere decreases by approximately 19.6%. The more spheres merge, the larger the area is released (at the merging of 1092 amer into protons in the Ether Germ thousands of times). This property made it possible to obtain energy for the free movement of amers and protons in it;

- at the confluence of any number of spheres into one, its volume decreases by approximately 26%: this property allowed freeing up the volume of the Germ for the free movement of amers and protons;

- with a uniform increase in the radius of the sphere, its volume increases rapidly: this property allowed, with a uniform increase in the radius of Ether, to move rapidly to the masses of amers of Ether to excite cosmological gravity in nucleons.

It seems that our evidence for the existence of the Creator of the Universe turns the main dogmas of the Church (God is omnipresent, the Trinity is one God, God is original, God is not on Earth, not in Cosmos, but in the Kingdom of Heaven and Almighty God) into scientific facts. After all, every cell, every molecule, every atom, every proton and electron is immersed in Zero Space, which gave birth to the Universe and controls it. It is the Creator of the Universe. Based on the above, we propose a design scheme for the "New Etheric Physical Model", explaining the structure and evolution of the Universe. The model includes all four interactions (including the gravitational one). It is based on two physical realities:

- all matter in the Universe appeared before its birth due to the first physical

closed Space: ameru in the form of a black hole, born from a non-physical Zero-Space with zero entropy, which today occupies almost 100% of the universe, later already after the birth of the Universe, the fusion of protons into stellar black holes (in supernovae); - all processes in the Universe are controlled by gravity: in the microworld - centrifugal, in the macroworld - cosmological. Briefly, the model can be represented as follows:

1. Amer is the smallest physical closed Space (Black Hole) created by the Creator of the Universe - the essence of an integrally expanding Ether: $r = 10^{-19}$ m, $m = 10^{-39}$ kg;

2. Proton is a physical closed Space (Black Hole) obtained as a result of amer merging - the essence of an integrally expanding substance of Cosmos: $r = 10^{-15}$ m, $m = 10^{-27}$ kg;

3. The standard closed space (Black Hole), born in the explosion of a supernova, is the essence of the Universe: today - $R = 3.35*10^4$ m, $m = 4.5*10^{31}$ kg.

4. Amer and protons appeared before the birth of the Universe, stellar Black Holes - after the beginning of the integral expansion of the Universe. The rotation speed of these closed spaces is light;

5. *The constant coefficient* of centrifugal gravity of closed black holes: $G = c^2R/M$.

6. *The current coefficient* of cosmological gravity (Newtonian) in the Ether: $G = 8n\ c^2R/M$.

7. The mass of amers Aether is 26% of the mass of the Universe, the protons of Cosmos substance are 74% of its mass.

8. Currently, the volume of Ether is about 1078 cubic meters, substances (protons) - about 10^{35} cu.m.

9. The pressure in the Ether, thanks to which it is rapidly moving apart, is about 10^{-10} kg / sq. m, in space - about 10^{-27} kg / sq. m

10. In the control of all processes of the microworld of the Universe, constant centrifugal gravity dominates, expressed by three types of interaction (strong, weak, electromagnetic). In the processes of the macro world, the current linear cosmoltogic gravity dominates.

11. The basis of the motion of all particles and bodies in the Universe is one law: the force of inertia is equal to the force of gravity: $V^2/R = GM/R$.

12. Time in the closed Spaces (Amer, Proton, BH), as well as any physical processes, seems to be absent.

It is obvious that the article has answers to the main questions of physics in relation to the Universe: is the Universe open or closed? How did the universe appear? What was before the beginning of the integral expansion of the Germ of the Universe? But the mysteries of the birth of physical matter from non-physical Zero-Space to our species of humanity, it seems, will not remain open.

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科学出版物

上合组织国家的科学研究：协同和一体化

国际科学大会的材料

（2018年12月12日，中国北京）

编辑A.A.Siliverstova
校正A.I.尼古拉耶夫

2018年12月17日印刷版。格式60 x 84/ 16。
USL。沸点：99.2。 订单263.流通450份。

在编辑和出版中心印制
无限出版社


中央民族大学