



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

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这些会议文结合了会议的材料 – 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 examine technical, juridical and sociological aspects of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

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生成式人工智能，作为现有商业模式转型和构建效率轮廓的一种选择，以满足工业 4.0 竞争力的新要求。

GENERATIVE AI, AS AN OPTION FOR THE EXISTING TRANSFORMATION OF BUSINESS MODELS AND BUILDING EFFICIENCY CONTOURS IN THE FIGHT FOR NEW REQUIREMENTS FOR COMPETITIVENESS IN INDUSTRY 4.0.

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抽象的。作者分析了人工智能和大数据的现代趋势、正在进行的信息通信技术转型、世界经济数字化领域正在进行的初创企业和绿地、全球化国家工业的演变，这些在后疫情时代的复苏中需要新的方法和商业模式。对于后工业化的“知识经济”和“消费经济”，它们决定了主权国家寻求降低全球治理结构和试图维护霸权思想的跨国行为体对其影响程度的替代路径的向量。在“美国世界”的进一步瓦解中，大都市与其服务的外围地区之间的殖民发展。第三世界。”

关键词：ADF、人工智能、大数据、ICT 行业、替代现实、额外现实、市场、巨型宇宙、生态系统、创新、俄罗斯、美国、中国、解耦、LLM（大语言模型）、聊天、机器人、神经算法、网络解决方案、机器学习（ML）、工业 4.0、生成智能。

Abstract. *The authors analyze modern trends in AI and Big Data, the ongoing ICT transformation, ongoing startups and greenfields in the field of digitalization*

of the world economy, the evolution of globalized national industries, which in the post-Covid recovery require new approaches, business models for the post-industrial “knowledge economy” and “consumer economy,” which determine the vectors of alternative paths for sovereign states seeking to reduce the level of influence on them of global governance structures and transnational actors who are trying to preserve the ideas of hegemony and colonial development between the metropolises and their serving peripheral areas in the further disintegration of the “American world.” third world.”

Keywords: *ADF, AI, Big Data, ICT industry, alternative reality, additional reality, marketplace, megaverse, ecosystem, innovation, Russia, USA, China, decoupling, LLM (large language models), chats, bots, neural algorithms, network solutions, machine learning (ML), Industry 4.0., generative intelligence.*

Modern criteria for the emerging efficiency in the coming robotic-humanoid way of life determine the growing gap in the “conflict of generations”, proposing models for smoothing out the resulting voids and chaotically inflated market bubbles, which introduce dissonance for the accumulation, testing and further use of scientific and technological progress knowledge by humanity and in building trends in a unified competitive environment. At the same time, the digital infrastructure of a replenished model of knowledge [1], skills and competencies in Big Data coordinates and based on the personal involvement of each individual will be able to try on and make the most effective interaction at a single point. At the same time, this process of the required emerging professions, the motivation of the employee, as a basic labor resource, emotionally driven towards the area of his own self-realization and the effectiveness of the synergy of machine and man, which, as part of the ecosystem of the urbanizing future, will lead to the emergence of new approaches to the very idea of competitiveness [2].

The solution for each frame, when installed in a single network, as in the required linear structure, will help remove the emotional burnout of the individual in the technocratic soulless world of machines, where each mechanism, in the case of applying such a philanthropic concept, becomes part of the tool to achieve satisfaction of the needs of everyone in their personal and professional assessment. Moreover, vacancies for the non-standard thinking of each potential employee will mature according to the emerging needs and vulnerabilities predicted by neural algorithms, which, based on existing databases (Big Data) and applied AI or machine learning (ML) models, will clearly depict to the parties the creative probability of realized opportunities, with taking into account the vision of each of its place in the flow of creation of goods and services [3]. The concept of “effective demand”, as the engine of a market economy or planning criteria for building optimal models for saturating buyers with real and virtual orders to create “centers of

endorphin joys” of today’s mindless shopping of “behavioral economics” by Daniel Kahneman and Richard Thaler, will combine the synergy of ideas of “Abraham Maslow’s pyramid” “and “animal aspirations for a state of unlimited absorption of matter from the trading space of marketplaces and personal and banking ecosystems,” which determine the rational priority of the tasks of developing profitability and producers, and protecting unreasonable waste by buyers of the funds of their own savings at their disposal [4].

At the same time, the evolution of various forms of AI, in particular generative AI, which is expanding and entering many business models from small and medium-sized businesses, both getting rid of routine blue-collar operations, and transforming entire sub-sectors and TNC structures through the unique use of targeted decisions across a range of meso- and macro-level actors. And the quieter this “quiet revolution” occurs, which began as a prelude to the early 2000s with the “explosive growth theory” of economic improvement of missions and goals at the tactical and strategic level, solving the problems of deep transformations and motivational determination of the need and capacity of each labor asset in “economics of production,” which was previously repeatedly stated by Russian President V.V. Putin, in connection with issues of national security, technological sovereignty and leadership of states on the industrial and integration platforms of Industry 4.0.[5]

The very forms of generative AI, according to the calculations of experts in digitalizing specialties and robot-oriented processes, will be able to generate up to 4.4 trillion US dollars of net profit, which will allow the creation of a creative spirit of multi-purpose content as a basic form, based on intersectoral and interdisciplinary principles of data processing and use information and cultural interaction between layers of various gender, ethnic and religious societies in search of their adequacy and self-correction, as well as classes of a deforming and degenerating society, awaiting the effect of increasing profitability of their investments in human capital and the joyful uncontrolled saturation of the brain with falling costs of physical, intellectual and emotional in the accumulation, retention and conversion of acquired knowledge [6].

Therefore, everything that can contribute to this, from the standpoint of the use and mass implementation of relevant forms of generative intelligence, such as music and video, texts and images, is translated into streaming and background supply of the “flock of a new technogenic religion”, the main goal of which is to acquire material, and from that and artificial “paradise” even during life, in the tabernacles not of the Garden of Eden, but in virtual games of avatars/surrogates on the sites of metauniverses that know neither fatigue, nor age restrictions, nor moral clichés and restrictions [7].

Therefore, large language models LLM (large language model), as part of generative AI, led to the emergence of Chat GPT, which this year became the most

developing and rapidly growing chatbot and service, which more than one hundred million people used in the first 2 months of its appearance. And such success has led to an explosion of networked and alternative solutions that have brought generative intelligence to an inflection point with a volume (Bloomberg estimate for 2023) of more than US\$40 billion. This initial bonus has attracted the interest of leading players in the gaming and ICT industry, who are already estimating the potential for a breakthrough in the development of similar services and chatbots by 2032 to reach a volume of 1.3 trillion US dollars, which means an almost exponential growth of 32 times since the launch of such technologies into the commercial and innovative sector of global big tech [8].

Thus, the experts of the Business Consulting Group (BCG), who initially perceived this technology with concern as entertainment for undereducated teenagers, and later perceived it as a viral threat to the markets for the development of families of neural networks and chatbots of leading telecommunication empires, today really realize the potential for an unexpected increase in the productivity of their companies are looking forward to accelerating research and receiving prototypes and prototype semi-industrial batches of goods with predetermined and predicted properties, thereby correcting technological regulations, as well as the corresponding standards and protocols, through a set of methods that clarify and update business operations and cycles for obtaining finished semi-finished products or goods brought to market standards for sale, will be engaged in increasing the volume of data on reporting databases and the demand for tasks of personalized customer experience, which provides feedback and forms the company's goodwill in the process of its digital transformation [9].

When these shifts in approaches to the evolution of models of previously announced business solutions come up against a shortage of what is being created today on the fly, less scientifically, but more than practically, rather than legislatively and industrially, however, not systematically, not in a cluster, in a symbiosis of start-ups and greenfields, without clear support for PPPs, which are changing the face of many global sectors of the world economy, then the idea of grants and other targeted bonuses for subsidized development of the ICT industry will come to an understanding of the main task for businesses and states of all levels of technological development and AI involvement - the formation of individual tactical and strategic business plans level, in the form of strategies and practices of strategic alliances, as well as the accompanying waves of mergers and acquisitions [10].

In the context of the ongoing ADF of Russia in Ukraine, which has brought to life more than 14,000 restrictions, as well as retortions and reprisals, one can only regret the increasingly complex schemes of accessibility to already working practical world cases of generative AI, as well as the emerging technological autarky to those replicated and tested by everyone solutions from the global Inter-

net to critical infrastructure elements, which are being replaced today by Russian analogues for both Chat GPT and Midjourney (as a neural network created for publishing generating images) [11].

Therefore, our solutions, being domestic and implemented taking into account local specifics both in circuit design and in working with nuclear materials, allow us to speak about a fairly advanced level and quality of our responses to such challenges, which distinguish ready-made Russian products from a more promising effect, taking into account knowledge and use basic Russian language and the available possibility of authorized access to the corporate circuit of customer companies. A special difference is that it is a legal connection for any user on the network: from a company to an ordinary programmer and a private client. At the same time, the very concept of strict determinism of the results of various types and types of models leads, on a global and country scale, to introduce volatility and uncertainty. This is due to the fact that the business community has traditionally ordered and used certified and globally proven, traditionally used algorithms [12].

Also, issues of coordination in time and space for generative AI pose obstacles to its mass application, and while many players are considering options for its partial implementation in their business models, because there are no video calls, no communication via mobile gadgets, no conferences with parallel data transfer. For now, for technical reasons, they are not allowed to work out tasks in real time [13].

There is a worldwide problem about cryptographic protection and the preservation of personal data of users and companies themselves, which are increasingly subject to phishing, hacker attacks and simply the introduction of alien content that can crash the system and cause a cyber threat to the entire circuit of the solutions used within the corporation or when transferring the data itself to external level users B2C, B2B and B2G.

It is the specification of solutions for the end customer, his personal infrastructure to repel aggression from external challenges and market shocks, giving way to innovation in the ICT sector [14].

So, in particular, Adobe launched a version of the generative AI Generative Fill closer to the summer of 2023 for working in Photoshop, taking into account the existing AI model for Firefly. And all the progress in content correction here was implemented through simple text queries, highlighted in fields and panels, after selecting an element [15].

At the end of the summer of 2023, Google began testing Duet AI to use corrections for Gmail, Meet, Docs, Slides Sheets for Workspace, as a generative AI tool that works as a chat for presentations and working with tables, charts and pictures.

Its competitor Microsoft has created a product for larger data sets, Copilot, which helps create presentations in Excel, Outlook, PowerPoint and Word, clean up your inbox, and visualize and rank data from tables.

A month ago, Just AI created its version of the generative intelligent assistant Jay CoPilot, which works on the basis of diffusion models of image generation, allowing you to edit and create files and documents using generative models of synthesis and speech recognition in a regular interface [16].

Unites all services created and tested at different stages of mass implementation in office life for solving rewriting problems, voice-over of texts, their correction and transcription, digitization and storage, maintaining streaming recordings for broadcasts and online broadcasts with automatic formatting and writing meeting minutes and their transmission to the media on separate channels in close to real time [17].

From these applications of generative AI, another popular opportunity for marketing and advertising activities was born - the creation and replication of podcasts and models of participation in their discussion, simulating “open air” discussions between the hosts and guests of the corresponding shows and information blocks.

Particularly important are applied solutions that all the previously listed generative mechanisms and AI assistants can combine and solve from the perspective of several neural networks for standardized tasks, such as creating and reformatting data into presentations and content, as well as forecasting and analyzing scenarios of business processes themselves. complementing human dreams with practical methods of concrete assistance and recreating a whole host of LLM solutions [18].

They can also provide leverage for rating systems and criteria-based indexing of the results of each stage of business processes based on previously distributed Big Data data, converting the results obtained using various editors or their implementation into neural network structures of distributed registries, etc.

Work in this direction, according to Bloomberg analysts, can be unified by removing up to 40% of the routine and redirecting working time to more creative options for achieving the intended goals. And the generative AI assistants themselves will create additional annual income for ICT industries and their service sectors in real globalized supply chains from 2.6 trillion to 4.4 trillion US dollars, with banking, the investment sector, the military-industrial complex and space becoming the main beneficiaries of the data digital transformations, creating additional profits from 200 to 340 billion US dollars annually [19].

The administration of business processes itself will save up to 40% of temporary costs, lead to 38% automation in education, up to 36% in the financial, credit and payment sectors, lawyers and ICT specialists will free up to 37% of free traffic of labor resources, in banking it will expand to 54% level of automation and robotic solutions that save human labor and eliminate errors on the part of company personnel, in insurance up to 48%, in software development up to 36% of all on-going operations will be transferred to generative AI neural algorithms (Source: Bain & Company, Accenture) [20].

The final modern triumph of the modern market of money, numbers and algorithms can be considered the constant monitoring of the actions of the US Federal Reserve by generative AI since 1998, which helps calculate the probabilities of the occurrence of various forecasts for the key rate and the processes of the US exit from the global recession. At the same time, and in contrast to Rothschild's Goldman Sachs [21], which solves the problem of popularizing knowledge and information, they are creating their own new generation chatbot Chat GS, the approach to digitalization is radically different, because it teaches the competent use of corporate knowledge and their systematic integration into a single a digital infrastructure matrix that preserves the unique skills and competencies of employees of various sectors and ages, building a cellular architecture to overcome the challenges of digital vulnerabilities [22], and combining with the required efficiency of human resources waiting to be freed from the rubbish of everyday life and the implementation of creative ideas of their own professionalism [23].

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基于风险的方法在水下机器人系统管理中的应用
**APPLICATION OF RISK-BASED APPROACH IN THE
MANAGEMENT OF UNDERWATER ROBOTIC SYSTEMS**

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抽象的。在当今技术快速进步和创新的世界中，水下机器人系统的管理尤为重要。水下机器人系统是自主远程操作设备，旨在探索海洋、调查水下结构和其他任务。此类系统配备了传感器、操纵器和通信系统，并且能够在很深的深度运行。它们用于科学、商业和军事应用，伴随着高水平 and 多样化的风险。

本文研究了基于风险的方法在水下机器人领域的应用。该研究的重点是评估和管理不同环境和应用中水下机器人相关的风险。作者概述了最先进的风险评估技术，例如运营安全分析、外部因素考虑和应急管理。特别关注监控和警报系统的开发，以使水下机器人操作员和工程师能够应对潜在的危险情况。

该研究还涵盖了基于风险的方法在水下机器人技术中应用的实际例子，包括深海勘探任务、海底基础设施维护和沉没物体检索。该文章强调了将基于风险的方法与水下机器人的开发和操作流程相结合以提高安全性和效率的重要性。

关键词：水下机器人、风险导向方法、风险评估、操作安全分析、水下基础设施维护。

Abstract. *In today's world of rapid technological advancement and innovation, the management of underwater robotic systems is of particular importance. Underwater robotic systems are autonomous and teleoperated devices designed to explore the oceans, survey underwater structures and other tasks. Such systems are equipped with sensors, manipulators and communication systems, and are*

capable of operating at great depths. They are used in science, commercial and military applications, which is accompanied by a high level and variety of risks.

This paper examines the application of a risk-based approach in the field of underwater robotics. The study focuses on the assessment and management of risks associated with underwater robots in different environments and applications. The authors present an overview of state-of-the-art risk assessment techniques such as operations safety analysis, consideration of external factors, and emergency management. Particular attention is given to the development of a monitoring and warning system to enable underwater robot operators and engineers to respond to potentially hazardous situations.

The study also covers practical examples of the application of risk-based approach in underwater robotics, including deep-sea exploration missions, subsea infrastructure maintenance and sunken object retrieval. The article emphasises the importance of integrating a risk-based approach and the development and operational processes of underwater robots to improve safety and efficiency.

Keywords: Underwater robotics, risk-oriented approach, risk assessment, safety analysis of operations, maintenance of underwater infrastructures.

Introduction

In today’s world of rapid technological progress and innovation, the management of underwater robotic systems is of particular importance. Operations in the underwater environment often involve risks associated with technical failures, the environment and human factors. In this context, a risk-based approach to technology management becomes particularly relevant [1]. The article examines key aspects of the application of this approach in the context of underwater robotic systems, and also identifies features integral to the efficient and safe operation of these systems.

An overview of modern risk assessment methods is presented in Table 1.

Table 1
Modern methods of risk assessment

Risk assessment method	Description	Advantages	Flaws
Monte Carlo method	A method based on the generation of random scenarios for risk assessment.	Flexibility and ability to accommodate a variety of variables.	Requires a large amount of calculations.
Analysis of events and consequences	Risk assessment based on the likelihood of events occurring and their impact.	Easy to use.	Can underestimate risks due to limited data.

Sensitivity Analysis	Studying the impact of changing parameters on project results.	Allows you to identify key risk factors.	Does not take into account the relationship between variables.
Probability and Statistics Analysis	Risk assessment using statistical methods and probability distributions.	Allows you to take into account statistical uncertainty.	Requires expert knowledge in statistics.
Risk Matrix	Systematic description of risks and their impact in the form of a matrix.	Visualizes relationships between risks.	Difficulty in using large projects.

The application of these methods in underwater robotics is presented in Table 2.

Table 2
Methods for risk assessment in underwater robotics

Method	Possibilities
Probability and Statistics Analysis	The method allows you to estimate the likelihood of various events, such as equipment failure, navigation errors or changes in the environment. Statistics and modeling can be used to predict risks.
Sensitivity Analysis	Underwater robots can be affected by various factors such as changes in depth, water temperature and salinity. Sensitivity analysis allows us to identify which parameters can have the greatest impact on the robot's performance [4].
Monte Carlo method	Use the method to simulate random scenarios, such as mission failure due to weather conditions or unexpected technical failures. It helps determine the likelihood and consequences of various events.
Analysis of events and consequences	In the underwater environment, various events may occur, such as collisions with underwater objects, loss of communication, or loss of energy. Event and consequence analysis determines the likelihood and impact of such events on the mission.
Modeling and simulation	The use of computer modeling and simulation allows virtual tests and risk assessments to be conducted prior to the actual mission. This helps rule out a lot of potential problems up front.

A risk-based approach to managing underwater robots includes assessing and prioritizing potential threats, using autonomous systems to respond to risks, and regularly updating to ensure safe and efficient operations.

Conclusion

A risk-based approach is a management method in which organizations analyze and assess potential risks, take measures to reduce them and develop response strategies in case of unforeseen situations to ensure the stability and sustainability of their activities [3]. A risk-based approach to managing underwater robotic systems should consider the following:

- Risk identification: Analysis of potential hazards and adverse events associated with the operation of the safety equipment.
- Risk assessment: Assessing the likelihood and impact of risks on the implementation of PBA tasks.
- Risk Management: Developing risk mitigation and management strategies, including technical and operational security measures.
- Education and Training: Provide training to personnel in the field of security and emergency response.
- Monitoring and analysis: Continuous monitoring of the state of PBA and the environment to quickly identify risks.
- Response planning: Developing action plans in the event of unforeseen situations, including evacuation or repairs.
- Compliance with regulations and standards: Compliance with legal and industry requirements related to the safety of pharmaceutical substances.
- Communication and cooperation: Establishing effective communication channels and cooperation with regulatory authorities and other structures.
- Innovation and development: Using new technologies and innovations to improve safety and reduce risks.
- Incident Analysis: Post-incident analysis to learn lessons and continuously improve the risk management system.

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业务分析作为经济数字化背景下公司分析的新概念
**BUSINESS ANALYSIS AS A NEW CONCEPT OF ANALYTICS IN
A COMPANY IN THE CONTEXT OF DIGITALIZATION OF THE
ECONOMY**

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抽象的。 本文致力于业务分析及其关键要素。 信息流的加速导致需要实施变革管理系统并开发新的分析工作领域——业务分析。 业务分析使您能够根据公司已确定的需求来管理变革，同时考虑到经济数字化背景下利益相关者的要求。 本文评估了业务分析的重要性，对概念工具进行了研究，揭示了业务分析师在变更管理系统中的角色，并确定了他必须解决的任务。 值得注意的是，概念模型可以普遍应用于任何公司来描述情况、识别因果关系并制定有效的问题解决方案。

关键词：业务分析、业务分析、基于数据的解决方案开发、可持续发展、公司变革、业务分析师。

Abstract. *The article is devoted to business analysis and its key elements. The acceleration of information flows has led to the need to implement a change management system and develop a new area of analytical work - business analysis. Business analysis allows you to manage changes based on the identified needs of the company, taking into account the requirements of stakeholders in the context of digitalization of the economy. The article evaluates the importance of business analysis, conducts a study of the conceptual apparatus, reveals the role of the business analyst in the change management system and identifies the tasks that he has to solve. It is noted that the conceptual model can be universally applied in any company to describe the situation, identify cause-and-effect relationships and develop effective solutions to problems.*

Keywords: *business analysis, business analysis, data-based solution development, sustainable development, changes in the company, business analyst.*

The emergence of the concept of business analysis in global analytical practice has objective reasons. The rapid changes characteristic of the modern VUCA

world (and its subsequent manifestations BANI world, SHIVA world and TACI world) have significantly reduced the value of using predictive, predictive and normative analytics, which were traditionally used as the basis for the development and adoption of management decisions. Situations in the external environment began to change at such a speed that companies using this kind of analytics could no longer keep up with them when developing and implementing solutions in response to emerging challenges. Thus, a need has arisen to create a fundamentally new analytical concept that allows not only to keep up with changes in the external environment in the development of solutions, but also to guarantee sustainable development for the company [1].

From the beginning of development, the conceptual idea of business analysis was refined and improved for about ten years, until in 2015 the third version of the Business Analysis Body of Knowledge (BABOK) was released, which continues to operate in 2023. The initiator of its development and the creation of the concept of business analysis became IIBA (International Institute of Business Analysis), which was organized in 2003 and officially registered in 2004. BABOK is a collective work of practicing professionals in the field of business analysis with around the world, a fundamental document on business analysis, which reveals its concept, the areas of knowledge of business analysis, the competencies of business analysts, the range of tasks they perform in the company, and also presents more than fifty techniques that are most often used to perform tasks business analysis [2].

This international standard is recognized and used in many countries around the world. More than 120 IIBA (International Institute of Business Analysis) branches are registered and operating around the world. The Russian branch of IIBA was created in 2015 [3, p. 59]. The relevance and demand for business analysis increases every year both abroad and in Russia.

The interpretation of the term “business analysis” is ambiguous. The first mention of business analysis appeared in 1958. The term was proposed by one of the researchers at IBM, Hans Peter Luhn [4, p. 314].

In table 1 provides an overview of the most common definitions of this term.

Table 1
The concept of business analysis in domestic and foreign literature

Author	Interpretation of the term
Hans Peter Luhn	The ability to notice relationships between existing facts and the goal of achieving the desired result
V. I. Barilenko	A means of implementing the principles of social responsibility of business and ensuring conditions for sustainable development of both companies and society as a whole [5, p. 15]

N.V. Kondrashova	A separate thematic area of economic analysis and, accordingly, the type of analytical work [6, p. 45]
A.V. Kugaevskikh	This is an activity that allows you to implement changes in the organization by identifying needs and forming recommendations for solutions that provide value to stakeholders [7, p. 13]
I.A. Nikitin,	This is a set of tasks and methods used in work to establish and further maintaining relationships between stakeholders, regulatory documents and operational activities of the organization [8, p. 182]
M.T. Tsulaya	Activities that enable changes to be made in an organization that benefit stakeholders in a particular context by identifying their needs and justifying decisions that describe possible ways to implement these changes [9, p. 79]
BABOK	A set of tasks, methods, qualifications and capabilities necessary to clearly define the problems facing a business and justify ways to solve them

In our opinion, business analysis is an analytical activity aimed at identifying and solving business problems in the interests of the company, stakeholders, and society.

Specification and comparison of the goal, subject, method, tasks, subjects, tools of business analysis and analysis of economic activity are presented in Table. 2.

Table 2

Comparison of content elements of business analysis and business analysis

Content elements	Analysis of economic activities	Business analysis
Target	Increasing the economic efficiency of business entities, identifying unused reserves	Mandatory changes to solve problems or take advantage of opportunities [10, p. 84]
Item	Economic processes, economic efficiency, financial results of business entities	Economic phenomena that occur as a result of the implementation of both individual business processes and the entire activity of organizations as a whole. Also, cause-and-effect relationships of these phenomena and processes, their compliance with the requirements of stakeholders [5, p. 37]
Method	A dialectical way of approaching the study of economic processes in their formation and development	Identifying business problems and developing solutions to them, taking into account the requirements of all stakeholders

Tasks	Study of economic phenomena, factors and causes that determined them; objective diagnosis of the condition and assessment of the efficiency of economic activity; scientific substantiation of business plans, monitoring the progress of their implementation; identification of on-farm reserves, study and generalization of specific experience [11, p. 9]	Selection of main stakeholders, analysis of their requirements; identifying business problems in accordance with stakeholder requirements; business change development
Tools	Methods of factor analysis (chain substitutions, method of absolute and relative differences, integral), tabular, comparison, grouping, index, economic and mathematical methods, etc.	Business opportunity analysis, conceptual modeling, data mining, financial analysis, functional decomposition, metrics and key performance indicators (KPIs), mind mapping, etc.
Subjects	Business entity management and external users	Company management and stakeholders
Standardization and certification	There is no standardization and certification of analytical activities	Professional standard «Business Analyst» Business Analysis Body of Knowledge (BABOK) Three types of certificates: Entry level (knowledge of the theoretical foundations of analysis; Advanced level (involves the ability to carry out analysis in practice, not excluding theoretical knowledge); Expert level (excellent knowledge of the theoretical foundations of analysis, existing practical experience)

A comparison of the substantive elements of the analysis of economic activity and business analysis allows us to draw a conclusion about the existing differences between the analytical areas under study. For some elements, insignificant differences are observed; for some, the results of comparisons are very different, for example, regarding standardization and certification of analytical activities. It should also be noted that business analysis is focused on the interests of stakeholders. This position is predetermined by the high competition of companies and the huge number of risks they face in the course of their activities in the modern realities of a market economy. Today it is no longer enough to identify unused reserves and monitor the implementation of business plans. The need to make mandatory and permanent changes in the activities of companies in accordance with ongoing

changes in the external environment is becoming urgent. A management system based on the results of business analysis becomes more flexible and more adapted to functioning in changing conditions.

A comparative analysis of the directions and advantages of business analysis compared to the analysis of economic activity is presented in Fig. 1.

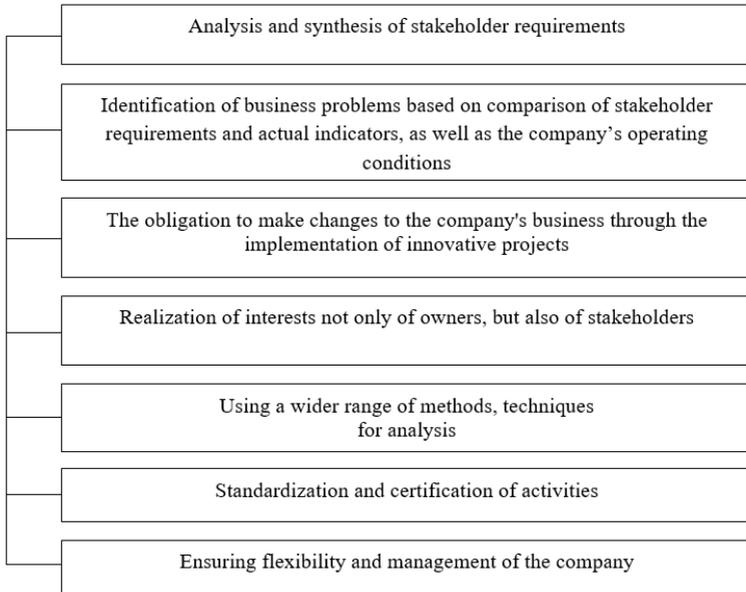


Figure 1. Advantages of business analysis compared to business activity analysis (Author's development)

A fundamentally important feature of business analysis, which distinguishes it from traditional approaches to domestic analysis, should be considered a change in guidelines and basis for comparisons. Now this is not a plan and not indicators of past periods, not an analogue enterprise and not some ideal calculation option, but the requirements of key stakeholders. It is with them that it is necessary to compare the actual situation in business and thus find business problems in order to then analytically substantiate the ways to solve them [12].

The concept of business analysis can be revealed through understanding the essence of its conceptual apparatus, primarily the basic and key concepts and the relationships existing between them.

The concept of business analysis is the highest level of analytical work, implementing a fundamentally new approach to developing solutions to business prob-

lems - the Data Driven Decision Making (DDDM) approach - information-based decisions (or data driven decisions), data-based decisions. This approach can be implemented by the concept of business analysis, which is based on a set of its six basic concepts - change, decision, value, stakeholders, needs, context and a description of the relationships between them (Fig. 2).

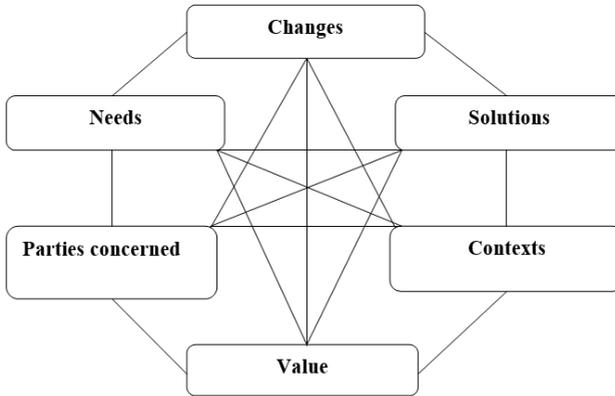


Figure 2. Conceptual model of business analysis (Author's development)

It is important that all elements of the conceptual model have connections with each other. This means that when developing a solution, not only must you work with each element, but a change in any of the components also requires a mandatory re-examination of all elements to correct the available information.

In the changing and unpredictable VUCA world, it is the equally deep and detailed work, necessarily with each of these concepts, that together allows us to get the truly best result (the greatest value) when developing a solution. Moreover, if in the process of developing a solution you “forget” about any of the listed basic concepts or “work through” it insufficiently deeply, then the quality of the developed solution will suffer greatly. Therefore, the process of business analysis work cannot be approached formally or always act according to unchanging patterns, otherwise the developed solution will not meet expectations in terms of its value. It is the combination of the six listed basic concepts of business analysis that allows you to approach the solution of a problem systematically and conceptually, literally “see everything” and develop a data-driven solution.

Business analysis helps solve problems associated with changes in business, including: identifying the expectations and needs of stakeholders; collecting requirements and working with them; analysis of the situation; development of solutions based on the data driven approach; assessment of the company's capabilities

in implementing the solution; assessment of risks associated with stakeholders, implementation of decisions, changes; development of current and target business process models, etc.

Working within the framework of a conceptual model, a business analyst must be able to appropriately apply the entire variety of existing techniques (methods) of analysis and management. Business analysis combines and usefully uses all previously developed and relatively “separately” applied management and analysis techniques, in addition, it applies new flexible practices for working on projects (and all the activity of an analyst is project work, since each developed solution should always contain novelty) , also uses digital technologies, data mining capabilities, etc. [13]. In addition, business analysis has a recognized value, confirmed by international certification in the areas of cybersecurity, product development, agile, business data analytics [14].

Some examples of techniques used by business analysts are: techniques for analyzing context and identifying the causes of a problem (for example, root cause analysis, document analysis, Canvas model, etc.); process analysis and modeling techniques (for example, data flow diagrams, process analysis, process modeling, etc.); working with stakeholders and requirements (stakeholder map, surveys and questionnaires, user stories, use cases and scenarios, prioritization, etc.); techniques for developing and evaluating a solution (metrics and KPIs, balanced scorecard, lessons learned, project evaluation techniques, etc.).

BABOK describes the fifty most commonly used techniques used by business analysts. Moreover, most of the techniques on this list are a combination of techniques, not just one [15].

The business analysis framework also includes six knowledge areas that are based on the defining and unique competencies of a business analyst. In general, they can be described as follows [16, p. 61-62]:

- planning and monitoring – planning the process of business analysis work itself. Planning involves the formation of an action plan, work on business analysis, a description of specific tasks related to a given problem (initiative, project), the choice of techniques used in carrying out certain work on business analysis (they may change or be supplemented during the work) . This area contains many analogies to project planning, since business analysis work is always a project;

- identification and cooperation is the identification and work with stakeholders. Includes a description of tasks in terms of identifying stakeholders when developing a solution, obtaining information from them or from other sources, confirming the results of identifying information, and transferring information to interested parties. The work has much in common with the work of a project manager with some features inherent in business analysis;

- requirements life cycle management is a description of the main and important tasks and types of work from the point of view of business analysis in the

field of managing and maintaining requirements, including the development of requirements for a solution and working with them throughout the entire work on the problem from beginning to end, description the process of achieving agreement between stakeholder requirements and solution requirements when working on a project;

- strategy analysis – development of solutions for the development of the organization. This area describes the work of a business analyst with a strategic focus on leveraging the organization’s capabilities for further development. Strategy analysis focuses on collaborating with stakeholders, identifying the resulting strategic business needs, and identifying future and transition parameters to meet those business needs. Achieving the desired future states should enable the satisfaction of strategic business needs in a specific context, taking into account existing constraints, and ensure the sustainable development of the company;

- requirements analysis and design determination is the development and detailed description of the essence of the developed solution. It includes a description of tasks for the formation, structuring and systematization of requirements (documentation, modeling, specification, verification, validation, determination of requirements architecture), identification of solution options (their description - design) that meet business needs, and the expected potential value for each solution option;

- solution assessment - this area describes tasks for assessing the value (efficiency, benefit) of a solution: its value for the company and stakeholders and recommendations for eliminating obstacles or restrictions that do not allow this value to be fully realized. Typically, to assess the value of a solution, KPIs are developed to monitor its results and ensure that the solution actually achieved all the expected goals.

Business analysis allows you to develop guaranteed best solutions, providing the opportunity to make changes in your business. “Guaranteed best solutions” is one of the mandatory requirements for business analysis, enshrined in BABOK [2]. The development of truly better solutions allows the use of the Data-driven approach, which has become an alternative to the HiPPO (Highest Paid Person’s Opinion) approach - decision-making based on the opinion and experience of management, on expert assessments, which is already outdated. The problem with the HiPPO approach is that the manager cannot be competent and objective in all matters, know all the features and subtleties of the context in which the problem arose [17, p. 236].

The data-driven approach assumes that at the solution development stage there must be a full understanding of what this decision will affect, who will be affected and how, what will need to be changed during its implementation, and what result can be achieved in the end. This significantly increases the opportunities

for successful business development and gaining advantages over competitors. Nowadays, successful management tactics and strategies in the modern world are built on this approach [18].

Thus, carrying out work on business analysis, which requires not only a significant amount of knowledge, but also its constant development and expansion, fully reflects the requirement of the VUCA world - constant training so that the specialist's level of competence allows him to withstand his challenges [19]. This also applies to gaining knowledge from related fields, and in addition, a business analyst must monitor all new trends, study them, and usefully apply them in his work. Thus, the recent emergence of artificial intelligence is already used by business analysts when analyzing problems and developing solutions.

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制定提高公司人力资源管理效率的建议 (案例研究)
**DEVELOPMENT OF RECOMMENDATIONS TO INCREASE
EFFICIENCY OF THE COMPANY'S HR-MANAGEMENT
(CASE STUDY)**

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抽象的。人力资源管理 (HRM) 在吸引、培养和留住成功执行公司增长战略所需的优质人才方面发挥着关键作用。本研究重点分析四个关键的人力资源管理实践：招聘、选拔、绩效管理和培训，以深入了解特定公司 (DTC Corporation) 如何吸引、选择、发展和留住员工。它还旨在研究 DTC 的人力资源管理如何使其人力资源实践与公司的发展目标保持一致，并将其与人力资源管理的最佳实践进行比较。这项研究的结果为 DTC (和其他公司) 提供了宝贵的信息，有助于未来改进和实施其既定的“加速增长”战略。

关键词：人力资源管理 (HRM)、关键人力资源实践、招聘和选拔、员工绩效管理、人力资源培训、高绩效工作系统。

Abstract. *Human resource management (HRM) plays a key role in attracting, developing and retaining the quality talent needed to successfully execute any company's growth strategy. This study focuses on analyzing four critical HRM practices: recruitment, selection, performance management and training to gain insight into how a particular company (DTC Corporation) attracts, selects, develops and retains its workforce. It also aims to examine how DTC's HRM aligns its HR-practices with the firm's development goals and comparing them with the best practices in HRM. The results of this study provide DTC (and other companies) with valuable information for future improvements and implementation of its stated "Accelerate to grow" strategy.*

Keywords: *human resource management (HRM), key HR-practices, recruitment and selection, employee performance management, HR-training, high-performance work systems.*

Introduction

Corporation DTC is a Dutch telecom provider offering a wide range of services to individuals and businesses, including mobile and fixed telephony, internet,

television, and cloud services. Since DTC's creation 31 years ago, the company has become a powerhouse in the Dutch telecommunications sector. The DTC market share was around 40% in 2022 and its main competitors are Odido, formerly known as T-Mobile, and Vodafone Ziggo. DTC's success in this sector is also reflected in the company's stock exchange listing. DTC market capitalization is approximately 12.5 billion euros. According to Beursgenoten (2023), the top level of management consists of CEO Kurt Friedrichsen and five other senior managers, who are controlled by a nine-member board of directors. The company has 9,372 employees, making it a fairly large organization whose goal is to implement DTC's core strategy: *accelerating digitalization*. This plan focuses on *three key areas*: connected networks (fiber and 5G), connected customers (customized services), and connected organization (optimized processes for sustainability and innovation). This strategy aims to position DTC as a market leader. Of course, a separate specialized HR department is required to manage all these employees. *The purpose of the article* is to examine the HRM-practices of DTC at its headquarters and develop recommendations for its improvement.

1. Theoretical Framework

The practices of *Human Resource Management (HRM)* play an important role in the success of an organization. They directly influence the organization's ability to attract, develop and retain talents (Komm et al., 2021). One could argue that four practices, in particular, are necessary for an organization's success: *recruitment, selection, performance management and training*.

Recruitment is the initial step in the HRM process through which the organization seeks candidates for potential employment. This practice aims to attract a wide range of qualified individuals who not only possess the necessary skills and qualifications but also align with the values and culture of the organization. *The goal of recruitment* is to ensure a pipeline of candidates that will enable the organization to achieve its goals by placing suitable individuals in appropriate roles.

Selection is the next stage in which the organization evaluates and chooses the employees from among the candidates identified during the recruitment process. This practice entails an assessment of applicants through methods such as *interviews, testing and reference checks*. The ultimate *goal of selection* is to match candidates' skills, experiences and attributes with requirements for the job position (Kumari, 2012, p. 2).

Performance management, in turn, is a process whose purpose is to align the actions and results of an employee with the goals of the organization. This includes setting expectations, monitoring progress, and providing feedback (Komm et al., 2021). The main purpose of performance management is to improve the performance of an organization by identifying areas for improvement, means for growth, and employee accountability (Kumari, 2012, p. 2).

Training refers to organized efforts to help employees acquire “job-related knowledge, skills, and behaviors.” Training programs are designed to equip individuals with the competencies needed to perform their roles, thereby increasing their productivity and adaptability.

These four areas are interrelated and essential for effective HRM. For instance, a designed recruitment process attracts qualified candidates that enhances making the selection process more efficient. Effective performance management helps identify employees who may require training or development opportunities and training programs are important for improving employee productivity (Kumari, 2012, p. 5).

2. Methods

To scrutinize the HRM-practices at DTC’s headquarters, two interviews were conducted: an employee responsible for talent acquisition and an information technology manager were interviewed. The content of the interview (see Appendix A) in terms of questions asked differed between the HR-manager (Kurt) and the IT-manager (Christie), but the method used (STAR-method) remained the same. During the first interview, a large amount of information was collected about DTC’s HR-practices, while during the second interview, potential points of HRM improvement were noted and recorded based on the IT-manager’s comments. The interviewer started off by asking some ‘general’ questions, such as what the position of the individual in question is at the firm. After this, questions were asked, the answers to which became more and more detailed, for instance, what problem did the HR-manager or IT-manager encounter when developing HR-policies?

3. Results

Recruitment. The role of HRM in recruiting primarily focuses on activities related to identifying and attracting potential candidates for open positions. DTC’s HR-managers participate in the formation of shortlists of candidates based on job profiles developed by department heads. One of the interviewees, Kurt, noted that he often communicates with HR-managers about the profiles of candidates he is currently looking for to join his team. In another interview, Christy gave a lot of information about recruiting strategies. It was found that DTC takes a multifaceted approach to recruitment, combining traditional and modern methods. One example is the use of specialized job portals to attract candidates with niche skills, thereby strengthening employer branding. The company also uses internal referrals, gives new tech employees better equipment and encourages them to attend events and write blogs. Through this approach, they aim to attract applicants with the right characteristics and skill sets.

DTC’s HR-department pays special attention to young technical candidates, some of whom have not even completed their studies. While DTC is a big company, they simply can’t compete with the salaries offered by giants like Facebook

and Google. Hence, DTC focuses on offering these young tech-talents a clear development path and a great environment to work and grow in. Overall, DTC's recruitment strategy aims to attract young talent by offering them a clear development path and providing them with the latest equipment and technology.

Selection. HRM plays a critical role in matching candidate profiles to the specific needs of business unit leaders, aiming to provide candidates with the required competencies for the relevant positions. The selection process at DTC is very structured and rigorous, involving a thorough resume screening and multiple rounds of interviews. During these various rounds of interviews, a variety of tests are conducted - technical, personality, leadership and cultural. Christie stated that the technical quality of the candidate is the first element which is analyzed through the technical test. A candidate's thought process can provide insight into future growth potential. Apart from the technical qualities of the candidate, DTC requires a certain level of communication skills from its candidates. These skills are commonly observed during interviews to assess personality and leadership ability. In several DTC departments, particularly Christy's department, skills such as communication, planning, and teamwork are highly valued.

Other key values include a desire to learn and continually improve. DTC is committed to selecting qualified, social and ambitious candidates from its recruitment pool to strengthen its organization. Finally, there must be compliance with the cultural level. DTC as an organization has three core values: trust, courage and growth. It is logical that candidates should demonstrate closeness to these values. An imperative is a match between the candidate's characteristics and the team's expectations. Therefore, there is no "one-size-fits-all" policy. The HR-department looks at what a particular team requires and what candidate characteristics need to be ensured during selection. More often than not, DTC prioritizes team-candidate fit over technical quality because teamwork is fundamental. While the majority of applicants are male, Christie emphasized the importance of gender diversity on teams and a commitment to maintaining a 50/50 gender ratio among new hires.

Performance management. DTC's approach to employee performance management is characterized by regular reviews as well as reporting on progress. From the interviews, it became clear that HRM uses a tool such as the DTC academy, which helps stimulate employee improvement and development. The academy runs an internal training program with a range of courses and modules, but also facilitates mentoring and coaching initiatives to support staff career development.

An important aspect of this program is the progress presentation of new employees, in which they must show how they have progressed in their growth path over the year and receive evaluation from their peers and managers. This is a really good component of the performance review process. Through these presentations, employees communicate their suitability (and value) to the organization, discuss

career aspirations, and receive constructive feedback. It is logical that the further along the path of growth you are, the more responsibility you bear, but you also receive compensation for it. If your colleagues approve of your presentation, this will affect your (financial) reward. Typically, a percentage increase in salary is paid, or even the employee is transferred to a new higher salary category, or bonuses are paid. Over time, DTC has moved from so-called benefits to financial compensation. Transparency allows every employee to voluntarily report on their progress and advocate for their point of view. With this approach, he gains control of his own destiny rather than relying on the judgment of senior managers who may not have a detailed understanding about the work he has done.

Other relevant practices. DTC's HRM-department manages significant internal conflicts, ensures legal compliance, invests in employee development, and prioritizes fairness and equal opportunity for all employees, all of which contribute to the success of the organization.

4. Discussion

This section critically evaluates and discusses current DTC HRM-practices. It will be assessed the *horizontal and vertical alignment* of HRM-policies, systems and practices against best practices as well as *High Performance Workforce Systems (HPWS)*.

Vertical fit and horizontal alignment. A strategy to accelerate DTC growth requires strong alignment with HR-practices, especially to achieve vertical alignment with three core goals: connected networks, connected customers, and a connected organization. The interviews indicated that there was room for improvement in achieving this vertical alignment. Given the rapidly evolving nature of the IT-industry, DTC's HR-managers must adapt their talent selection skills and techniques to the changing environment. Notably, Kurt's observation that HR professionals may lack a deep understanding of business and role-specific competencies highlights the importance of HRM learning more about industry-specific knowledge and tailored practices to ensure the company's success in an ever-changing environment.

Horizontal alignment, an equally important aspect, involves the interconnection and mutual improvement of HRM-practices. The interviews revealed that hiring managers work closely with the HR-department in recruiting staff. However, there is an opportunity to better understand the needs and challenges of a particular department, thereby improving the selection process. This deeper understanding can facilitate more synchronized horizontal alignment, which will ultimately contribute to the achievement of the organization's overarching goals as it ensures consistent HR-practices across all departments.

Recruitment. The DTC's approach to recruiting is comprehensive and also involves HR-working closely with hiring managers to identify and attract qualified

candidates. Although DTC's HRM-department already plays a key role in the selection of candidates, there is still room for improvement and developing a deep understanding of the specific competencies required for various positions. Sources also confirm the importance of the hiring manager having a thorough understanding of the business to ensure that his efforts closely match the needs of the organization (Guest, 1997). DTC can truly benefit from a more proactive approach to creating and retaining new skills and adjusting recruitment practices accordingly to meet the demands of the evolving IT-landscape.

According to Burks et al. (2015), a company's use of internal referrals is a best practice because research has shown that referred candidates tend to have higher job performance and stay with the organization longer. In the context of DTC, attracting employees from universities is commendable and is in line with the goal of creating a skilled workforce. To strengthen this recruitment drive, DTC could create special internship and collaboration programs to better integrate and develop such young talent within the organization. Moreover, Phillips and Galli (2015) argue that HR-managers' hiring activities, characterized by open communication with others in the company, are consistent with best recruitment practices. This collaboration ensures that the selection process is synchronized with the needs of the organization. DTC, in turn, should consider formalizing feedback mechanisms to further improve its recruitment practices.

Selection. The DTC selection process is rigorous and structured and includes: technical assessment, behavioral interviews, group interviews and even simulation exercises. According to Campion (2011), these methods are consistent with best practices in attracting new talent. The use of job-specific simulations demonstrates DTC's commitment to assessing candidates under stress. This practice for occupations where decision making under stressful conditions is critical is also supported by Lievens et al. (2012).

To identify employees with high potential, DTC uses *LP-assessment* (Leadership Profile) of candidates, which is considered to be consistent with a reasonable approach to personnel management. Identifying an applicant's high potential allows for targeted training and development, which Gallardo-Gallardo (2013) argues is best practice for securing a talent pipeline. Additionally, focusing on a candidate's cultural fit with the company's corporate values is commendable, as Chatman's (1989) research shows higher job satisfaction and engagement levels among such candidates. To improve the selection process, DTC could conduct regular vacancy reviews to harmonize job requirements and candidate assessments. According to Hartog and Verburg (2004), this practice helps to update selection methods as job roles evolve. As interviewed suggested, greater collaboration between HR-managers and company departments could improve the selection process in terms of understanding what each department needs.

Performance management. The DTC approach to employee performance management includes: regular reviews, feedback, development opportunities, LP-assessments and formal employee presentations. The use of LP-assessments combined with specialized training and mentoring for high-potential employees is consistent with best talent management practices (Gallardo-Gallardo et al., 2013). At the same time, DeNisi and Murphy (2017) argue that regular feedback and coaching are essential for employee growth and formalization of accountability.

According to Atwater and Yammarino (1997), formal presentations by DTC employees receive feedback not only from managers but also from peers, which can be associated with the 360-degree feedback method. They claim that this method is effective for evaluating job performance and promotes professional growth of employees. At the same time, DTC's approach to employee compensation, bonuses and benefits demonstrates the fairness and transparency of the reward system that Miljkovic and Newman (2019) wrote about in their book as relevant best practice. For DTCs, implementing modern performance management software can improve efficiency and insight into the data generated. In addition, creating individual development plans based on regular feedback will promote a culture of continuous improvement.

Other relevant practices. DTC's HRM-practices go beyond recruiting and performance management. Company involvement in conflict resolution and legal compliance is critical to the organization's success. Studies conducted by Jackson et al. (2008) highlight the role of HRM in maintaining a healthy work environment and ensuring compliance with laws and regulations. At the same time, according to Noe (2017), developing a skilled and adaptable workforce is vital to the success of an organization. Thus, the company's emphasis on employee development and training programs is consistent with best HRM-practices. Moreover, Cox and Blake (1991) argue that diversity and inclusion in HRM improves organizational performance and promotes increased innovation.

Note that DTC is committed to fairness and equal opportunity for its employees. However, to further improve these practices, DTC could focus on developing HRM metrics to measure the effectiveness of conflict resolution, as well as to capture the number of diversity initiatives and the level of HR-inclusion. This data-driven approach ensures that HRM-practices align with organizational goals and can be continually improved.

High performance work systems (HPWS) also have implications for employee selection and training. To work on equipment created using new technologies, employees need professional knowledge and basic skills. The HRM-practices reviewed support HPWS. These practices are designed to give employees skills, incentives, knowledge, and autonomy. High-performance work practices are typically associated with improved employee productivity, long-term financial perfor-

mance, and integrated use of all practices. In this way, HPWS maximizes the fit between the company's social system (employees) and its technical system (Hartog and Verburg, 2004). Technology provides the information needed to improve customer service and product quality. Considering the above, the introduction of HPWS into DTC activities is undoubtedly commendable.

5. Conclusion

This paper has attempted to present a comprehensive analysis of the HRM-practices of a DTC company, focusing on recruitment, selection, performance management and other relevant human resource management practices. In addition, a study was conducted on how the above-mentioned practices align with DTC's strategic goals. An extensive analysis of the previously mentioned practices revealed that DTC has a multifaceted and evolving approach to HRM aimed at successfully implementing its "Accelerating Growth" strategy.

The company's recruitment practices, combining traditional methods and modern strategies, are primarily focused on young talent in the technology sector. Selection processes are rigorous and structured, focusing not only on technical skills, but also on soft skills and applicants' cultural fit with the company's values. Performance management includes regular feedback, development opportunities and employee presentations, emphasizing reward transparency and highlighting high-potential employees. In addition, DTC's HRM-practices extend to conflict resolution, legal compliance and employee development, reinforcing the company's commitment to fairness and equal opportunity.

The study's findings have significant implications for both DTCs and peer organizations in competitive, high-growth industries. Let us note the importance of aligning HRM-practices with changing business goals, adapting them to the changing requirements of the IT-environment, while ensuring their compliance with the strategic goals of the organization. To achieve this, DTC must proactively adjust its recruitment, selection and performance management practices. In addition, horizontal alignment of HRM-practices across departments is critical to improving the selection process, providing a better understanding of departmental needs and contributing to the achievement of common goals. Best practices identified include the use of job-specific simulations, focusing on high-potential candidates who fit the firm's culture and embrace its values. Finally, implementing integrated HPWS, formalizing feedback mechanisms, and increasing collaboration with other departments can further optimize DTC HRM-practices.

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Appendix A. Interview Questions

Preliminary Questions for HR employee:

1. Hi, what is your name and your official function (title) within DTC? How long have you been with the company?
2. What tasks does your job typically entail, more specifically within human resource management?
3. Can you describe the most crucial components/hulpmiddelen of your HR-systems?

Recruitment Questions

1. What are places or events where you most frequently encounter potential talents for DTC? Are these on your initiative or on the initiative of candidates?
2. Which steps are typically taken to find suitable candidates until an actual interview? any preliminary checks/ background checks or CV-review

Selection Questions

1. What are key driving factors and characteristics you look for when searching for talents?
2. How do you determine whether the candidate fits into the position and the role within the team?
3. Are there any metrics or indicators that significantly outweigh compared to others? What is element/score is most important for the selection procedure?

Performance Management Questions

1. Once someone is actually hired, what are some factors or indicators you keep track of to measure their performance?
2. If a (new) employee performs more than expected, what rewards are typically awarded?
3. Are there any regular check-in moments for you to assess new employees?

STAR

1. Is there any specific situation you can tell us about when you encountered a problem within the HRM-system, and how did you solve this?

Preliminary Questions for regular employee(s):

1. Hi, what is your name and your official function within DTC?
2. What does your function entail specifically?
3. In what situations do you reach out to HR?
4. What are your feelings toward the HRM-department within DTC?
5. Do you think HRM is efficiently organized within DTC? What are components are parts you would like to see improved?
6. Can you tell me about any specific situation in which you had a problem, had to reach out to HR and what actions were taken to fix the situation? What was the result?

全球刑事司法的问题和前景：国际刑事法院的作用

**PROBLEMS AND PROSPECTS OF GLOBAL CRIMINAL JUSTICE:
THE ROLE OF THE INTERNATIONAL CRIMINAL COURT**

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注解。这篇研究型文章探讨了全球刑事司法的问题和前景，并探讨了国际刑事法院（ICC）在此过程中的作用。分析了国际刑事法院的非法性、政治影响力和资源有限等全球刑事司法的主要问题。此外，文章还探讨了国际刑事法院的立法职能、其在起诉危害人类罪和保护受害者方面的作用。然后，它提出了加强国际刑事法院的观点、加强执法机构与成员国之间合作的必要性以及公众参与的重要性。最后，文章总结了全球刑事司法的问题和前景，强调了国际刑事法院的作用以及进一步发展和加强全球刑事司法体系的必要性。

关键词：全球刑事司法、国际刑事法院、问题、前景、非法性、政治影响、有限资源、立法职能、起诉危害人类罪、受害者保护、加强、合作、公众参与。

Annotation. *This research-oriented article explores the issues and prospects of global criminal justice and examines the role of the International Criminal Court (ICC) in this process. It analyzes the illegitimacy of the ICC, political influence, and limited resources as the main problems of global criminal justice. Furthermore, the article examines the legislative function of the ICC, its role in prosecuting crimes against humanity, and protecting victims. It then suggests perspectives for strengthening the ICC, the need for enhanced cooperation between law enforcement agencies and member states, as well as the importance of public participation. In conclusion, the article summarizes the problems and prospects of global criminal justice, highlighting the role of the ICC and the need for further development and strengthening of the global criminal justice system.*

Keywords: *global criminal justice, International Criminal Court, problems, prospects, illegitimacy, political influence, limited resources, legislative function, prosecution of crimes against humanity, victim protection, strengthening, cooperation, public participation.*

Global criminal justice plays a significant role in the modern world, aiming to achieve justice and accountability for violations of international law. Given

the criminal nature of the most serious crimes, such as genocide, war crimes, and crimes against humanity, global criminal justice seeks to address impunity for such crimes.

The International Criminal Court (ICC) is a key institution in global criminal justice. It was established in 2002 as a permanent international body to handle cases of serious crimes that fall within the scope of global criminality. The work of the ICC is based on the Rome Statute, a document adopted in 1998, which establishes its jurisdiction and procedures.

The ICC is an important international mechanism for judicial prosecution, providing an avenue to hold accountable individuals who have committed the most serious crimes within the court's jurisdiction. It serves as a vital instrument for achieving justice, inflicting moral and material harm on perpetrators, and ensuring international peace and security.

Key principles of global criminal justice, upon which the ICC is based, include independence, fairness, immunity, and mutual respect. The ICC operates under the principles of limited jurisdiction, applying international criminal law and human rights law.

Global criminal justice, carried out by the International Criminal Court (ICC), has become a means of pursuing the commission of the most serious crimes, such as genocide, war crimes, crimes against humanity, and crimes of aggression. However, despite its significance, global criminal justice faces a number of challenges that impact its effectiveness and public trust in the system.

The first problem of global criminal justice is linked to the limited jurisdiction. The ICC can only hear cases involving individuals from states that have ratified the Rome Statute. This limitation leads to a situation where criminals in non-state parties to the Rome Statute remain unpunished. This raises allegations of selective justice and creates barriers to achieving full accountability for perpetrators.

The second problem lies in the political influence on global criminal justice. ICC member states can exert influence on the Court's work, particularly regarding the investigation and prosecution of specific crimes. This allows for political manipulation of the justice process and raises the risk that politically supported criminals may evade accountability.

The third problem of global criminal justice is related to limited resources. The ICC faces funding shortages and case overload, which hamper its work. Limited resources affect the Court's ability to investigate and prosecute all crimes requiring its intervention. This can result in situations where some cases are wrongly prioritized or not addressed at all.

Overall, global criminal justice faces several challenges that constrain its effectiveness and reliability. Limited jurisdiction, political influence, and resource constraints have a negative impact on the work of the International Criminal Court and raise doubts

about its ability to ensure justice and hold perpetrators accountable. Overcoming these problems requires improving mechanisms of cooperation among ICC member states, increasing funding, and enhancing the Court's efficiency.

The International Criminal Court (ICC) plays an important role in establishing and developing international criminal law. It is the first and only permanent international criminal court empowered to hear cases of the utmost seriousness, such as genocide, war crimes, crimes against humanity, and crimes of aggression.

One of the key roles of the ICC is its legislative function. The Court plays an active role in establishing and interpreting international criminal law. The precedents and decisions of the ICC contribute to the development of judicial practice and the gradual evolution of criminal law, especially in relation to crimes against humanity and crimes committed during armed conflicts. ICC decisions also create norms and standards that can serve as a basis for the development of new international conventions and laws.

The ICC plays a crucial role in the prosecution and judicial investigation of crimes against humanity. The Court handles cases related to mass human rights violations, such as torture, killings, rape, and forced deportations. Investigating and holding accountable those responsible for such crimes contributes to justice and the prevention of impunity.

Precedent-setting decisions of the ICC regarding crimes against humanity are of vital importance in protecting human rights and preventing similar crimes in the future. The Court's decisions establish that such crimes can not go unpunished and that individuals committing such acts must be held accountable and receive fair punishment. This helps create a deterrent effect and prevents the commission of similar crimes in the future.

The ICC also plays a significant role in protecting the rights of crime victims. The Court emphasizes the importance of safeguarding and holding accountable those responsible for crimes against the individuals affected by these crimes. The ICC takes measures to ensure the participation of victims in the judicial process, ensure their safety, and provide opportunities for them to present their positions and evidence.

Additionally, the Court provides opportunities for compensation for victims. It can establish obligations for the payment of compensation or reparation for the harm suffered by victims of crimes. This is an important element in restoring justice for victims and allows them to begin the process of recovery after the commission of crimes.

However, it is important to note that the International Criminal Court plays a significant role in establishing and developing international criminal law. It carries out its legislative function, contributing to the formation of judicial practice and the development of new norms and standards. The Court also prosecutes and

adjudicates crimes against humanity, promoting justice and preventing impunity, as well as ensuring the protection of victims' rights and providing opportunities for compensation. All these aspects contribute to supporting human rights and ensuring justice.

International Criminal Court (ICC) plays an important role in investigating and prosecuting crimes against humanity, war crimes, and acts of aggression. However, to ensure the effectiveness and legitimacy of the ICC, it is necessary to strengthen its powers and increase support from member states.

Firstly, expanding the jurisdiction of the ICC is a crucial aspect of its strengthening. The international community should seriously consider the possibility of extending the ICC's competence to other types of international crimes, such as environmental crimes and financial crimes, which have global implications and cause significant harm to humanity.

Secondly, to ensure the legitimacy of the ICC, principles of independence, impartiality, and transparency must be upheld. The appointment of ICC judges and prosecutors should adhere to strict procedures. Member states should support and adhere to these principles to ensure unbiased and fair investigations and judicial proceedings.

Thirdly, enhancing the financial and resource capabilities of the ICC contributes to its effectiveness. Member states should provide the necessary financial and human resources for the work of the ICC, including ensuring the security and confidentiality of witnesses and defendants, as well as providing necessary experts and specialists.

Cooperation between law enforcement agencies and member states is crucial for the effectiveness of global criminal justice. To achieve success in criminal justice, cooperation should be strengthened in the following areas:

Firstly, active exchange of information on crimes and defendants. Law enforcement agencies and member states should collaborate in exchanging information on crimes and defendants, which helps establish facts, gather evidence, and identify individuals responsible for the crimes.

Secondly, strengthening the practice of extradition and transfer of defendants. Member states should actively cooperate in the process of extraditing and transferring individuals accused of committing international crimes. This ensures that justice prevails over impunity and that criminals are held accountable.

Thirdly, effective collaboration in crime investigations. Law enforcement agencies and member states should actively cooperate in the investigation of crimes, provide necessary resources and expertise, and ensure the safety of witnesses and participants in the investigation.

The involvement of civil society, organizations, and activists is a key factor in supporting and developing global criminal justice. Public participation can be fostered through the following means:

Firstly, providing support to crime victims. Civil society and organizations should provide legal and psychological support to crime victims, facilitate their participation in judicial proceedings, and ensure compensation and recovery.

Secondly, education and awareness-raising. Civil society and organizations should conduct educational programs to increase awareness about global criminal justice and its impact on justice and human rights. This helps develop critical thinking and active citizenry in the fight for justice.

However, for the development of global criminal justice, it is necessary to strengthen the ICC, enhance cooperation between law enforcement agencies and member states, as well as actively involve civil society and organizations. These measures will ensure justice and human rights on a global scale and help prevent impunity for serious crimes against humanity. Translation: However, for the development of global criminal justice, it is necessary to strengthen the ICC, enhance cooperation between law enforcement agencies and member states, as well as actively involve civil society and organizations. These measures will ensure justice and human rights on a global scale and help prevent impunity for serious crimes against humanity.

Thirdly, promoting reforms. Civil society and organizations can support reforms in global criminal justice by providing expert assistance and advocating for principles of justice and human rights. They can actively participate in public debates and campaigns aimed at strengthening global criminal justice.

Global criminal justice is of paramount importance for ensuring justice, protecting human rights, and preventing impunity for serious crimes against humanity. As the global community evolves, criminal justice must also evolve to effectively respond to global challenges and criminal acts.

In analyzing the problems and prospects of global criminal justice, special attention has been given to the role of the International Criminal Court (ICC). The ICC plays a key role in investigating and prosecuting crimes against humanity, war crimes, and acts of aggression. However, to ensure the effectiveness and legitimacy of the ICC, it is necessary to continue its development and strengthening.

One of the main prospects of global criminal justice is expanding the jurisdiction of the ICC. Considering the possibility of extending the ICC's jurisdiction to other types of international crimes, such as environmental crimes and financial crimes, will allow for more effective combating of global criminality.

To ensure the legitimacy of the ICC, the principles of independence, impartiality, and transparency must be upheld. The appointment of judges and prosecutors for the ICC should be carried out through strict procedures. Strengthening the financial and resource capacities of the ICC also requires active support from member states.

Cooperation between law enforcement agencies and member states is another important aspect of global criminal justice. Exchanging information on crimes and

suspects, enhancing extradition and transfer practices, as well as effective collaboration in crime investigations, contribute to successful prosecution and holding criminals accountable.

An important element in the development of global criminal justice is public participation. Involvement of civil society, organizations, and activists helps provide support to crime victims, raise awareness about global criminal justice, and contribute to reforms in this field.

In conclusion, the development and strengthening of global criminal justice play a crucial role in ensuring justice, protecting human rights, and combating impunity for crimes against humanity. Enhancing the International Criminal Court, fostering cooperation between law enforcement agencies and member states, as well as active engagement of civil society and organizations, are integral components of the development of global criminal justice and the promotion of justice at the international level.

志愿者运动是残疾儿童和国内流离失所家庭儿童有效社会化的一种手段

VOLUNTEER MOVEMENT AS A MEANS OF EFFECTIVE SOCIALIZATION OF CHILDREN WITH DISABILITIES AND CHILDREN FROM INTERNALLY DISPLACED FAMILIES

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抽象的。 本文分析了志愿服务作为学生社会教育手段的教学潜力； 确定并论证组织师范大学学生志愿者活动的教学条件和方向。 本文展示了对“小学教育”和“学前教育”中的小学生和一年级学生关于组织志愿服务这一主题调查结果。 介绍了研究和创意领域实践块的活动。

关键词：志愿服务、学生、组织和活动领域、事件。

Abstract. *The article analyzes the pedagogical potential of volunteering as a means of social education of students; the pedagogical conditions and directions for organizing volunteer activities of students of a pedagogical university are identified and justified. The article shows the results of a survey of schoolchildren and first-year students of the “Primary Education” and “Preschool Education” profile on the subject of organizing volunteering. The activities of the practical block in the research and creative areas are presented.*

Keywords: *volunteering, students, organization and areas of activity, events.*

There are many problems in the modern world that are difficult to solve without the help of volunteers who consciously and selflessly work for the benefit of others. Volunteering is done by people who want to do something good and

useful for other people who need help or support. The Rostov region, one of the first among the regions of Russia, adopted the regional law “On the support of volunteer activities in the Rostov region” (dated 06.27.2012 No. 895-ZS). Volunteers actively participate in regional events: the “Volunteer of the Year” and “Leader of the Year” competitions, projects: “Governor’s Youth Team”, “Young Citizen Academy”, specialized sessions at the regional youth forums “Rostov” and “Young Wave”.

Volunteer youth patrols operate in all 55 municipalities of the Rostov Oblast, in which more than 1.5 thousand young people are involved. The youth patrol team, together with law enforcement agencies, provides social guardianship over persons who have committed unlawful acts.

Also in our country there is such an organization as the “Russian Schoolchildren Movement”, which is aimed at educating the younger generation, developing children based on their interests and needs, as well as organizing leisure and employment for schoolchildren.

Thus, we see that volunteerism is quite developed in our country and region. Volunteer activities can help not only in solving social problems, but also contribute to the development of socially significant personality traits, the formation of life positions and value orientations.

In Russia, despite the efforts made and significant progress in medicine, the number of people with disabilities is increasing every year.

Isolation from society is one of the pressing problems of families with special needs children. Currently, state social services cannot fully satisfy the needs of this category of citizens for professional assistance (weak resource availability, imperfect legal framework, insufficient infrastructure development). In these conditions, a volunteer corps can provide great assistance to children with disabilities.

The next important and pressing problem is providing assistance to children of refugee families from the DPR, LPR, Kherson and Zaporozhye regions. For children and teenagers who have left their homes, a sense of security is simply vital, an understanding that their lives are no longer in danger, that they are currently provided with everything they need. Comprehensive support helps families find the peace of mind and sense of stability they are missing.

Considering the pedagogical vector of work with forced migrants and students, scientists and practitioners (S.E. Sikorskaya, G.P. Bodrenkova, etc.) pay attention to the close relationship between the success of the integration of migrants into Russian society and the professional competence of teachers and volunteers called upon to help carry out this integration [1; 2].

Researchers identify the following as the leading competencies required for teachers and volunteers to work with immigrants: communicative, social, and informational. At the same time, the emerging multicultural society (class, school,

university), at the center of which are teachers and volunteers, places certain demands on them as connecting links between various social institutions and factors influencing the process of adaptation of forced migrants.

Therefore, the topic of volunteering both for children with disabilities and for children from newly annexed regions is relevant today.

Studentship is a period of study at a university, during which the student's personality goes through all stages of socialization through mastering the culture of human relations and social experience. At student age, all mechanisms of socialization are involved: this includes mastering the social role of a student, and preparation for mastering the social role of a "professional specialist," and mechanisms of social influence on the part of teachers and the student group. The socialization of youth is impossible without the active inclusion of each individual and the entire student community in various types of spiritual, moral and creative activities [3].

And it is volunteer activity that is one of the main forms of manifestation of social activity of citizens around the world. Volunteering, whether individual or group action, is one way to achieve one's professional identity.

A volunteer (volunteer) group is a voluntary association of students who have expressed a desire to disinterestedly (without making a profit) carry out work in professionally oriented activities [4].

Students of 1-5 years of various profiles participate in volunteer activities.

Stages of development of volunteer activities at the Department of Pedagogy of Preschool, Primary and Additional Education:

- ✓ Creation of new formats for involving 10-11th grade students and students in volunteering and conducting an awareness-raising campaign about volunteering.
- ✓ Creation of infrastructure, formation of new school and student volunteer teams, and formats for their interaction with possible partners.
- ✓ Creation of a program of events for the existing group "Children's Project".
- ✓ Methodological support: creation of a volunteer group model, a series of training sessions, webinars accompanying the implementation of the model, testing the model in educational institutions.
- ✓ Work with leaders of school and student volunteerism: thematic sessions and forums, competitions, regional and federal councils.

For the effective development of school and student volunteering, a comprehensive program has been formed to involve school and student students in volunteer activities and social practices. This program is aimed at creating a system of motivation and involvement of students in socially significant activities by forming their knowledge base about volunteerism, increasing their civic competencies,

as well as providing conditions for their involvement in volunteer initiatives and projects [5].

Involving students in volunteering can be represented by the following stages:

- ✓ *Preparatory*. Social and psychological training of volunteers. At the first stage of work on the project, schoolchildren and students form ideas about the role and place of volunteering in modern society, and a definition of the concept “volunteer” is given. Here the development of communication skills, self-confidence, and the development of attributes of the volunteer movement take place. Practice has shown that both schoolchildren and students cannot immediately help others without knowledge and communication skills, so the task of the first stage is to train volunteers. To train effective communication and develop self-confidence, training is carried out in two directions:

a) informational and educational (obtaining information followed by discussion), watching videos, discussing the actions of literary and real heroes and association with real life examples and actions of people in various problem situations.

b) motivational-behavioral (testing of methods of desired types of behavior). To develop the ability to realize and control one’s experiences, to understand the emotional state of other people, games, exercises, and trainings are used in the work (“What would you do?”, “Training of emotions,” “Gift for everyone,” etc.) Game modeling of problematic situations helps to make the right decision in life’s actions.

Identifying the interests of high school students and students of the “Primary and Preschool Education” profile. To include them in volunteer activities, their interests and needs are clarified. Teachers of the department and senior students identify the interests of students and first-year students (surveys, questionnaires), talk about the possibility of volunteering in this direction. It should be noted that the survey of high school and first-year students is conducted by 4th-5th year students; the questionnaire offered for completion consists of closed questions, in the answer options for which you can choose the type and field of activity you are interested in. Along with questionnaires, individual and group conversations are conducted. As part of the conversations, schoolchildren and first-year students are told about the available areas of volunteering, the results of actions and projects carried out by the existing volunteer group “Children’s Project”. At the end of the conversation, they are given a registration sheet to register for participation in the activity they like.

According to an annual survey of tenth-graders and first-year students (from 185 to 210 people take part in the survey):

- from 52% to 69% of respondents are ready to participate in socially useful activities for free,

- 48% of tenth-graders and first-year students already have experience in such activities;

- over 50% of respondents consider themselves volunteers.

We conducted a study aimed at identifying the dominant motives of 10-11th grade students to participate in volunteer activities. The survey method was chosen as the research method. The total number of respondents for the 2021-2022 academic years is 304 people. Respondents were asked an open-ended question about the determining motives for deciding to participate in volunteer activities. We offer for consideration the structure of the leading motives for volunteering, ranked by the degree of prevalence of the selected answers:

1. *Altruistic motives*: “the opportunity to be useful” – 64% and “the opportunity to influence changes in the lives of other people” – 47.7%,
2. *Motives for personal development*: “gaining initial professional experience” (49%); “interest in everything new” (54.9%), “acquisition of useful social and practical skills” (39.8%), “opportunity to navigate a future profession” (38.8%); “an opportunity to learn responsibility and self-organization” (21.4%).
3. *Motives of involvement*: “the opportunity to become part of an interesting project” (38.8%) and motives of self-realization: “the opportunity to realize oneself and one’s initiatives” (45.4%).
4. *Motives for communication* – “an interesting way to spend leisure time” (19.1%).
5. *Selfish motives*: “receiving recognition from classmates”, “achieving success”, “the opportunity to learn how to lead a small team”, “the opportunity to solve one’s problems and the problems of others”, “the opportunity to receive additional bonuses in studies, when building a career”, “getting useful connections” (in percentage terms the range ranges from 19.1% to 8.8%).

Thus, we can conclude that a sufficiently large number of students strive to satisfy altruistic needs, needs to satisfy feelings of belonging, personal (professional) growth and communication through volunteer activities.

- ✓ *Familiarity with socially significant problems*. At this stage, high school and first-graders are introduced to various areas of volunteering through discussion of socially significant topics, as well as through inclusion in the processes of solving socially significant problems, usually related to their place of residence and territorial characteristics. This direction is implemented using the following methods: lessons of goodness (volunteers’ stories about participation in environmental protection, the fight against orphanhood, helping people with disabilities, displaced people, etc.), talks about volunteering and volunteer events, opportunities for self-realiza-

- tion of teenagers and students through volunteering, about the experience gained and prospects for the development of the movement.
- ✓ *Webinars, discussions and round tables* on priority volunteer practices, the most relevant social topics.
 - ✓ *Quizzes on socially significant topics* such as ecology, health, safety, family, common diseases, etc.
 - ✓ *Essay competitions, projects, research and creative competitions*, both regional, Russian and international levels.
 - ✓ *Involvement in solving socially significant problems of the region*. Through involvement in social practice, volunteers solve current problems, interact with each other and the surrounding reality.
 - ✓ *Quests, case methods, coworking, etc.* Most often they are organized by schoolchildren and student volunteers for families and class groups. Carrying out tasks step by step, quest participants at unexpected moments come into contact with the most pressing problems of society, offer non-standard solutions to problems, sometimes putting forward ideas for new social projects.
 - ✓ *Business and interactive exercises/games on the topics “Safety”, “My friends and I”, “City of the future/village of the future”, “Family budget”, “Organizing an event”*. They are held within thematic weeks and decades, promoting involvement in solving social problems.
 - ✓ *Practical*. A journey into the world of good deeds and deeds. Development of the volunteer movement, holding promotions and events. At this stage, various events are being prepared and held, the public and teaching staff are involved in supporting the development of the volunteer movement. Let us give several examples of the research and creative direction of this block.

Problem to be solved: development of personal resources and competencies, intellectual and creative abilities.

Activity:

- ✓ Conducting an all-Russian conference “First Steps into Science” for primary school students with the participation of children with disabilities.
- ✓ Conducting an all-Russian conference “Planet Earth – Planet of Children” for students in grades 5-8 with the participation of teenagers with disabilities.
- ✓ Conducting an international scientific and practical conference “Continuity between preschool and primary general education in the context of the implementation of the FCP PS and the updated Federal State Educational Standard of the PGE.”
- ✓ Conducting creativity lessons at Social Support Center No. 5, Taganrog School No. 1.

- ✓ Conducting city and regional exhibitions of drawings, crafts, creative works, projects, etc.
- ✓ Organization of concert programs with the participation of children and adolescents with disabilities.
- ✓ Organization of creative master classes, training in communication skills with disabled children, displaced children, initial career guidance work.
- ✓ Preparing children and adolescents with disabilities, children from displaced families to participate in competitions and festivals.

Development of didactic aids for the intellectual and creative development of these categories of children and adolescents.

Members of the volunteer group annually provide assistance to children with disabilities and children from displaced families (from 12 to 23 people) in preparing for participation in competitions, conferences, creative projects, and folk art festivals. At the same time, they try to ensure that children of these categories participate in offline activities, which is the most important, but also the most difficult.

- ✓ Prospective – analysis of the results obtained and determination of prospects for the further development of the volunteer movement.

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中国共产党领导下的媒体融合：媒体形态与技术创新
**MEDIA CONVERGENCE UNDER THE LEADERSHIP OF
THE COMMUNIST PARTY OF CHINA: MEDIA FORMS AND
TECHNOLOGICAL INNOVATION**

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摘要. 中国共产党领导下的媒体融合是一项重要的国家战略，旨在推动媒体形态与技术创新，以满足现代社会的信息需求。媒体融合涵盖了各种媒体类型，包括传统媒体、数字媒体和社交媒体，在内容、传播和技术层面进行深度整合。中国共产党领导下的媒体融合不仅提供了更多多样化的信息资源，也有助于弘扬党的声音和宣传党的理念。这一战略在塑造国内国际舆论环境，增进国际影响力方面发挥了关键作用。媒体融合的不断发展为中国的媒体行业带来更多机遇和挑战，同时也将推动中国媒体行业在全球舞台上崭露头角。

关键词: 媒体融合，媒体形态，国际影响力，国家战略

Abstract. *Media convergence under the leadership of the Communist Party of China is an important national strategy, aiming to promote media form and technological innovation to meet the information needs of modern society. Media convergence covers various media types, including traditional media, digital media and social media, with deep integration at the content, communication and technology levels. Media integration under the leadership of the Communist Party of China not only provides more diverse information resources, but also helps promote the party's voice and promote the party's ideas. This strategy has played a key role in shaping the domestic and international public opinion environment and increasing international influence. The continuous development of media integration will bring more opportunities and challenges to China's media industry, and will also promote China's media industry to emerge on the global stage.*

Keywords: *media convergence, media form, international influence, national strategy.*

Media convergence under the leadership of the Communist Party of China is an important strategy in the Chinese media field, aiming to respond to the chal-

allenges of the modern information age and promote media form and technological innovation. There is a complex historical and strategic background behind this strategy that deserves further exploration. Since the founding of the Communist Party of China in 1949, the Chinese Communist Party has always used the media as an important propaganda and information dissemination tool to shape the party's image, convey policies, and mobilize the people. This has occupied an important position in the history of Chinese media. The Party's media policies and practices have always been influenced by the Party's guiding ideology, such as Mao Zedong Thought, Deng Xiaoping Theory, and the Threefold People's Theory. In recent years, Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era has also had a profound impact on media strategy. Secondly, with the rapid development of digital technology, the communication methods and business models of traditional media have been impacted unprecedentedly. China's new media, social media and mobile Internet applications have now become the main channels for people to obtain information, which poses challenges to traditional media forms, but also provides opportunities for media integration. The Chinese government has adopted a series of policy initiatives to promote media convergence and technological innovation, including supporting the digital transformation of news services, promoting the application of big data and artificial intelligence in the media field, and encouraging cross-border cooperation in the media industry. These policy initiatives reflect the Chinese government's emphasis on media convergence strategies to cope with changes in the media ecosystem and improve international competitiveness.

Therefore, media convergence under the leadership of the Communist Party of China is an important initiative in the Chinese media field, with a long history and complex strategic background behind it. Studying this topic will help to gain a deeper understanding of the development path, policy implications, and future trends of Chinese media.

1. The practice of media convergence in China

The practice of media convergence in China is an important national strategy under the leadership of the Communist Party of China, aiming to promote media form and technological innovation to adapt to the needs of the modern information age. The practice of media convergence in China covers a wide range of media fields, including traditional media, digital media and social media. This practice is reflected on multiple levels: China's traditional media organizations, such as TV stations, radio stations and newspapers, are actively undergoing digital transformation, bringing content online and providing multimedia news reporting and program production. This allows audiences to obtain information more conveniently, while also increasing the competitiveness of media organizations. Secondly, new media and social media play a key role in China's media convergence. These plat-

forms provide the public with a highly interactive and personalized information experience. They have also become an important channel for the government and the party to spread their voices, expanding their influence and publicity effects. The Chinese government promotes the application of high technologies such as big data analysis, artificial intelligence, and virtual reality in the media field through policy support and financial investment. These technological innovations improve the efficiency of content production, help media better understand audience needs, and enhance personalized content recommendations and user interaction.

China's media integration practice covers a wide range of fields, from traditional media to new media to technological innovation, playing a key role in meeting the diverse information needs of modern society, shaping the party's voice, and improving international competitiveness. This practice has far-reaching significance for the future development of China's media industry.

2. Innovation in Chinese media forms

Innovation in media forms in China is an important media strategy under the leadership of the Communist Party of China, aiming to respond to the challenges of the modern information age and promote the further development of the media industry. This innovation covers many aspects, including the renewal and transformation of traditional media and the emergence and development of new media forms.

First, China's traditional media organizations, such as television stations, radio stations and newspapers, are actively seeking innovation. They digitize content and actively expand multimedia platforms to provide online news, interactive programs and digital publications to meet the audience's needs for diversity and convenience. This innovation helps traditional media remain competitive in the digital age.

Second, new media forms such as social media, short video platforms and live streaming applications are booming in China, providing users with a new media experience. These platforms emphasize user participation, instant interaction and content sharing, making information dissemination faster and more extensive. The party and government also actively promote the party's voice and policies on these platforms.

Third, China's media form innovation also includes exploring cutting-edge technologies such as virtual reality, augmented reality and 3D technology to improve content presentation. The use of these technologies not only improves user experience, but also enriches content presentation methods, such as holographic news reports, virtual exhibitions and immersive experiences.

To sum up, China's media form innovation covers many fields, from the transformation of traditional media to the emergence of new media and the application of cutting-edge technologies. This innovation helps meet the diverse information needs of modern society, while also helping the party's propaganda work and

improving international competitiveness to cope with the changing landscape of the media industry.

3. The impact of technology on media convergence

Technology has had a profound impact on media convergence, a key aspect of media development under the Chinese Communist Party. The rapid development of technology has changed the media ecosystem, shaped new media forms, and promoted innovation in content production and dissemination.

The rise of the Internet and digital technology has changed the way information is obtained. People no longer rely on traditional media, but can access a variety of content anytime and anywhere through the Internet and mobile devices, which provides users with greater information choices. This has also prompted traditional media organizations to actively transform themselves digitally to remain competitive. The application of big data analysis technology in the media field helps to better understand audience needs, personalize information, and improve user experience. By collecting and analyzing user behavior data, media organizations can provide more engaging content, increase user interaction, and also improve advertising strategies. The application of artificial intelligence technology shows great potential in news reporting, content generation and editing. Automated news writing, intelligent editing and speech recognition technologies are changing traditional news production methods, improving efficiency and reducing labor costs. In short, the rapid development of technology has had a profound impact on media integration, bringing about changes in media forms, content innovation, and improvements in interactivity. The application of these technologies is expected to continue to promote the development of the media industry and meet the changing needs of audiences, while also strengthening the competitiveness of Chinese media on the international stage.

In conclusion:

The significance and impact of China's media convergence are multifaceted and have far-reaching impacts on the country, media industry and society. Under the leadership of the Communist Party of China, this strategy has brought new opportunities and challenges to China's media development. China's media convergence helps strengthen the party's voice and promote its ideas. The media is regarded as an important propaganda tool. Through integrated media, the party can disseminate its own policies and values more widely, shape the public opinion environment at home and abroad, and increase its international influence. Media convergence helps meet the needs of diverse audiences. Modern society has diverse information needs, and converged media provides more diverse information sources and multimedia content to meet the needs of different audiences, thereby promoting information acquisition and knowledge dissemination. In addition, media convergence creates economic opportunities and drives growth in the media

industry. The application of digital technology and the emergence of new media forms have provided media companies with new business models and advertising opportunities, promoting innovation and competitiveness in the media industry.

China's media convergence has a profound impact on the country, media industry and society. It not only helps the party's propaganda work, but also improves the efficiency and interactivity of information dissemination, and also brings economic growth and employment opportunities. This strategy will continue to play a key role in China's media development.

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世界语言图景中的社会：非正式提名的动态
**SOCIETY IN THE LINGUISTIC PICTURE OF THE WORLD:
DYNAMICS OF INFORMAL NOMINATION**

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摘要. 本研究的相关性在于对母语人士对社会的非正式提名的研究。本研究的目的是从俄语提名动态的角度（以中文材料为背景）将社会作为世界语言图景的一个片段进行分析。世界语言图景中的社会的呈现是根据现代俄罗斯媒体的材料（1200个例子）建模的，使用了成分分析和比较分析的方法。工作成果可用于语言学、新闻学和社会学。

关键词: 世界语言图景、提名、社会、非正式提名、动态。

Annotation. *The relevance of this study lies in the study of informal nomination of society by native speakers. The purpose of the study is to analyze society as a fragment of the linguistic picture of the world from the point of view of the dynamics of nomination in the Russian language (against the background of Chinese language material). The representation of society in the linguistic picture of the world is modeled based on materials from the modern Russian press (1200 examples); methods of component analysis and comparative analysis are used. The results of the work can be used in linguistics, journalism, and sociology.*

Keywords: *linguistic picture of the world, nomination, society, informal nomination, dynamics.*

In the modern era of rapid development of language and culture, the linguistic picture of the world as an emerging area of research has become one of the “hot” topics in the field of linguistic studies. The mental picture of the world shows human cognition of the world from a macro perspective, while the linguistic picture of the world is the result of concretization and verbalization of the mental picture of the world. Since the process of development of nature and society is a process of continuous cognition and transformation of the world, a person in the process of cognition has his own vision and assessments in understanding all aspects of reality.

Nomination as an expression, the design of a linguistic picture of the world is the relationship between linguistic symbols and the objective reality they represent; in this capacity, it is inseparable from human thinking and cognitive activity.

From the point of view of genesis, pragmatics and scope of use, the nomination is divided into official and unofficial. Official nomination are terms used to “legitimize” concepts through written text, used primarily in politics. An informal nomination often appears in polemical articles and talk-shows of politicians and experts, in the reactions and comments of viewers and listeners in chats, in the comments of blog subscribers, etc.

Informal nomination is the main sphere reflecting society in the linguistic picture of the world. This article analyzes society in the linguistic picture of the world from the point of view of the dynamics of informal nomination in Russian and Chinese.

Unofficial nominations are dynamic and changeable. They change according to changes in society or changes in people’s views. Assessments change according to the following principle: repetition “through the paradigm” of the principles of the organization of society and the exchange of the axiological sign for the opposite [2, With. 254, 259]. Let’s take as an example some groups of naming:

Names of the past decades. In Russian language The 90s of the twentieth century, euphemistically called “dashing” by the press, and those who benefited from the predatory “grabbing” of layers of the population by the oligarchs, from their point of view, were “saints” (tired of the “dashing nineties” society was waiting for the solution of socio-economic problems, the strengthening of the national security [eleven]), are currently called “gangsters” and “garbage”: Today we see them, aged, but still just as vile, stuck in the garbage of the nineties and hating the Soviet system, Stalin[15]. In Chinese: 20世纪70年代本身一直被视为时代的界标，因为它包含着新旧两种生活。(The 1970s themselves have always been considered a milestone because they have both old and new life)[14]. The 1970s marked a turning point in China’s development, but now, compared with improving living conditions, people call it the “poor seventies.”

Country names. In Russian: As we remember, these lands (with the exception of Galicia, captured by the “civilized West” back in the Middle Ages) were previously part of the Russian state and were seized by Poland in 1921 [8]; the high level of technology and creativity of the country cannot be the only basis for claims to the sole control of the world and the role of gendarme for the whole world ‘USA’ [4]. In Chinese: In the past, due to the causes of previous wars and differences in national systems, China calls the US “美帝 ‘American imperialism’: 70年前新中国立国之战，美帝成最好试金石！’美国’ (In battle for the founding of New China 70 years ago, American imperialism became the best touchstone! ‘USA’) [5]; Now China is successfully developing and can compete with the Unit-

ed States, so it jokingly calls the United States a “beautiful country”: “漂亮国”就是会说漂亮话，但这事干得真“不漂亮”。‘美国’ (“Beautiful Country” can say only beautiful words, but her actions are ugly. ‘USA’) [13].

Leaders and public figures of countries. In Russian: the period of the 70s of the twentieth century, called “stagnation”, a period of “soft censorship”, apparently in comparison with the hard Stalinist times (When some liberals call the Brezhnev era an era of stagnation, referring, for example, to dissatisfaction with consumer demand, I would like to answer this that during Brezhnev’s time, home refrigerators were full[10]), now, not without nostalgia, is remembered as “gentle Brezhnev”: Tender Brezhnev caresses the mirrors; gentle Brezhnev, spinning top [12].

Professions and occupations of the population. In Russian: Candidate of Economic Sciences, President of the Union of Entrepreneurs and Tenants of Russia Andrey Bunich discusses this [16]; those who call themselves supporters of liberal economics are not liberals, but typical compradors [17]. In Chinese: 县城缩编，消失的“铁饭碗”有哪些？ (*As urban jobs dwindle, which “iron rice bowls” have disappeared?* ‘working for a government department or government’) [7]; 做人民公仆, 让人民满意。 (*It is good to be a public servant of the people and satisfy the people.* ‘working for a government department or government’) [9].

Life is constantly changing, and with it changes occur in language. New objects appear - words appear that name them. And vice versa: people stop using some things; This means that the words with which these things were called also gradually disappear from speech. Historicisms and archaisms are included in the passive vocabulary of the modern Russian language. Historicisms are words that are the names of objects that once existed, but disappeared, phenomena of human life [1], for example, *limit, master, herald*. Archaism is an outdated word, which in modern speech has been replaced by a synonym [3], for example, *aquarium* ‘cafe with glass walls’ – cafe, *piit* – poet. There are also obsolete words in Chinese: “茅房” ‘toilet’ (now apply names like 洗手间, 卫生间, etc.), “万元户” ‘family with 10,000 yuan savings’ (With the development of the economy, people’s living standards have increased, so this name is no longer used by people).

With the development of society, when new things appear, new nominations appear or the meaning of old names changes. In Russian, a government vehicle was called a member carrier in Soviet times, “Chaika”, because members of the Politburo of the CPSU Central Committee traveled in it. Currently, the President of the Russian Federation V.V. Putin drives an Aurus car, but this brand of car does not have an informal name for the first person of the state. The name “Aurus” is a combination of the words Aurum, that is, “gold” and Russia. The models of the “Aurus” line are given names in honor of the towers of the Moscow Kremlin: that’s where the names “Senate”, “Commandant” (SUV), “Arsenal” (minivan)

come from [6]. As for examples of the emergence of new names in the Chinese language, in connection with the advent of the Internet, many new nominations were created in the Chinese language: 网红 ‘People who have many fans on the Internet’, 草根 ‘Ordinary people or groups at the bottom of society’.

The unofficial nomination reflects the times and changes in society. The unofficial linguistic picture of the world performs a number of important functions in society (cognition, evaluation, euphemization, etc.) and therefore deserves a comprehensive study.

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情绪状态对犯罪行为性质的影响

**THE INFLUENCE OF THE EMOTIONAL STATE ON THE NATURE
OF THE COMMISSION OF A CRIMINAL ACT**

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注解。 文章重点介绍了当前犯罪行为时情感、压力和挫折对行为意志表达、动机、行为选择和控制的影响问题。 该研究重点关注犯罪行为背后的心理机制以及危急情况下情绪状态对个人决策过程和行为的影响。 本文作者通过分析现代理论方法和经验数据，试图找出导致犯罪的因素，并提出防止反社会行为的方法。 这项工作有助于犯罪心理学的发展，并可以作为制定有效的预防犯罪策略的基础。

关键词：情感、压力、挫折、犯罪行为、意志表达、动机、犯罪心理机制。

Annotation. *The article highlights the current problem of the influence of affect, stress and frustration on the expression of will, motivation, choice and control of behavioral acts when committing a criminal act. The research focuses on the psychological mechanisms that underlie criminal behavior and the influence of emotional states on the decision-making process and behavior of individuals in critical situations. Analyzing modern theoretical approaches and empirical data, the authors of the article seek to identify factors contributing to the commission of crimes and propose ways to prevent antisocial behavior. The work contributes to the development of criminal psychology and can serve as a basis for the development of effective crime prevention strategies.*

Keywords: *affect, stress, frustration, criminal behavior, expression of will, motivation, psychological mechanisms of crime.*

Criminal behavior is a multifaceted phenomenon, which is based not only on social and economic factors, but also on complex psychological processes. Important components influencing human behavior in critical situations are affect, stress and frustration. Affect is an intense emotional state that can dramatically change habitual behavior patterns, stress is the body's response to external challenges, which can lead to maladaptation, and frustration is a state resulting from the inability to achieve a goal, which can cause aggression and antisocial behavior.

The relevance of the topic is due to the growing interest in the psychological aspects of criminal behavior, especially in light of recent criminological studies that emphasize the importance of emotional states in the process of committing crimes. Modern court cases often involve analysis of the psychological state of the accused, which requires professionals to have a deep understanding of the influence of affect, stress and frustration on decision-making and behavioral reactions.

The purpose of this study is to systematically study and analyze the impact of affect, stress and frustration on the expression of will, motivation, choice and control of behavioral acts when committing crimes. In order to achieve this goal, the following objectives were set:

1. Identify the psychological mechanisms of affect, stress and frustration and their impact on behavior.
2. Consider modern theoretical approaches to the study of these phenomena in the context of criminal psychology.
3. To analyze empirical data on the influence of emotional states on criminal behavior.
4. Study the practical aspects of applying the acquired knowledge to prevent crime and develop correctional programs.

Volition and motivation are key concepts in psychology that explain why people commit certain actions, including criminal acts. Volition is the individual's ability to control his impulses and make informed decisions, while motivation is a set of internal and external stimuli that encourage action [3, p. 145].

Theories of motivation, such as Freud's psychoanalytic theory, Maslow's hierarchy of needs theory, and Deci and Ryan's theory of self-determination, provide various explanations of the motives for criminal behavior, ranging from unconscious impulses to the desire to satisfy basic or higher needs.

Affect can significantly influence the decision-making process, especially in conditions where it is necessary to quickly respond to a changing situation. In a state of passion, when emotions reach their peak intensity, the ability to rationally analyze the situation, as a rule, is significantly reduced. This can lead to impulsive

and even aggressive actions that would normally be suppressed or controlled. [4, p. 562].

Stress and frustration play a significant role in the formation of a person's motivational sphere. Prolonged stress can lead to decreased behavioral control and an increased likelihood of criminal behavior as a way to cope with stress. Frustration resulting from unmet needs or failure to achieve goals can cause aggression and antisocial behavior.

Dollard and colleagues' frustration-aggression theory and Lazarus and Folkman's concept of stress provide a framework for understanding how these emotional states can lead to crime.

Affect is a complex psychological phenomenon that encompasses intense emotional reactions that can be short-term (affective outbursts) or long-lasting (mood). In psychology, affect is classified according to various parameters: by duration (from momentary emotions to long-term moods), by intensity (from a weak feeling to a strong impulse), and by sign (positive or negative). These emotional states can significantly influence cognitive processes, including attention, perception and memory, which in turn influence decision-making and behavior [2, p. 35].

Affect can have a significant influence on the choice and control of behavioral acts. In a state of high affect, especially negative affect such as that caused by the emotions of anger or fear, logical thinking is often significantly suppressed, which leads to impulsive and less controlled actions. Affect can distort cognitive processes, increasing biases such as confirmation bias or the anchoring effect, which can lead to ill-considered and risky decisions. Affect plays an important role in the decision-making process, especially when there is a need to respond quickly to difficult or threatening situations.

Examples of cases in which affect had been recognized as a mitigating circumstance highlighted the importance of understanding its role in criminal conduct. At the time of committing a crime, affect can so strongly influence a person's mental state that his actions become inadequate and inconsistent with usual behavior. These examples highlight the need for in-depth study of affect and its influence on behavior to ensure fair trials and develop effective intervention programs.

Stress and frustration are psychophysiological responses to perceived obstacles or threats, and they can have both short- and long-term consequences on a person's health and behavior. Stress activates the fight-or-flight system, which prepares the body to react immediately, while frustration is associated with a feeling of powerlessness and inability to achieve what you want. Both conditions can lead to physiological changes, such as increased cortisol and adrenaline levels, which affect cognition and behavior. Understanding these aspects is important in explaining how stress and frustration can contribute to crime, especially when they affect an individual over a long period of time.[7, p. 503].

Stress and frustration can significantly increase the likelihood of aggressive and antisocial behavior. Stress can lead to decreased self-control and increased impulsivity, making aggressive behavior more likely. Frustration, especially when it builds up without resolution, can cause outbursts of anger and aggression. Such emotional outbursts can be directed towards objects that are perceived as the cause of frustration, which can lead to criminal acts. Analyzing these relationships helps us understand why some people commit criminal acts in response to stress and frustration.

Prevention of criminal behavior may include strategies aimed at reducing stress and frustration in the community. This may include stress management programs that teach individuals relaxation, meditation and problem-solving techniques. It is also important to create social support and support networks that can help people cope with frustration and stress. Educational institutions and workplaces can implement programs aimed at developing interpersonal communication and conflict management skills. Avoiding situations that may cause stress or frustration is also a key aspect of crime prevention.

Criminal psychology uses a variety of research methods to study the psychological aspects of criminal behavior. Quantitative methods include statistical analysis of crime data, psychometric testing, and experimental research. Qualitative methods include interviews with offenders, content analysis of court cases, and psychological profiling. Mixed methods combine quantitative and qualitative approaches to gain a deeper understanding of criminal behavior. Modern research also includes neuropsychological techniques such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) to study the brain mechanisms underlying affect, stress and frustration[1, p. 109].

Experimental studies can accurately measure the effects of stress on decision making under controlled conditions, but they may not take into account the complexity of real-life situations faced by offenders. Qualitative research provides insight into the motivations and experiences of criminals, but the results can be subjective and not always generalizable. Neuropsychological research offers important insights into brain processes, but their relationship to actual behavior can be ambiguous.

Challenges and limitations of existing approaches include ethical considerations when working with offenders, difficulties in obtaining reliable data due to social desirability or lying on the part of participants, and limitations associated with the representativeness of elections. In addition, many studies do not take into account cultural and social factors that may influence criminal behavior[6, p. 250].

A study was conducted using fMRI to study brain activity in individuals who committed crimes while in a state of passion. Researchers have found that when remembering a crime, the same areas of the brain are activated as during stress.

However, a critical analysis may indicate that such activation is not necessarily the cause of criminal behavior, but may be a consequence of it. In addition, study participants may have experienced stress from the very fact of participating in the experiment, which distorts the results. It is also important to consider that brain activity does not always directly correlate with behavior, and many factors can influence the brain's response, including previous experiences, personality traits, and current psychological state.

In the course of the presented analysis, key aspects of the influence of affect, stress and frustration on the expression of will, motivation, choice and control of behavioral acts when committing a tort were considered. It has been found that affect can significantly distort the decision-making process, while stress and frustration are more likely to increase aggressive and antisocial tendencies, which in some cases can lead to crime. Methodological limitations of existing studies were also identified, including limited experimental conditions and difficulties in interpreting neuropsychological data.

The results obtained have important practical significance for criminal psychology and judicial practice. They can be used to develop criminal behavior prevention programs aimed at reducing stress and frustration in society, as well as for the professional training of law enforcement officers, in particular forensic experts. Understanding the psychological mechanisms underlying criminal behavior will help in developing more effective methods for rehabilitating criminals and preventing relapse.

Based on the analysis, we can conclude that modern legal science and practice needs a more in-depth and long-term study and assessment of the results of prolonged exposure to stress and frustration affecting the behavior of the subject of a crime and the likelihood of him committing a tort. Finally, attention should be paid to the study of cultural and social factors that may have a significant impact on the course of affect, stress and frustration in the process of committing criminal acts.

In order to increase the efficiency of detection and investigation of crimes against the person committed in states of stress, frustration, affect, which could significantly influence the behavior of the subject of the crime at the time of the act charged to him, it seems important to us to develop more valid methods included in complex techniques that will allow simulate real tort conditions with greater accuracy.

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智力心理学
PSYCHOLOGY OF INTELLIGENCE

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注解。以D.V.Ushakov提出的智力结构分析为例，考虑了人的整体视野问题，显示了“在头脑中”行动的能力在人的任意行为中的作用。展示了智力和个人潜力在解决广泛问题时的相互作用；显示了与智力因素的不同特征相关的优点和缺点。

关键词：一个人的整体视野、智力、“用心”行动的能力、个人特征。

Annotation. *The problem of a holistic vision of a person is considered on the example of the analysis of the structure of intelligence proposed by D.V.Ushakov, the role of the ability to act “in the mind” in arbitrary behavior of a person is shown. The interaction of intellectual and personal potential in solving problems of a wide profile is demonstrated; the advantages and disadvantages associated with different features of the intellectual factor are shown.*

Keywords: *Holistic vision of a person, intelligence, ability to act “in the mind”, personal characteristics.*

The current problem of modern psychology is the creation of a theoretical and experimental basis for psychotherapeutic and consulting practice, the transition to a symbiosis of methodology and practice (Ushakov 2020, Vasilyuk, 1960). The root of this problem is “facetedness” - the lack of a holistic vision of a person (Ushakov, 2020). One of the ways to solve it is research within the framework of the structure of intelligence that D.V. Ushakov described.

According to D.V. Ushakov, the structure of intelligence is the result of the interaction of a person’s intellectual potential, his personal characteristics and preferences, as well as stimulating and counteracting environmental influences. At the same time, the leading role in a person’s intellectual potential is played by the ability to act “in the mind” (abbreviated as AAM) (Ushakov, 2006).

Speaking about personal characteristics in the structure of intelligence, let us refer to the works of Ya. A. Ponomarev, who, describing the personal and intellectual characteristics of brilliant chess players, stated the fact that outstanding achievements are achieved not by those who have the highest intelligence or creativity, but by those who is persistent, purposeful, ambitious (Ponomarev, 1976). This does not mean that world-class chess players lack intellectual and creative potential: their potential is, of course, extremely high, but it is their personal characteristics and preferences that allow them to achieve outstanding victories. The formation of these characteristics and preferences is greatly influenced by the external environment - its stimulating or counteracting influences.

In the field of education, these influences are manifested, among other things, in accordance with the form of presentation of educational material to individual characteristics associated with the intellectual factor. Thus, analyzing the educational performance of medical university students, we assumed that with a low level of development of AAM (with the dominance of the visual factor in thinking), it is better to assimilate educational material using visual teaching aids, diagrams, presentations, breaking a large volume of educational material into smaller pieces (Pasternak, 2022). In addition, we hypothesized that in order to obtain high academic results, these students, in addition to perseverance and perseverance, need more time than their fellow students with a higher level of development of this ability.

This approach, in contrast to the traditional one, which claims that high intelligence provides opportunities for more successful learning in higher education, allows you to build individual educational trajectories depending on the characteristics of the intellectual factor. In this case, we are not talking about the effectiveness of training, which depends primarily on motivation, but about the pace. This fact, from our point of view, allows us to combine “theory and practice”, providing interested students with psychological recommendations.

Speaking about this, we refer to our own research related to the role of AAM in the intellectual and personal potential of a person. These studies are based on the work of Ya.A. Ponomarev, who showed that at a low level of AAM development, subjects, when solving an intellectual problem, use the “trial and error” strategy, without modeling “in their minds” the image of the future solution (Ponomarev, 1967). This strategy is associated with a certain time, which is necessary to assimilate mental action and use it to solve intellectual problems. .

In addition, the “trial and error” strategy constitutes individual experience, by appealing to which the individual develops the capabilities of pre-adaptation - readiness to act in situations of life uncertainty (Asmolov, 2014). That is why, in our opinion, this type of intelligence (with a low level of development of AAM) has its advantages.

Here again it is necessary to recall the experiments devoted to creative thinking by Ya.A. Ponomarev, who showed that unsuccessful attempts to solve an experimental problem in a logical way end in success only in the case of a “hint” - finding a solution in past experience. However, for this to happen, a person must show persistence - maintain the desire to find a solution after numerous unsuccessful attempts (Ponomarev, 1976).

Here we are again faced with personal characteristics in the structure of intelligence: we can talk about cognitive and search activity, intellectual initiative, etc. The formation of these qualities, as before, is greatly influenced by stimulating and counteracting influences of the environment, such as restrictions on the child’s cognitive activity in early childhood, excessive prohibitions, etc. (Pasternak, 2020). These same environmental influences include possible school failures associated with the characteristics of the intellectual factor: they can both suppress educational motivation and stimulate it, shaping the volitional qualities of the individual.

When we talk about the limitations associated with a low level of development of the intellectual factor, we mean the fact established in empirical research that individuals with high intelligence use more diverse strategies for coping with difficult situations, analyzing and reflecting on their life experiences; using various forms of distraction (Kholodnaya, 2007, Kornilova, 2010, Khazova, 2014). This fact, in our opinion, dictates the need for proactive training of adolescents in coping strategies (Pasternak, 2023). In addition, these restrictions can initiate the social activity of the individual, which contributes to his self-realization - the constant development of his potential, the manifestation of individuality, and the development of emotional intelligence (Dikaya et al, 2020).

Another limitation associated with the low level of development of SDS is related to goal setting and future planning: knowing what they want, young people 18-20 years old rarely imagine a way to achieve their goals, acting, as in the process of solving intellectual problems, using the “trial and error» (Pasternak, 2021). Extrapolating this knowledge to practice, we can recommend including classes on future planning and goal setting in the practice of school psychologists working with older adolescents.

For a holistic vision of the prospects for the development of a person with low intelligence, let’s look at the above limitation from the point of view of life advantage: the experience accumulated in the process of “trial and error” will subsequently act as a pre-adaptation to difficult and unpredictable life situations. .

The last remark related to the possibilities of adaptation to situations of different types, it is necessary to recall the well-known fact that only a small percentage of children who demonstrate academic talent in school subsequently become professionally and socially successful people. This is due to the lack of skills to

behave in a situation of tough interpersonal competition in the labor market, and the lack of experience in overcoming life's difficulties. This circumstance can be considered a "minus" of persons with high intellectual potential.

All of the above speaks in favor of both further research in the field of interaction between intellectual and personal factors, further research related to the role of AAM in the voluntary behavior of an individual and the connection of this ability with other components of intelligence, and the need to build a typology of personality according to the intellectual factor (Ushakov, 2006). At the same time, each pole of intelligence development (low and high) will be characterized by its own strengths and weaknesses.

Thus, if the subject's intelligence is low, it is useful to inform him that he may face difficulties in mastering his own behavior in a situation of stress, more specifically, difficulties in analyzing a life situation and planning behavior scenarios. These difficulties can be overcome by undergoing psychological training or experience. In the latter case, you need to be prepared for a number of failures in life, which over time will lead to success. At the same time, the subject himself, who is provided with these recommendations, chooses for himself which path he prefers to take - a long one, associated with errors and emotional stress, or a shorter one, requiring additional training and, in some cases, psychological support. These same subjects need to be informed about their "strengths" - the ability to solve problems of various types using intuition, in the development of which their individual experience associated with "trial and error" plays a large role.

High intelligence, while having its obvious advantages, can "suffer" from a lack of experience in "failures" and overcoming difficulties. In some cases, people with high intelligence should be recommended to develop emotional intelligence and intuitive thinking.

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1905–1907 年阿塞拜疆公共政治生活问题。1905–1907 年运营的期刊
**ISSUES OF PUBLIC POLITICAL LIFE OF AZERBAIJAN
IN 1905-1907. JOURNALS OPERATING IN 1905-1907**

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概括。 文章反映了阿塞拜疆社会政治思想的形成过程及其上升到民族自我意识的水平。“Hayat”、“Irshad”、“Fuyuzat”、“Molla Nasreddin”、“Dirilik”、“Achyk soz”、“Istiggal” - 在阿塞拜疆北部充当进步、民主的媒体。 文章强调了媒体在阿塞拜疆土耳其人生活中的重要性。 研究的主题是在维护突厥穆斯林人口的团结和民族认同的同时实现共和国理想的媒体。 该研究基于 1905 年至 1907 年期刊出版物的数据，这是阿塞拜疆民族解放运动的主要推动力。

关键词：报刊、杂志、鞑靼人、高加索地区、突厥穆斯林人口。

Summary. *The article reflects the process of formation of the socio-political thought of Azerbaijan and its rise to the level of national self-awareness. “Hayat”, “Irshad”, “Fuyuzat”, “Molla Nasreddin”, “Dirilik”, “Achyk soz”, “Istiglal” - functioned as progressive, democratic media in Northern Azerbaijan. The article emphasizes the importance of the media in the life of the Azerbaijani Turks. The subject of the research is the media leading to the ideals of the republic while maintaining the solidarity and national identity of the Turkic-Muslim population. The research is based on data from journal publications from 1905-1907, the main driving force of the national liberation movement in Azerbaijan.*

Keywords: *press, magazines, Tatars, Caucasus, Turkic-Muslim population.*

In 1905–1907, the rhythmic intelligentsia was concluded in the union of the magazines “Molla Nasreddin” and “Fuyuzat”. These magazines served the people. Although their printing style was different from other publications, the goal was the same. The Molla Nasreddin magazine introduced new ideas and expressions into the national press of Northern Azerbaijan. “Molla Nasreddin” gathered around itself the progressive forces and democratic intellectuals of the Azerbaijani people. In addition to famous poets, writers and journalists, the magazine also features artists Oscar Shmerling, Joseph Rotter and Azim Azimzade, who laid the foundations of a new art school in Azerbaijan. The struggle of “Molla Nasreddin” for

modern literature, enlightenment, democratization and its powerful satire determined the creative direction of other writers and writers collaborating with the magazine, and began to decisively promote them in becoming outstanding artists, thus becoming “publicists”. The traditions of classical education, oriental, Russian and artistic-journalistic respect and humor laid the foundations of satirical journalism in the history of the Russian press and played an unprecedented role in the development of journalism with genres and styles. The first issue of the magazine Tiflis (Georgia) edited by the famous writer and publicist Jalil Mammadguluzade. Earlier, in August 1905, he received official permission to publish the Novruz newspaper in Tbilisi (Georgia), but one day he refused to publish it. Praise poems to the viceroys [1,p.5]. “National freedom and independence of unity nations” - this idea was the journals published in Northern Azerbaijan. The content of Molla Nasreddin magazine was organized according to recommendations and political issues. It should be noted that half of the magazine, the first issue of which was confirmed to have a circulation of one thousand copies, was sold out at noon in one day. The magazine, which had 370 issues in Tbilisi, continued in 1918, and in the early years the magazine was published in other countries. “Molla Nasreddin” was published in 1921 in Tabriz, in 1922-1931 in Baku. The editor and author was Jalil Mammadguluzadeh. Over 25 years, 748 issues were published (340 in Tbilisi, 8 in Tabriz, 400 in Baku) [2, p.7]. From the point of view of the problem under consideration, the activities of the journal during the Tbilisi period, especially in 1906–1907, are important for us. The illustrations in the magazine were printed in red paint, which alarmed the Baku police; the paints were confiscated and, according to the editor of the magazine, “arrested” [3, p.80]. Despite threats, intimidation and censorship, the magazine continued to be published. Mammadguluzadeh left white spaces with photographs or materials that were not allowed to be published in the magazine by the censor, and wrote: “For reasons beyond our control, this space remained white”[4, p.81]. The courageous speeches of “Molla Nasreddin” led to the closure of the magazine of the Governor-General of Tiflis (Tbilisi) on June 8, 1907. However, protests and the publication of protest articles in newspapers led to the resumption of publication of the magazine after a short break. On July 25, the 23rd issue of the magazine was published [5, p.81]. Such closure and re-opening of the magazine was observed in the future. Despite all the restrictions and difficulties, the magazine continued to operate until January 7, 1931. The editors of the magazine “Molla Nasreddin” are also of interest. Thus, J. Mammadguluzadeh, who published the first issue largely thanks to the efforts of Omar Faigi and the artist Shmerling, who subsequently gathered the most influential and talented writers around the magazine. Nasreddin” in Soviet times, Aligulu Gamkusal is another outstanding writer, writer and playwright Abdurragim bey Hagverdiyev, Mejuz Shabustari, J. Jabbarli, Ali Makhzun Iravani, Bayramali Hammal,

Suleiman Malikov and others.[7,p.84] Not a single literary school before or after it did not teach as many writers, poets and artists at the same time as the Molla Nasreddin literary school. Thanks to the consistent and great efforts of Jalil Mammadguluzadeh, the army of the Azerbaijani creative intelligentsia “Molla Nasreddin” was formed at the beginning of the twentieth century. The struggle for national independence and freedom is the main goal of the Molla Nasreddin movement. [8, p.20] The main stylistic direction of Molla Nasreddinism was renewal, advancement of people, deepening the processes of national and spiritual self-awareness. In its activities, the Molla Nasreddin magazine reflects democracy and the inner spiritual world of the people. [9, p.23] “Jalil Mammadguluzade played an invaluable role in the national awakening and winning the revival of the people with his creativity. The role of the activities of the Molla Nasreddin magazine and Mirza Jalil in the change in national self-awareness, our people have no equal” [10, p.241]. For this reason, for 1996-2011, the full text of the magazine was published in 8 volumes in the Azerbaijani alphabet in Latin, with a circulation of 700 copies, with fiery color illustrations. In 2017-2018, the song, taking into account the growing art magazine “Molla Nasreddin”, was republished in 10 volumes. progress of other peoples, but also in order to act as an external commentator. Thus, the Molnasreddinites published the “Fundamentals of Law” of Sultan Abdulhamid, the “Young Turks” movement, the Russo-Japanese War, guarantees for freedom in Russia, relations and solidarity of Caucasian and Ottoman Armenians, etc.[12] News and comments about the events were also written. At the same time, the events of 1905-1906 broke out on the pages of this magazine, that is, the genocide committed by the Armenians against the Azerbaijani Turks. Omar Faig Nemanzade, the main author of the magazine, described in detail a number of the most important events in the socio-political life of the Caucasus, including the Ottoman Empire, in his book “Memoirs from the Caucasus to Istanbul”[13, p.212]. For the first time in his work, the author tried to shed light on the Armenian-Muslim (meaning Azerbaijani Turks - Sh.P.) conflict that occurred in Tiflis (Tbilisi) in 1905–1907.[14,p. The Molla Nasreddin magazine published on its pages materials full of information about the Armenian character and the gullibility of Muslims. It is enough to mention only one of them. Thus, in 1906, in the 14th issue of the magazine, the article “Sermon of Akhund and the Priest” said: “In the Iravan province there is a village whose name is Samanlyg. The population of the village is half Armenians, half Muslims. One day I went on horseback to visit the owner of the village, Rahim Bey. In one of the courtyards... The priest stood up, raised his right hand and spoke... The priest said in a loud voice: “Miracle, miracle, miracle! (Khairenig in Armenian). The priest shouted to the villagers: “The Armenian people have three beloved children in the world. This is the homeland, the nation and the language, and as long as we can sacrifice ourselves for the sake of these three

beloved children, neither the Ottoman soldiers and Kurds, nor the Russian troops, and no one else can harm the beloved children of the Armenian people.” After these words of the priest, Gurbangulu’s voice was heard. The mullah read the following words from the book: “Babi-haftum (chapter seven). If a person spits, then due to the amount of sleep he gets, he will not suffer from any problems or troubles in the world.” through church speeches. In a sense, these stories allow Molla Nasreddin to explain in simple language the reason for the massacres committed by Armenians against Muslims.[16,p.2-3] On the colorful pages of Molla Nasreddin or in the memoirs of its founders, we often find statements about that the Armenian-Muslim conflict is a deliberate discord on a political basis, and not a national-historical conflict. Omar Faik, who witnessed those events, addressed the people: “Satan the government finds a stupid Muslim and a cunning Armenian, pits them against each other, and he himself remains on the sidelines to observe. Think about how we will use this result, what we are waiting for, no matter how boldly we move forward, tomorrow no one will give us Armenian shops, or our shops to Armenians. Confirming this logical conclusion, “Molla Nasreddin” wrote: “It is a big secret for me that as soon as the Armenian-Muslim war begins, the government soldiers realize in such a state of agony that doctors do not allow them to go out.”[17] “Molla Nasreddin”, in simple terms, wants to awaken the consciousness of the nation and oblige to provide for compatriots in the Zangezur region of Karabakh. “My dear Muslim brothers! Our compatriots are dying of hunger in Zangezur. Now the hungry Muslims in Zangezur are free to run to the Vans with wheat, but they promote that the Armenians control this wheat for their hungry fellow tribesmen. So, are we people, Armenians – good or bad...” [18, p.3]. Or in another article it is written: “What kind of grief can a person who does not know the Zangezur region have? The fifth section of the Zangezur region was destroyed. From the very beginning of the Armenian-Muslim conflict, bread and famine reigned in this area. Sisian region: both the third and fourth plots have not been sown for two years, because there are no seeds... Let’s go abroad. In June, the dirty Armenians bought one hundred thousand bushels of flour for their hungry brothers in the city of Armavir, and in September they waited for it in the Ganja region and began distributing it to the hungry congregations. But in October a special commission on victims was created in Baku. In April alone, five to six thousand idols of flour were sent to the Zangezur region for two manats and ten kopecks.” The magazine “Fuyuzat” was published in Baku from November 1, 1906 at the expense of Haji Zeynalabdin Tagiyev under the editorship of Ali bey Huseynzade. This magazine, which consisted of 32 issues and 16 pages each, worked well because of its linguistic and stylistic qualities, which played a progressive role in the history of our literary language. writers like Mamed Hadi, Huseyn Javid, Akhund Yusif Ziya Talibzade, Abdullah Shaig, Mamedamin Ra-

sulzade, Abdullah Sur, Ahmed Kamal, Ahmed Raig, Abbas Sahhat, Tofik Fikret. [21, p.134] The editors of “Fuyuzat”, which was positioned as “literary, scientific, political, social, creative weekly Turkish-Islamic magazine”, located on Nikolaevskaya Street and activist Haji Zeynalabdina Tagieva. Ali bey Huseynzade in his “Hayat and Meili-Fuyuzat” (Life and inclination-Fuyuzat) noted that the real meaning of the word “Fuyuzat” is “happiness and especially happiness-spirituality, consisting of real spiritual values” [22, p.134]]. As can be seen from the article “Ijmal” (Review), published in the first issue of this magazine, rapidly developing socio-political events, as well as containing information about the political situation in Europe, Iran, the Ottoman Empire and the Caucasus. As can be seen from the articles of the first issue published in them, “Fuyuzat” not only acts as a literary organ, but also expresses a political attitude towards the processes taking place in the world. Abdullah Shaig described Fuzat as “the most magnificent movement of information dissemination ever seen in the Islamic world.” saying: “Goodbye!” He leaves the world and clicks: on the statement on the cover of the last issue: “The release of “Fuyuzat” will be temporarily accompanied from today.”[24, p.8-9] How was “Fuyuzat” different from the media that worked in the songs of 1905–1907? A clear and concise answer to this question is where to find articles published in the first block of the journal. The first issue of the magazine depicted the Prime Minister of the Ottoman Empire, Midhat Pasha, who first proclaimed the constitution in 1876. By this, Ali Bey Huseynzade aroused the desire of the Turkic people “for law.” In the same issue he wrote of the constitution that “all hopes of justice and prosperity, such as liberty, individuality, theology, conscience, society and political happiness, which are the sources of the kind of grace and prosperity founded on this word - Law.” 25] In general, the opinion of the magazine editor Ali Bey Huseynzade in the Hayat newspaper, which is considered the first embryo of the idea of national independence, can be considered the main thesis for restoring the traditions of statehood and starting the path to independence. to his relative Mamed Tagi Aliyev: “We are Caucasians. We must demand autonomy for our life in the Caucasus, which is necessary in order to be able to independently govern the territory. We are Muslims: we ask that according to each conviction, you need for the freedom of our conscience. We Turks”: be attentive to the removal of all obstacles and walls that lead to the development of our language.”[26, p.53-54] In the future, he developed this idea in “Fuyuzat,” of which he was the editor. It is no coincidence that “Fuyuzat” was not a literary collection, a press organ that defended and promoted the unity of the Turkic peoples, their unity around national ideologies and their political rights. Therefore, Turks living in different geographical regions gladly greeted the first issue and sent their wishes to the editor. For example, Hasan Sabri Aivazov from Tatarstan wrote in his article “Impressions from the decline of “Hayat” and “Fuyuzat”: “Does the Caucasus

remain blessed and wise at a time when my people today are probably one hundred degrees ignorant. the first Islamic printing house among Russian Muslims, “Ekinchi” and “Keshkul” are the children of the Caucasus, the heroes of the Caucasus” [27, p.26] This magazine, which gathered around itself the literary and political forces of that time, became a leading force in the process of national self-awareness in twentieth century and managed to create a literary and political movement called “Fuyuzatins”. The main goal of this movement culminated in the region against the oppression and slavery of tsarism and in the development of the ideology of Turanism, which is considered the spiritual unity of the Turkic peoples. Thus, the main desire of the Fuzatins was to achieve the awakening and development of the national self-awareness of the Turkic peoples fighting for their national independence, in the direction of “Turkization, Islamization, and Europeanization.” Fusatism was also the promotion of Romanticism in English, Common Turkish, World Literary Language Policy, Islamism, the ideology of Turkism against Persinization and Russification in the countries of the world. Ali bey Huseyn-zade scientifically and theoretically substantiates this ideology in the journal “Turani”. Huseyn-zade published articles under the subscriptions “Shair Naim”, “Delhi Shair” in such press organs as “Fuyuzat”, “Hayat”. The press was wary of the magazine’s ideological and political orientation. Samples of ideology in the collection A. Huseyn-zade developed the program “Progress of the Progress of the Union,” which opened a new page in the history of socio-political thought of the Turkic peoples. The three words (enlightenment, unity and freedom) that he introduced in 1904–1907, which formed the basis of the program, were simplified expressions of great British truths. According to him, “real salvation lies in three possibilities.” [31] This, in turn, shaped the national consciousness of the Turkic peoples in the region for the union of the Turks. His goal of freedom was both national and universal, and was the basis for the glorification of economic and financial affairs. For this reason, he wrote that the economic and political situation is so compressed that it is impossible to imagine the prosperity of the economy without politics and the progress of politics without the economy. Therefore, the struggles for economic and political freedom are two aspects of the same struggle. By combining “freedom and enlightenment,” Ali bey Huseyn-zade expressed his political position on this issue. This was due to the fact that he was drawn to civilization, development and progress. [32, p.138-139] In the 2nd issue of “Fuyuzat” in the article “A Look at World Events” he saw ways of freedom for the Turkic peoples in Syria. [33] We saw the only way out in the well-being of the nation and the region for economic and political freedom.[34] As the bearer of this idea, A. Huseyn-zadeh was subject to long-standing accusations; he was accused of dissuading people from fighting “in the midst of a revolution.”[35] A. Gusei-nzade, despite these attacks, continued to publish articles, explaining his thoughts as fol-

lows: [36] “Who said that we must be neutral? No! Never! Neutrality is staying under your feet. Water is afraid to stand still and runs away; water should flow like a river and be able to enjoy freedom.” “Fuyuzat” created a chronicle of national progress, organizing the unity of the language and religion of the Turkic peoples, his scientific innovations in Europe. Despite all the threats and pressure, the idea of “Fuyuzat” spread throughout society. By the 30s of the twentieth century, the collection “Fuyuzat” was highly valued by such great writers as Jalil Mammadguluzade, M. Khadi, A. Shaig, M. S. Ordubadi. However, from the 1930s to the 1990s, it acted as a “reactionary press organ” in scientific research and journalistic articles in the history of our press and literature. [37] In addition to these magazines, at that time there were the magazines “Bahlul” (1907, May 19) and “Azerbaijan” (1906-1907), published under the influence of the magazine “Molla Nasreddin”. With the latter magazines, there were the magazines “Dabistan” (1906–1908) and “Rahbar” (1906), which were devoted to the development of science and education, as well as the principles of revolutionary democratic ideas, although they were intended primarily for children, parents and teachers. On May 19, 1907, publicist Alesgar Aliyev began publishing the satirical magazine “Bahlul”. The editor of the magazine, Alesker Aliyev, studied at the Russian-Tatar school in Baku in 1898, and then worked as a student at the Kaspi printing house. He was one of the participants in the revolutionary movement in Baku and even in 1902–1903 he was especially active in distributing a number of Bolshevik leaflets. The magazine “Bahlul” - a collection of life was very short. Bahlul was launched as a satirical magazine on May 19, 1907. The magazine was published in Baku by Alasker Aliyev, in collaboration with Seyid Hussein. “Bahlul as Molla Nasreddin” was also named after Bahlul Dananda, known for his humor. “Bahlul” reflects revolutionary events, the unification of workers and peasants, raises the issue of political struggle, and highly evaluates the activities of the social-democratic labor party “Gummat”. [41, p.96-97] The magazine contains shortcomings of public administration, events related to the national awakenings in Iran and Turkey were also conveyed to the reader in simple vernacular language in a satirical style. Such authors as A. Aliyev (“Bahlul”), A. Razi (“Duduk”), M.Kh. Zeynalov (“Derdmand”) took direct part in the magazine. The magazine “Bahlul” was published before November 4, 1907. After the last 9th issue, the publication of the magazine was closed “for its negative impact on society.” [42, p.68] One of the successors of “Molla Nasreddin” was the satirical magazine “Azerbaijan”. The first issue of the magazine was published on December 6, 1906 and was published for 9 months. The publication and activities of this magazine are directly related to the name of Sattarkhan. This magazine existed until September 1907 and was called “Molla Nasreddin” of southern Azerbaijan. The magazine was reminiscent of Molla Nasreddin in style and democratic views. Even in the first issue of the magazine

there was an image of Haji Baba, representing Iranian Azerbaijan, and an image of Molla Nasreddin with smiling eyes was given.[43,p.94-95] The magazine “Azerbaijan” often published articles and photographs from “Molla Nasreddin” in accordance with the cartoons and materials. Prose sections of the magazine, as well as news, telegrams, etc. In his works one could feel the strong influence of the authors of “Molla Nasreddin.” [44, p.95] As the revolution expanded under the leadership of Sattarkhan, more and more extensive articles were published in the pages of the Azerbaijan magazine. For this reason, when the revolution was in great danger in August-September 1907, the magazine found itself in a difficult situation. It was closed in September 1907 after its 21st issue. Despite its short existence, the Azerbaijan magazine is of great importance for the analysis of socio-economic and political processes in the south of Azerbaijan. As a result of the destructive impact of information at that time, as we have already noted, there was the magazine “Rahbar”. The first issue of this magazine was published on September 24, 1906. The editor was Makhmudbek Makhmudbekov. After graduating from the Gori Seminary in 1883, Makhmudbekov worked for several years as a teacher in Barda, Tartar and Shemakha, and in 1890 he worked in Baku and taught until the end of his life (1923).[45] The main article in the first issue of the magazine talks about the future. The magazine, which paid special attention to the development of science and education, wrote: “Previously, the independence of a nation was that nation that was better armed and defeated another weak nation by force of arms. But now the domination of one nation over another is not exercised by force of arms in school, literature, science, society and other spiritual achievements.”[46] “Our aim is to do all we can to secure the regularity of our school, the progress of our nation in life, science and education, and the knowledge of the national literature,” says the magazine. [47] Despite the fact that only 5 issues of the magazine were published (4 in 1906, 1 in 1907), a number of socio-political issues were raised on its pages.[48,p.21] In his journalistic article “What We Need” M. Mahmudbekov tried to give a picture of the revival and awakening that occurred in Azerbaijan after the revolutionary events of 1905, and commented on the challenges ahead.[49] The Dabistan magazine, which operated from April 16, 1906 to March 1, 1908, was previously published in Baku under the leadership and editorship of Ali Iskender Jafarzadeh and Mamedhasan Bey. Despite the two-year period, 18 issues were published in 1906, 7 in 1907, and only 2 in 1908. The reason for the closure of the magazine was financial difficulties. Dabistan Magazine is a Turkish magazine for students, published twice a week, serving the progress and development of the nation.[50] The magazines “Molla Nasreddin” and “Fuyuzat” and other magazines often encountered problems, which, in turn, led to their closure. In some cases, their activities ceased. In general, the authors of magazines published in 1905–1907, with the aim of enlightening the nation, saw the way out

of its destruction, mainly in enlightenment. They looked for the reason for the leadership that befell people in ignorance.

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城市环境对人类行为的影响

THE INFLUENCE OF THE URBAN ENVIRONMENT ON HUMAN BEHAVIOR

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注解。 城市建成环境在塑造人类行为方面发挥着重要作用。 本文根据各种研究和科学著作探讨了城市环境与人类行为之间关系的多方面性质。 分析涵盖城市设计、交通系统、绿色空间、社会互动和文化方面对人类行为的影响。 通过研究这些因素的相互作用,我们可以更深入地了解城市环境如何影响个人和社区。 研究结果强调了创造促进健康、可持续和包容性行为的城市空间的重要性。

关键词: 城市环境、人类行为、城市设计、交通系统、绿色空间、社会互动、文化方面。

Annotation. *The built urban environment plays an important role in shaping human behavior. This article explores the multifaceted nature of the relationship between the urban environment and human behavior based on various studies and scientific works. The analysis covers the influence of urban design, transport systems, green spaces, social interactions and cultural aspects on human behavior. By studying the interaction of these factors, we gain a deeper understanding of how the urban environment affects individuals and communities. The findings presented highlight the importance of creating urban spaces that promote healthy, sustainable and inclusive behaviors.*

Keywords: *urban environment, human behavior, urban design, transport systems, green spaces, social interactions, cultural aspects.*

The built environment of cities has a profound influence on human behavior. As populated areas around the world continue to rapidly urbanize, understanding the impact of urban environments on individuals and communities has become

increasingly important. The purpose of this article is to explore the complex relationships between the urban environment and human behavior, highlighting the various factors that shape our actions and choices in urban environments.

Urban design and human behavior.

Urban design covers the organization, functionality and aesthetics of urban spaces. It plays a key role in shaping human behavior, influencing movement patterns, social interactions and psychological well-being. Various urban design elements, such as street layout, building density, and architectural styles, influence how people navigate and perceive the environment. For example, let us analyze the Old City of Jerusalem as an example [1]. Most people there rent because they can't afford to have their own apartment. This explains the poor condition of houses in which the residents are temporary and do not care about their preservation. A lot of overcrowded space. More than a third of the windows of the houses overlook the windows of their neighbors, and the distance between houses is often less than two meters. This physical environment negatively affects the sense of privacy and confidentiality among the population, hence the sense of comfort and security. A large number of houses suffer from excessive dampness, which affects the physical health of people. Firstly, this entails the appearance of a huge amount of mold. Secondly, in such an environment, diseases spread more quickly among family members. And also the materials from which the houses in this area were constructed deteriorate faster in such an environment, which affects the appearance of the buildings, a certain aesthetic component, and the safety of residents and passers-by. The current situation in the Old Town continues to promote social division and discrimination against its population by residents of many other areas of the city. This example shows how poor urban design and urban space planning can have a negative impact on the population.

Well-designed cities with walkable neighborhoods and accessible public spaces promote physical activity, social connections and a sense of community. And also a well-designed urban space has a positive effect on the physical and mental health of people.

Transport systems and behavior.

Transport systems are an integral part of urban infrastructure and significantly influence human behavior. Efficient and sustainable transport networks, including public transport, bike lanes and pedestrian-friendly infrastructure, promote active transport modes, reduce dependence on private vehicles and improve air quality. Research also shows that a general shift from car use to active and public transport could have significant environmental, climate, health and economic benefits [2].

Accessible and well-connected transportation systems promote increased social interactions, economic opportunity, and a sense of belonging in the urban environment. A well-developed urban transport system provides access to health

and educational services, especially important for children and the elderly. And also such a system realizes people's rights to work and rest.

Green spaces and well-being.

The presence of green spaces in cities, such as parks, squares and urban gardens, has a positive effect on a person's physical and mental well-being. Research consistently shows that contact with nature and green environments promotes physical health, reduces stress, improves cognitive function and promotes overall well-being [3]. Moreover, the influence of green spaces on human mental health has also been recorded [4, 5]. A connection has been proven between the frequency of visiting parks, a person's emotional state and his satisfaction with life. Access to green spaces in cities encourages physical activity, social interaction and relaxation, counteracting the harmful effects of urban life and helping to create more sustainable and livable urban environments.

Social interactions and urban behavior:

Cities serve as vibrant social centers, offering a diverse range of social interactions. The urban environment shapes the dynamics of social interactions, influencing social behavior, cultural practices, and community coherence. Factors such as high urban population densities and the availability of public meeting spaces contribute to increased opportunities for social interactions. The presence of a variety of cultural institutions, shopping centers, public places and events that are open and accessible to the public develops the social reality of the city.

Cultural aspects and identity.

Cities contain a huge number of different cultures, each of which has its own characteristics and traditions. Cultural aspects present in urban environments deeply influence human behavior, influencing daily routines, social norms and values. The city's architectural heritage, public art, cultural attractions and festivals contribute to a sense of place and identity. Cultural diversity enriches city life, promotes intercultural understanding and encourages inclusive behavior.

Thus, the influence of the urban environment on human behavior is a complex and multifaceted phenomenon. Urban design, transport systems, green spaces, social interactions and cultural aspects play a significant role in shaping the behavior of people in cities. Understanding these relationships allows urban planners, policy makers and designers to create cities that promote sustainable behavior, improved well-being and the development of social cohesion. Future research should continue to explore the complex relationships between the built environment and human behavior, providing scientific insights to create healthy, inclusive and livable cities for all.

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探索源自多种动物物种的胶原蛋白成分的形态和化学特征及其对研究最终产品的可能影响

EXPLORATION OF MORPHOLOGICAL AND CHEMICAL CHARACTERISTICS OF COLLAGEN COMPONENTS ORIGINATING FROM A VARIETY OF ANIMAL SPECIES AND THEIR POSSIBLE IMPACT ON THE FINAL PRODUCTS OF THE STUDY

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抽象的。胶原蛋白作为一种在食品和医药工业中广泛应用的蛋白质，其来源取决于其来源。这篇科学文章介绍了一项旨在对从不同动物物种获得的胶原蛋白进行比较分析的研究。应用分析胶原蛋白结构和化学成分的方法来鉴定从鸡、猪和牛肉等不同来源获得的胶原蛋白之间的差异。

结果显示动物物种之间的胶原蛋白结构和氨基酸组成存在显著差异。此外，本文还讨论了这些差异对胶原蛋白最终产品和潜在应用的影响。讨论了所确定的差异的实际和科学意义，以及不同来源的胶原蛋白的潜在应用。

这项研究强调了了解不同动物物种胶原蛋白的差异及其对最终产品的影响的重要性，为生物技术领域和胶原蛋白在各个行业的应用做出了贡献。

关键词: 胶原蛋白、纤维状、氨基酸、结构、螺旋结构。

Abstract. *Collagen, as a protein with wide application in food and medical industry, depends on the source of its origin. This scientific article presents a study aimed at comparative analysis of collagen obtained from different animal species. Methods for analyzing the structure and chemical composition of collagen were applied to identify differences between collagen obtained from different sources including chickens, pigs and beef.*

The results revealed notable differences in collagen structure and amino acid composition between animal species. Additionally, the article discusses the impact of these differences on the end products and potential applications of collagen. The practical and scientific significance of the differences identified, as well as potential applications of collagen from different sources, are discussed.

This study emphasizes the importance of understanding the differences in collagen from different animal species and its impact on end products, contributing to the field of biotechnology and applications of collagen in various industries.

Keywords: collagen, fibrillar, amino acids, structures, helical structure.

Introduction

It is important to understand the difference in the composition of animal raw materials for collagen production. This plays a role in both the quality of the resulting substance and the process of obtaining it. Collagen has a characteristic triple helical structure, but its exact parameters and properties may differ depending on the species of animal. For example, collagen from pork may have a denser and more elastic structure than collagen from fish.

There are differences in the arrangement of collagen in the composition of animal hides. In cattle, goats and buffalo, the collagen strands are arranged horizontally, in contrast to sheep and pigs, in which the strands are arranged in a chaotic pattern. The horizontal position gives strength to the animal's skin. The looseness of cattle skin creates a problem in processing. Randomly arranged collagen strands break down quickly and it will be problematic to obtain enough collagen from the extract of this skin. This difficulty will increase the cost of skin acquisition, so it is more advantageous to work with raw materials from sheep and pigs.

In addition, collagen from different animal species may have different functional properties that may be useful in the food industry. For example, collagen from pork may have a high ability to retain moisture, which may be useful for improving the juiciness and moisture content of meat products.[2]

Purpose of the study

The aim of this study is to analyze the effect of structural differences in collagen derived from different animal species on its functional characteristics. The analysis aims to identify how structural features of collagen may affect its strength, elasticity, solubility, biodegradability, interaction with other biomolecules, surface properties and immunogenicity. The goal is to understand which types of collagen from different sources may be most suitable for different food and medical applications, and which structural characteristics should be considered when selecting collagen for specific purposes.[3].

Selection of animal species and collection of collagen samples

The most common animals used for collagen sample collection are chickens, pigs and cattle. Fish collagen is also frequently used.

When selecting an animal species for collagen extraction, the availability of raw materials is the primary consideration. Chicken skin contains 8.0-20.0% collagen. Chicken is a rather cheap product, which makes it the most profitable source of raw materials.

Then comes cow skin - 11.0-11.7% content. As stated earlier, it is more difficult to obtain collagen from sheep skin because of the arrangement of filaments, so it is impossible to call sheep a profitable source of collagen.

Pig skin contains 3.0-8.0%. The use of this skin may cause problems in some religious countries, which plays an important role in the selection of animals for any use and production, so the raw material from pigs is not a profitable source of collagen.

It can be concluded that the use of chicken parts(feet, skin, bones, scallop, tendons, arteries, cartilage) is a suitable raw material according to all criteria.[4].

Samples are collected by cutting the chicken carcass. The skin is removed from the fleshy part. The bones are stripped of meat that will not be used later. The outer skin and claws are removed from the feet. Then all this is heat-treated. It is further boiled together with the enzyme - papain. After a few hours of infusion on the surface of the boiled you can notice the released collagen, which in structure is similar to colorless collagen fat-like substance.[5]

Analyzing the structure and chemical composition of collagen

Collagen is a structural protein in the connective tissues of living organisms. So far, 29 types of collagen have been studied.

Structurally, collagen is a triple helix composed of fibrils. Collagen chains are mainly composed of the sequence of hydroxyproline(Hyp), glycine(Gly) and proline(Pro). The collagen formula can be represented as Gly-Pro-X or Gly-X-Hyp, where X can represent any of the other amino acid residues. In collagen triads, the first substance is always some amino acid, the second is proline, and the third is glycine. The molecular weight of collagen is about 300 kDa, length 300 nm, thickness 1.5 nm. [14]

According to the composition of these chains, collagen is divided into two types:

Fibrillar(types I, II, III, V, XI, XXIV and XXVII)

The most common fibrillar collagen in most tissues is type I collagen. It is found on the surface of the connective tissues of skin and bone.

Non-fibrillar(all other types)

Non-fibrillar collagens are synthesized in smaller amounts.[6]

Differences in the structure of collagen

Let's start with the fact that collagen is a fibrillar protein, and animal protein is found in meat and fish. Animal protein (meat, offal, animal gelatin) contains large amounts of collagen. Animal collagen has several types, which differ in their structure. Below we will look at a few of the main types of collagen:

- Type I collagen: This type of collagen is the most common in humans and animals, considered the most abundant and strongest type of collagen found in humans. It makes up the bulk of skin, bones, tendons, and ligaments. The structure of type I collagen consists of three helical chains called alpha chains, which are linked together in a triple helix pattern.

- Type II collagen: This type of collagen is present in cartilage and plays an important role in joint support and flexibility. The structure of type II collagen also consists of three alpha chains, but they form a looser and more flexible network.

- Type III collagen: This type of collagen is found in blood vessels, skin, internal organs and muscles. Type III collagen consists of reticular fibers and the main component of the extracellular matrix that makes up our organs and skin. It is usually found in combination with type I and helps give skin elasticity and firmness. It also has a looser structure than type I collagen and consists of three alpha chains that form spiral structures.

- Type IV collagen: This type of collagen is present in the subrenal gland, renal capsules and basal membrane. It differs from other types of collagen in that it does not form spiral structures but forms a network of intertwined chains.[7]

Sources of collagen:

- Beef collagen. The main concentration is found in the skin, bones, and muscles of cows. It consists mainly of type 1 and type 3 collagen. Beef collagen has a large supply of glycine and proline, so it is useful for creatine production, muscle building, and also helps the body produce its own collagen.

- Porcine collagen. It is composed of amino acid chains that form a triple helical structure. It contains predominantly glycine, proline and hydroxyproline, which are the main amino acids of collagen. In addition, porcine collagen also contains other amino acids including arginine, asparagic acid and glutamic acid. Porcine collagen is derived from the skin of pigs. It is widely used in the food and cosmetic industries, as well as in medicine. Porcine collagen is highly biocompatible with the human body and is well absorbed. It is often used to produce food additives, cosmetic products, and medical materials such as sewing threads and wound patches.[12]

- Chicken collagen. Chicken collagen is dominated by type 2 collagen, which is best for building cartilage tissue. This makes it beneficial for joint health, especially because it contains chondroitin sulfate and glucosamine sulfate - which have anti-aging effects.

- Fish collagen. Collagen derived from fish has been found to be easily absorbed and provides mostly type 1 collagen, rich in the amino acids glycine, proline, and hydroxyproline. Since type 1 collagen can be found throughout the body, consuming more collagen is beneficial for joints, skin, vital organs, blood vessels, digestion, and bones.[13]

- Collagen from eggshells. It is found in the shell and albumen of eggs. Egg collagen is mostly dominated by type 1. It is rich in glucosamine sulfate, chondroitin sulfate, hyaluronic acid, and various amino acids, which play an important role in connective tissue formation, wound healing, building muscle mass, and reducing pain/hardness.[8]

The role of collagen in the food and medical industry is vast and varied.

The variety of applications of collagen in the food and medical industries makes it a valuable ingredient and material, contributing to the development of innovative products and procedures to improve health and quality of life.

Food Processing:

Food Texturizing: Collagen is often used to improve the texture of food products such as sausages, ham, and meat products, adding firmness and juiciness.

Gelling and stabilizing properties: Collagen can be used as a gelling agent and stabilizer for soups, sauces, and jellies.

Nutritional Supplements: Hydrolyzed collagen is often found as a nutritional supplement known as “collagen powder,” and can improve skin, joint, and hair health.

Structure Maintenance: Collagen helps maintain the structure and stability of many foods, and prevents sap production.

Medical Industry:

Surgery and Tissue Regeneration: Collagen is widely used in surgical procedures to regenerate tissues such as skin and blood vessels. It is also used in medical implants and biomaterials.

Cosmetic procedures: Collagen is often used in cosmetic procedures to reduce wrinkles and improve skin health.

Joint Disease Treatment: Collagen injections can be used to treat joint diseases such as osteoarthritis.

Medical Wraps: Collagen wraps and dressings are used to stimulate wound healing and reduce inflammation.

Cell transplantation and transformation: Collagen is an important component in cell culture and transplantation in medical research.[9]

Analyzing the effect of structural differences on the functional characteristics of collagen

Analyzing the effects of structural differences on the functional characteristics of collagen represents an important aspect of research. Analyzing these functional characteristics can help to understand how structural differences in collagen may affect its ability to fulfill different roles in the food and medical industries, and determine the best ways to use collagen in specific applications. Here are the functional characteristics of collagen that may depend on its structure:

Strength and elasticity: The structure of collagen affects its mechanical properties. For example, collagen with ordered molecules tends to be stronger and more elastic, which is important for its role in maintaining tissue structure.

Solubility and gelling ability: Some structural features of collagen can affect its ability to form gels or dissolve in liquids. This is important for applications in the food and medical industries, where collagen may be used to create gels or wraps.

Biodegradability: Structural differences can affect the rate of biodegradability of collagen. Some types of collagen may degrade faster, which is important in medical applications where controlled resorption of the material is required.

Interaction with other biomolecules: Structural features may determine the ability of collagen to interact with other biomolecules such as enzymes, cells or drugs. This is important in medical applications where collagen may be used to deliver drugs or stimulate cellular processes.

Surface properties: The surface structure of collagen can affect its adsorption and interaction with other surfaces. This is important in bioengineering and the creation of biomaterials.

Immunogenicity: Structural differences can affect the immunogenic properties of collagen, which is important in medical applications and when considering possible immune reactions to the material.[10]

Conclusion:

This study on the structural and functional characteristics of collagen obtained from different animal species has provided valuable insights that have important implications for the food and medical industries.

Analysis of collagen structure revealed notable differences depending on the source of collagen. These differences included variations in molecular ordering, amino acid composition, and surface characteristics. Such differences have a direct impact on the functional characteristics of collagen.

The effect of structural differences on the functional characteristics of collagen has been clearly demonstrated. The strength, elasticity, solubility, biodegradability, interaction with other biomolecules, and immunogenicity of collagen appear to be variable characteristics depending on its source.

These results provide important indications for industry, allowing the selection of the most appropriate type of collagen depending on specific requirements and objectives. In the food industry, this could lead to improved texture, flavor and nutritional characteristics of products. In the medical industry, it could mean the development of more effective biomaterials and medical implants.[11]

Based on theoretical results, we recommend more research in this area to better understand the molecular mechanisms underlying the structural and functional differences in collagen. This will help to optimize the use of collagen and create innovative products and technologies in the food and medical industries. In addition, the results of this study highlight the importance of further research in biotechnology and molecular biology. Understanding the structural features of collagen and their effects on its functional characteristics may lead to the development of new methods to produce and improve the quality of products in both the food and medical industries.

In addition, study leaves open questions that can serve as a starting point for future research. One such question is the influence of processing and storage processes on the structure and functional characteristics of collagen. A detailed study of these aspects may further expand knowledge in this field.

Overall, scientific work emphasizes the importance of an integrative approach to the study of collagen, taking into account both its chemical structure and its functional properties. This may lead to the development of more efficient and innovative products in the food and medical industries, as well as contribute to the further development of biotechnology and biomedicine.

Results, due to their scientific and practical significance, are intended to serve as a basis for future research and innovative developments in this field.

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智力障碍青少年的发育特点
**FEATURES OF THE DEVELOPMENT OF ADOLESCENTS WITH
INTELLECTUAL DISABILITIES**

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抽象的。文章分析了智力障碍青少年的人体测量、功能发育时期，以及影响孩子大脑皮层发育的偏差。

关键词：精神发育迟滞、智力障碍、人体测量指标、形态发育、功能发育、智力障碍青少年。

Abstract. *The article analyzes the anthropometric, functional periods of development of adolescents with intellectual disabilities, as well as deviations affecting the development of the child's cerebral cortex.*

Keywords: *mental retardation, intellectual disabilities, anthropometric indicators, morphological development, functional development, adolescents with intellectual disabilities.*

Adolescents with intellectual disabilities are of middle school age. This period covers children aged 12 to 15 years (grades V–VIII) and is defined as the stage of ongoing active development and improvement of physical and psychological abilities and qualities. Teachers of special correctional schools note that in order to implement periods of development of physical qualities and the motor abilities that characterize them and in the justified selection of methods and means of adaptive physical education, it is important to take into account the physiological characteristics of children with intellectual disabilities at middle school age [7].

It was revealed that in adolescence, children experience intensive growth and, as a consequence, an increase in anthropometric indicators. Over the course of a

year, a jump in length growth of 4–7 cm is possible, in particular due to an increase in the length of the legs. Body weight grows annually from 3 to 6 kg. The most intensive rate of increase in body height in boys occurs at 13–14 years, and in girls at 11–12 years. In middle adolescence, the long tubular bones of both the upper and lower extremities grow significantly. The rate of growth of vertebrae in height also increases. The spinal column of a teenager is extremely mobile. Extreme muscle loads sufficiently accelerate the ossification process, which slows down the growth of tubular bones in length [4].

During middle school age, the muscular system also develops rapidly. From the age of 13, there is a sharp jump in the increase in total muscle mass, mainly due to an increase in the thickness of muscle fibers. Muscle mass increases especially rapidly in boys at 13–14 years of age, and in girls at 11–12 years of age.

It has been established that there are differences in the timing of puberty between boys and girls. The process of puberty in boys usually occurs 1–2 years later than in girls [1].

In adolescents, against the background of the functional and morphological underdevelopment of the cardiovascular system, as well as the rather intensive development of the central nervous system, the incompleteness of the formation of mechanisms responsible for the regulation and coordination of various functions of the heart and blood vessels is extremely noticeable. In this regard, the possibilities for adaptation of the circulatory system in adolescents 12–15 years old with active muscular activity are much less than in slightly older adolescents. The teenage circulatory system responds to stress less economically. Only by the age of 20 the heart achieve complete morphological and functional perfection [5].

At the stages of puberty, adolescents with intellectual disabilities experience the highest rate of development of the respiratory system. Lung volume at the age of 11–14 years almost doubles, the per-minute breathing volume increases significantly and the vital capacity indicator (VC) increases: in boys - from 1970 ml (12 years) to 2600 ml (15 years); in girls - from 1900 ml (12 years) to 2500 ml (15 years). The breathing pattern is less efficient than in adults. In one respiratory cycle, a teenager consumes 14 ml of oxygen, while an adult consumes 20 ml. Adolescents are less able than adults to hold their breath and work in conditions of lack of oxygen. They are more likely than adults to experience a decrease in blood oxygen saturation [1].

It has been noted that adolescents with intellectual disabilities, in most cases, have deviations in the development of the musculoskeletal system, namely posture and flat feet. Poor posture is caused by deficiencies in the development of strength in the muscles of the back and abdominals, as well as the inability to differentiate between muscle and joint sensations, and the inability to tense and relax muscles at rest and in motion. It has been established that flat feet are often found in chil-

dren with intellectual disabilities and the main cause of flat feet is weak muscles, bursal-ligamentous apparatus and the ankle joint of the lower extremities. It is considered that most of the difficulties, especially flat feet and poor posture, are associated with coordination ability, a sense of balance, both dynamic and static [6].

Psychomotor deviation of adolescents with intellectual disabilities is revealed in the slow pace of the development of locomotor functions, unproductive movements, motor restlessness and fussiness [3].

Experts who study the physiological characteristics of children with intellectual disabilities note that the motor actions of such children are poor, angular, and lack smoothness. Subtle and precise hand movements, object manipulation, fine motor skills, gestures and facial expressions are extremely poorly developed. Deviations in physical development are clearly expressed in adolescents with intellectual disabilities - starting with anthropometric indicators (lack or excess of length and body weight), as well as quite frequent paresis of the upper and lower extremities, disturbances in the development of the foot or postural disorders, decreased chest circumference, and as well as disturbances in its development, delays. Indicators of the vital capacity of the lungs, deformation of the skull and anomaly of the facial skeleton, dysplasia also occur as secondary developmental disorders in adolescents with intellectual disabilities [2].

So, the basic concepts that are used in the domestic literature, the understanding of the reasons that determine the impairment of a child with intellectual disability from standard development, the assessment of the possibilities of positive dynamics and social and labor integration of this category of adolescents quite coincide with the opinions described in foreign literature. However, it is necessary to highlight direct differences between the forms, means and methods used by specialists from different countries when working with certain scientific issues [6].

Underdevelopment of intellectual and mental functions arises due to a large number of very diverse phenomena that have an impact on the development of the child's cerebral cortex:

1. factors of heredity, including pathology of the generative cells of the parents (intellectual disabilities of the parents, chromosomal disorders, drug addiction, alcoholism);

2. abnormalities in intrauterine development (various infectious diseases suffered by the mother during pregnancy, hormonal pathologies of the mother, intoxication, local injuries);

3. Pathological factors that are possible during childbirth and at an early age of the child (up to 2 years):

- asphyxia or birth trauma;
- various somatic diseases and neuroinfections (especially those that occur in the first months of a child's life, which are accompanied by dehydration

and possibly dystrophy, which is extremely pathogenic for the development of the child's brain);

- various brain injuries [8].

In modern, practical work and medicine, various specialists use the international classification (ICD-10), which classifies mental retardation according to the severity and depth of the intellectual defect as follows:

- mild degree (IQ within 50-69),
- moderate degree (IQ within 35-49),
- severe degree (IQ within 20-34),
- deep degree (IQ below 20) [7].

In case of disorders in the development of the brain and intellect, the main unfavorable factors are the child's extremely weak curiosity and low learning ability, i.e. his inhibited receptivity to the new.

The above deviations are basic, initial and influence the development of children with intellectual disabilities from the first days of life. For the most part, in such children, developmental timing lags not only throughout the first years, but also in subsequent periods of life. There is a noticeable absence or late manifestation of weak interest in the surrounding reality and adequate reactions to external stimuli, i.e. Lethargy, even drowsiness, often prevails, which does not prevent them from being loud, excessive anxiety, etc. [4].

Adolescents with intellectual development disorders often do not develop:

- the “revitalization complex” is most often absent or, in other words, emotional interaction with adults is extremely defective;
- ability to recognize familiar and unfamiliar people;
- interest in games, bright objects, which has been absent since childhood, for example, when babies were hung with various toys above the crib;
- it is possible to preserve gesture communication, which appears against the background of interaction with adults [8].

Children with intellectual disabilities under one year of age do not noticeably develop interactions with objects (offered toys), grasping does not manifest themselves, which qualitatively has a negative impact on the development of perception and visual-motor, spatial coordination, and therefore negatively affects the subsequent development of all mental processes.

At the beginning of the next age period, 2–3 years, some attempts to master motor actions with objects may occur. For example, a baby takes a toy, perhaps pulls it into his mouth, but most likely no other practical actions will be performed (examining, shifting, etc.) [5].

In the preschool period (3-4 years), underdevelopment of intelligence continues to show itself in behavioral characteristics and priority activities, namely play. Children are inhibited in acquiring new self-care skills, which most often are not

consolidated before school, and do not show childlike curiosity and liveliness, which are typical for a typical child. The interest shown in the surrounding reality, phenomena and objects does not grow and remains quite short-lived, at a low level. Their games consist of simple manipulation, lack of basic, simple rules and contacts with other children, low mobility [6].

In older preschool and primary school age, oligophrenic children do not show a desire to engage in intellectual games, since attention due to the diagnosis is practically absent, and there is an increased interest in active, unfocused, chaotic games. Children are not independent, lack initiative; imitative, copying activities of those around them come forward.

Closer to adolescence, intellectual impairments become more and more apparent, which clearly manifest themselves not only in educational activities, but also in all spheres of the child's life; deviations in behavior and higher mental activity are more obvious.

With intellectual disabilities, perception - the initial stage of cognition - is impaired. The speed of perception is slow, the volume is extremely small. Children can hardly identify the general and most important things in a text or picture; they pick out only individual parts and do not realize the internal connection between components and characters. Basically, they do not distinguish or confuse graphically similar numbers, letters, objects, and words that sound similar. Even when copying text correctly, adolescents with intellectual disabilities do not understand the meaning of what is written and most cannot take dictation. They also have certain difficulties in determining space and time, which makes it difficult to navigate the surrounding reality. In most cases, only by adolescence, they have difficulty distinguishing between the right and left sides, may confuse the directions forward and backward, get lost in a familiar space (for example, cannot find their class), make mistakes in determining the time on the clock, days of the week, seasons [1].

All higher cognitive activities (analysis and synthesis, comparison and generalization, abstraction) are at a low level of development. The main distinguishing feature of their thinking is not criticality, the inability to independently evaluate their work. Inflated self-esteem manifests itself in all areas of activity; adolescents with intellectual disabilities do not understand their failures and are always satisfied with themselves.

Unformed memory manifests itself in difficulties not only in the synthesis and analysis of information, but also in its reproduction (especially verbal material). This can be called the main difference between them and their healthy peers. Due to the fact that children do not perceive the logic of events, verbal reproduction is unsystematic [4].

In children with intellectual development disorders, in most cases, all aspects of speech are impaired. Attention is unstable, scattered, its ability to switch is inhibited.

The emotional-volitional sphere is marked by frequent emotional outbursts, inadequate manifestations to external stimuli, and instability of emotions. In their work activities, they prefer the easy path that does not require volitional efforts.

However, the learning trends of a child with intellectual disabilities are the same as those of a healthy peer. With timely, competent organization of education, and the earliest possible start of the process of comprehensive development, many disorders in such children can be corrected and possibly prevented [3].

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基于微生物代谢矿化类型及沉积机理研究进展

**RESEARCH PROGRESS ON THE TYPES OF MINERALIZATION
AND DEPOSITION MECHANISMS OF EXISTING MICROBIAL
METABOLISM**

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Ural Federal University

Tang Dongyang

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摘要.近年来,各国科研人员一直在尝试探索一种利用微生物诱导碳酸盐沉淀(MICP)技术解决行业现有裂缝的修复技术。该技术因其绿色环保、兼容性优异、修复率高、易于填充裂缝空间等特点,成为研究热点。本文主要从微生物矿化诱导碳酸钙沉积的机理入手,总结了几种常用的微生物品种,为后续研究提供可靠支撑。

关键词: MICP;混凝土微裂缝;修复过程;研究现状

Abstract. *In recent years, researchers from various countries have been trying to explore a repair technology that uses microbial-induced carbonate precipitation (MICP) technology to solve the existing cracks in the industry. This technology has become a research hotspot due to its green environmental protection, excellent compatibility, high repair rate, and easy to fill the crack space. In this paper, we mainly start from the mechanism of calcium carbonate deposition induced by microbial mineralization, and summarize several commonly used microbial varieties to provide reliable support for follow-up research.*

Keywords: *MICP; concrete microcracks; repair process; research status.*

1. Overview

At the beginning of the 80s of the 20th century, Russia was in a state of rapid development of infrastructure construction, and the demand for concrete in various fields was in short supply, and the requirements for its mechanical properties

were gradually increasing, such as roads and bridges and river crossing, deep-sea pile foundations, housing construction, underground transportation, national defense command and protection and water conservancy engineering. Although the building functions and environments in various fields are different and the requirements are different, the cracking of concrete under long-term service is a common problem^[1] Concrete is prone to cracks during construction and use, which affects the integrity and performance of concrete components, and also threatens the safety of building structures. If it cannot be repaired in time, it will lead to the aging of the building structure. In order to solve these problems, researchers from various countries have increased their research efforts on the properties of concrete itself, and found that ordinary concrete itself also has a certain repair ability^[2], which stems from the continuous hydration potential of concrete under the premise that it is not completely hydrated at the beginning, Figure 1 explains the mechanism of self-repair of concrete in the external environment, when the crack is generated, the external water (H_2O) and carbon dioxide (CO_2) enter the crack and the calcium ions (Ca^{2+}) inside the component combine to form calcium carbonate ($CaCO_3$). However, this kind of repair needs to last for a long time, and the repair effect is not ideal, and it does not have the ability to self-diagnose and self-repair after the concrete cracks in the later stage^[3]. In order to achieve the goal of self-diagnosing and self-healing concrete, the self-repair of cracks has been proposed^[4]. Traditional concrete crack repair methods, including surface treatment, grouting and filling^{[5][6]}, have achieved certain success and have been demonstrated, but the above traditional methods have the brittleness of the repair effect, the uneven repair surface, the poor interface anchorage, the construction complexity and limitations.

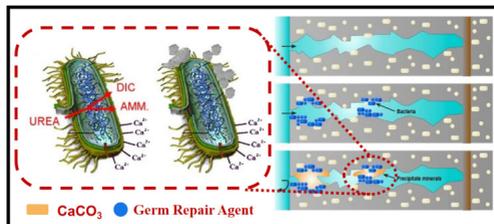


Figure 1. The principle of self-healing of concrete cracks based on microbial mineralization

In recent years, the MICP technology has largely made up for the limitations of traditional restoration methods in engineering applications. MICP technology is green and environmentally friendly, the deposited bio-calcium carbonate has good compatibility with the concrete matrix, and the repair fluid has strong permeability (viscous and low flow). It has been widely concerned about its advantages

such as large dynamics) and easy access to crack space. MICP technology has achieved remarkable results in the self-healing of concrete cracks. For example, Justo-Reinoso et al^[7] used air-entrained mixture to encapsulate the cracks of the mortar with a width of 0.5mm, and the results showed that when the cracking age was 28days and 9months, the healing rate of the embedding cuddle with the air-entrained mixture was 59.6% and 46.2% higher than that of the samples containing aerated concrete particles, respectively. Sun et al^[8] added healing agent to the mortar with a width of 0.4mm and loaded the cracks of the mortar reinforced with polyvinyl alcohol fiber with a width of 0.4mm, and loaded the samples for 7d, 14d, and 28d, respectively, and found that the healing time of the samples with a curing age of 7days and 14days took one week and two weeks, respectively, while the samples with a curing age of 28days did not completely heal after 28days of repair, which may be due to the fact that the bacteria had been inactivated in the high alkaline environment of the mortar after 28days of curing. Jiang et al^[9] used expanded perlite embedded hugs to prepare concrete samples, and after curing for 28days, they found that the crack width that was completely healed after 28days of self-healing could reach 1.24mm, and Wang et al^[10] repaired the cracks of the mortar specimen after embedding the hugs with microcapsules, and found that the maximum crack width that could be healed by the mortar specimen was 970mm. The above shows that MICP technology has been outstanding in concrete self-healing. For the cracking problem of the existing concrete in the project, the MICP repair technology can be used as a reference. Therefore, this paper intends to summarize the research progress of MICP on the repair of existing micro-cracks in concrete, so as to provide a certain reference for the practical application of MICP technology in repairing existing concrete cracks

2. Mechanism of mineralization and deposition of microbial metabolism

Most microorganisms in nature can induce calcium carbonate deposition under suitable conditions, and the main mechanism of calcium carbonate deposition by microorganisms is shown in Table 1.

*Table 1
Mechanism of microbial deposition of calcium carbonate*

Metabolic pathways	chemical reaction	Metabolic type
photosynthesis ^[11]	$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_2\text{O} + \text{O}_2$ $\text{HCO}_3^- \rightarrow \text{CO}_2 + \text{OH}^-$ $\text{Ca}^{2+} + \text{HCO}_3^- \rightarrow \text{CaCO}_3 + \text{H}^+$ $\text{OH}^- + \text{H}^+ \rightarrow \text{H}_2\text{O}^{[12]}$	Algae: <i>Cyanobacteria, Microalgae</i>

Enzyme catalysis	$\text{CO}(\text{NH}_2)_2 + \text{H}_2\text{O} \rightarrow 2\text{NH}_3 + \text{CO}_2$ $\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$ $\text{OH}^- + \text{CO}_2 \rightarrow \text{HCO}_3^-$ $\text{Ca}^{2+} + \text{HCO}_3^- + \text{OH}^- \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$	Take enzymes: <i>Bacillus lentus</i> : <i>Sporosarcina pasteurii</i> ^[13] , <i>Bacillus sphaericus</i> ^[14] , <i>Bacillus subtilis</i> , <i>Bacillus diminuta</i> , <i>Bacillus megaterium</i> ^[13] , <i>Bacillus pseudofirmus DSM 8715</i> ^[15]
denitrification	$\text{CH}_3\text{COO}^- + 2.6 + 1.6\text{NO}_3^- \rightarrow 2\text{CO}_2 + 0.8\text{N}_2 + 2.8\text{H}_2\text{O}$ $\text{Ca}^{2+} + \text{CO}_2 + 2\text{OH}^- \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$	Denitrifying bacteria: <i>Alcaligenes</i> , <i>Bacillus</i> , <i>Thiobacillus</i> , <i>Pseudomonas</i> , <i>Halomonas</i> ^[16] , <i>Spirillum</i> , <i>Micrococcus</i> , <i>Achromobacter</i> , <i>Serratia marcescens</i> , <i>Bacillus alkalinitrilicus</i> ^[17]
Ammoniation	$\text{Amino acids} + \text{O}_2 \rightarrow \text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O}$ $\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$ $\text{CO}_2 + \text{OH}^- \rightarrow \text{HCO}_3^-$ $\text{Ca}^{2+} + \text{HCO}_3^- \rightarrow \text{CaCO}_3 + \text{H}^+$	Ammoniating bacteria: <i>Mycococcus xanthus</i> ^[18] , <i>Brevundimonas diminuta</i> ^[19] , <i>Alcaligenes aquatilis</i> ^[20]
Sulfate reduction ^[21]	$\text{SO}_4^{2-} + 2\text{CH}_2\text{O} + \text{OH}^- \rightarrow \text{HS}^- + 2\text{HCO}_3^- + 2\text{H}_2\text{O}$ $\text{HCO}_3^- \rightarrow \text{CaCO}_3 + \text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$	Nitrate-reducing bacteria: <i>Desulfovibrio desulfuricans G20</i> ^[22]
Methane oxidation ^[23]	$\text{CH}_4 + \text{SO}_4^{2-} \rightarrow \text{HS}^- + \text{HCO}_3^- + \text{H}_2\text{O}$ $\text{Ca}^{2+} + \text{HCO}_3^- \rightarrow \text{CaCO}_3$ $\text{H}^+ + \text{HS}^- \rightarrow \text{H}_2\text{S}$	Methane oxidizing bacteria: <i>Methylocystis parvus OBB</i> ^[24]
Carbonic anhydrase catalysis	$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{HCO}_3^- + \text{H}^+$ $\text{Ca}^{2+} + \text{HCO}_3^- + \text{OH}^- \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$	Carbonic anhydrase bacteria: <i>Bacillus cereus</i> ^[25] , <i>Bacillus aerius U2</i> ^[26]
Aerobic respiration	$\text{Ca}(\text{C}_3\text{H}_5\text{O}_3)_2 + \text{O}_2 \rightarrow \text{CaCO}_3 + 5\text{CO}_2 + 5\text{H}_2\text{O}$	Aerobic respirators: <i>Bacillus cohnii</i> , <i>Bacillus</i> ^[27]

As can be seen from the table, the mechanism of urease-catalyzed mineralization of calcium carbonate has been widely studied due to its many advantages, but the ammonia produced cannot be ignored. To solve this problem, we can trace back to the source, bacteria in a specific environment in nature are often a variety of bacteria at the same time, that is, two or more bacteria can be combined, that is, several deposition actions can be combined and applied, so that we can not only learn from each other's strengths but also achieve the effect of cost saving. As early as wastewater treatment, it has been found that denitrifying bacteria and methane oxidizing bacteria can coexist^[11], and some studies have even shown that methane oxidizing bacteria, denitrifying bacteria, and ammoniating bacteria can coexist and maintain dynamic equilibrium in the system^[18], and the advantages of the combination of the three are that short-range denitrification and ammoniation can save carbon sources, and the demand for dissolved oxygen is low, saving the energy required for methane oxidation aeration. Another example is the combina-

tion of methane oxidation and sulfate reduction, and it has been shown that anaerobic methane oxidizing bacteria can coexist with sulfate-reducing bacteria in the deep-sea environment. For the elimination of ammonia, a by-product catalyzed by urease, Lee et al^[22] showed that *Lysinibacillus boronitolerans* YS11 could promote *Bacillus* sp. When there are urea hydrolysis bacteria and ammoniation bacteria in the environment at the same time, urea hydrolysis will first decompose urea to deposit calcium carbonate, and when urea is exhausted, ammonia^[23] can take effect and the ammonia produced by urea hydrolysis can be absorbed, which makes up for the shortcomings of urea hydrolysis. It is also possible to work together with phosphate mineralizing bacteria to eliminate the ammonia produced by urease-catalyzed processes and convert them into environmentally friendly struvite stones. However, the simultaneous application of two or more mechanisms has been studied in wastewater treatment, and whether it is suitable in concrete still needs to be further studied.

3. Prospect

Intelligence is the inevitable trend of the development of cement-based materials, this paper analyzes the genesis mechanism of calcium carbonate production by eight different metabolic methods, among which urease-catalyzed calcium carbonate is the most common, which has become a research hotspot in the field of concrete self-healing because of its microbial friendliness and obvious repair characteristics in concrete cracks.

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儿童和青少年精索静脉曲张发生和进展中的“荷尔蒙压力”
“HORMONAL PRESSING” IN THE DEVELOPMENT
AND PROGRESS OF VARICOCELE IN CHILDREN AND
ADOLESCENTS

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抽象的。 关联。 根据多位作者的说法，科学文献提供的关于激素对精索静脉曲张病因的影响的数据很少。 同时，人们普遍认为精索静脉曲张取决于青春期的进程。 精索静脉曲张的高峰发生在14-18岁。 精索静脉曲张的发病率在30岁后略有下降。因此，精索静脉曲张的出现频率和进展与患者血液中性激素的动态相对应。

目标。 确定使用睾丸静脉系统中性激素水平作为精索静脉曲张严重程度和复发标准的可能性； 从而探索睾丸静脉系统作为性激素含量调节器的作用。

材料和方法。 我们的研究反映了 Marmar 精索静脉曲张切除术期间精索静脉中性激素水平的研究结果。 研究人员将性激素水平与一般血液指标进行比较。 对 30 名年龄 12 至 18 岁、根据马尔马拉方法进行手术的精索静脉曲张患者进行了性激素研究。 对照组包括因与精索静脉曲张无关的另一种睾丸病理而接受手术的患者（35 人）。

结果。 肘部静脉性激素研究的结果在参考值范围内，而同一时间段左侧蔓状神经丛静脉的性激素结果明显较高 比正常情况。 在研究对照组患者的性激素时，还发现外周血中的激素水平与从睾丸流经蔓状神经丛静脉的血液中的激素水平存在显著差异。 然而，它没有达到与精索静脉曲张相同的比例。

结论。 因此，精索静脉曲张患者体内一般血液中性激素水平和比例的严格平衡，睾丸静脉系统的血液可能会发生某些偏差，导致性水平显著增加 激素（200

倍或更多)。所揭示的事实证实了沉积一定量血液中性激素浓度升高的可能性。

关键词: 精索静脉曲张, 青少年, 性激素, 睾丸静脉系统。

Abstract. Relevance. *According to various authors, the scientific literature provides little data on the hormonal influence on the etiology of varicocele. At the same time, it is generally accepted that varicocele depends on the process of puberty. The peak occurrence of varicocele occurs at the age of 14-18 years. The incidence of varicoceles then decreases slightly after age 30. Thus, the frequency of appearance and progression of varicocele corresponds to the dynamics of sex hormones in the blood of patients.*

Goal. *To determine the possibility of using the level of sex hormones in the venous system of the testicle as a criterion for the severity and recurrence of varicocele; thereby exploring the role of the testicular venous system as a regulator of the content of sex hormones.*

Materials and methods. *Our study reflects the results of a study of the level of sex hormones in the veins of the spermatic cord during Marmar varicocelectomy. The level of sex hormones was studied in comparison with indicators from the general bloodstream. A study of sex hormones was carried out in 30 patients with varicocele, aged 12 to 18 years, operated on according to the Marmara method. The control group included patients operated on for another testicular pathology not related to varicocele (35 people).*

Results. *The presented results of a study of sex hormones from the vein of the elbow were within the reference values, while the results of hormones from the vein of the pampiniform plexus on the left, taken in the same time period, turned out to be significantly higher than the norm. When studying sex hormones in patients in the control group, a significant difference was also noted between the level of hormones in the peripheral blood and the blood flowing from the testicle through the veins of the pampiniform plexus. However, it did not reach the same proportions as with varicocele.*

Conclusions. *Thus, a strict balance in the level and ratio of sex hormones in the general bloodstream, in the body of a patient with varicocele, can undergo certain deviations in the blood of the venous system of the testicle towards a significant increase in the level of sex hormones (200-fold or more). The revealed fact confirms the possibility of depositing certain volumes of blood containing increased concentrations of sex hormones.*

Keywords: *varicocele, adolescents, sex hormones, testicular venous system.*

Relevance of the problem.

Surgical treatment of varicocele remains an unresolved problem, despite the availability of many methods of surgical interventions.

The etiology of varicocele is multiple; among the theories explaining its origin, a significant place is occupied by the mechanical theory (Virchow, 1863), the absence or

insufficiency of the valves of the internal spermatic veins, due to impaired venous outflow from the renal vein and weakness of the wall of the testicular vein (N.A. Lopatkin, 1973). In adult men, the incidence of varicocele ranges from 2.2 to 38.2% [1]. The scientific literature provides little data on the hormonal influence on the etiology of varicocele. At the same time, it is generally accepted that varicocele depends on the process of puberty. Thus, the frequency of appearance and progression of varicocele fully corresponds to the dynamics of sex hormones in the blood in men [2].

The veins of the testis are embryologically different from the cremasteric vascular system of the scrotum. Thanks to this structure, veins can greatly expand and perform a depository function [3]. Experimental studies on various models of angiogenesis in animals reveal a noticeable effect of both male and female sex hormones on both the morphology of the vascular wall and angiogenesis and vascular tone [4]. No less interesting is the effect of sex hormones as vasodilators. The vasodilating effect is noted in experimental studies of both testosterone and female sex hormones. Both the arterial wall and the lumen of the venous vessel are subject to the influence of sex hormones [5]. One of the mechanisms for realizing the effect of sex hormones on the venous wall is their interaction with the corresponding receptors, detected by histochemical research methods [6]. A number of authors believe that the immediate cause of the development of varicocele is the increased flow of arterial blood to the genitals, which begins during puberty, which reveals the incompetence of the tone of the wall of the testicular vein and leads to dilatation of the pampiniform plexus [10]. In general phlebology, publications have appeared on the important role of connective tissue dysplasia in the pathogenesis of varicose veins of the lower extremities, which is confirmed by morphological, phlebographic and hemodynamic studies [11, 12].

The purpose of the work is to determine the possibility of using the level of sex hormones in the venous system of the testicle as a criterion for the severity and recurrence of varicocele; thereby exploring the role of the testicular venous system as a regulator of the content of sex hormones.

We considered the objectives of the work to be to identify the role of sex hormones in the pathogenesis of varicocele and, in connection with this, to create endocrinological diagnostic criteria for determining indications for surgical intervention, as well as to increase the accuracy of diagnosing the severity and recurrence of varicocele. The next task was a morphological study of the state of the venous wall in different venous basins of the spermatic cord with varicocele.

Material and methods. A study was conducted of the difference in the levels of sex hormones in a group of children and adolescents operated on for clinically significant varicocele on the left, grade 2-3. A study of the level of sex hormones in the blood serum in patients with varicocele was carried out during surgical interventions that were performed in the pediatric surgery clinic. Our study reflects the results of a study of the level of sex hormones in the testicular vein basin dur-

ing surgical treatment of varicocele using microsurgical varicocelectomy. For surgery for varicocele, the “Suprascrotal” approach was used [13]. A study of sex hormones was carried out in 30 patients with varicocele, aged from 12 to 18 years, operated on according to the Marmara method (microsurgical varicocelectomy). The control group included patients who underwent surgery on the scrotum for another testicular pathology not related to varicocele (35 people). The levels of sex hormones were determined in the Tafi-diagnostics laboratory using the Elecsis2010 apparatus using the electrochemiluminescence method. The level of sex hormones was studied in comparison, according to the original author’s method [14]. The determination method was as follows: during surgery for varicocele using the Marmara method, dilated veins of two main venous basins were gradually isolated - the cremasteric vein and the testicular vein basin (popiform plexus). Blood sampling for hormone determination was carried out simultaneously from the ulnar vein and the veins of the left spermatic cord. The results of the study were statistically processed by the method of variation statistics using the Student’s t test, and a nonparametric assessment of the reliability of the obtained data according to Mann-Whitney was also used. Correlations between the levels of sex hormones were tested using the Spearman test. The morphological part of the study was as follows. For the study, the veins of the cremasteric and pampiniform plexuses were taken when they were dilated. Thus, a comparison was made of the morphological changes in the veins in the same patient, on the affected side, from all venous areas of the testicle involved in the pathological process. The surgical material was fixed in 10% buffered formalin and, after paraffin wax, stained with hematoxylin and eosin, as well as Van Gieson. Histological preparations were subjected to systemic stereological analysis using the point counting method using a stereological probe for cytohistostereometric studies (G.G. Avtandilov, 1990). The thickness of the layers of the venous wall was measured, the presence of deformations, thinning, or, conversely, bulges such as “Ebner and Conti pillows” were noted. An immunohistochemical reaction was performed on histological sections to detect androgen, estrogen and progesterone receptors.

Results and discussion. The results of the study of sex hormones in patients with varicocele are presented in Table 1.

Table 1.
Initial indicators of sex hormone levels in the main group

Test	Result from the vein of the elbow (M+m)	Reference values (norm)	Result from the vein of the pampiniform plexus (M+m)	Excess ratio (M+m)
Progesterone (ng/ml)	0,469±0,061	0.20-1.40.	8,270 ±1,95	13,139±2,21
Estradiol (pg/ml)	15.78± 2.44	7.63-42.60	1349.37± 97.64	205.91±95.29
Testosterone (ng/ml)	4,68± 0.829	0.28-11.10	868.05± 158.91	220.96±30.79

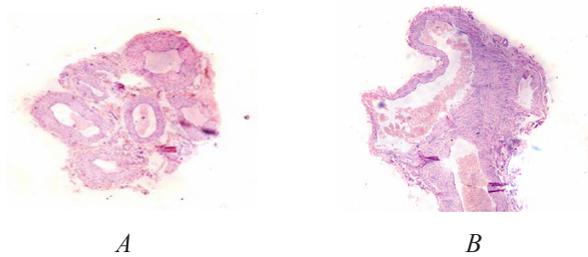


Figure 1. Veins of the pampiniform (A) and cremasteric (B) plexus. B-noy I, 15 years old. Hematoxylin and eosin staining, $\times 100$.

The lumen of the vein of the pampiniform plexus, in the case of its main structure, exceeded the diameter of the cremasteric vein (Fig. 1. A, B). With the scattered type of structure of the pampiniform plexus, a significant number (up to 5–6) bundle-shaped veins were noted, the total diameter of which also exceeded the total diameter of the cremasteric veins. An important conclusion arising from our morphometric studies of veins can be considered the fact of the relative thinning of the venous wall of the veins of the pampiniform plexus ($M+m=113.08+0.829 \mu\text{m}$), compared with the cremasteric veins ($M+m=120.77+0,3245 \mu\text{m}$), on the affected side. Further correlation analysis of the data from a group of subjects (first group) using the Spearman criterion revealed the following patterns. A strong correlation was revealed between the volume of the left testicle and the level of testosterone (positive), estradiol (negative). We interpret this fact as a manifestation of hormone dependence of the testicles.

Studying the influence of sex hormone levels prompted us to compare these indicators with testicular volume. The data is presented in Table 2.

Table 2.
Correlation between testicular volume and sex hormone levels

INDICATORS	R (Spearman)	p
Testosterone ratio and volume of the right testicle	-0,650	0,020*
Estradiol from the pampiniform and volume of the right testicle	-0,693	0,013**
Progesterone from the pampiniform and volume of the right testicle	-0,680	0,015**

Where R is Spearman’s test, p is the level of significance. A (-) sign in front of the R value means that the relationship is in the opposite direction. The absence of a (-) sign means that the connection is direct. Significance level $p < 0.05$, * - weak connection ($0.01 < p < 0.05$), ** - strong connection ($p < 0.01$). From the data in Table 2, increased levels of female sex hormones (estradiol and progesterone)

correlate with a decrease in the volume of not only the left but also the right testicle in patients with varicocele. When studying the level of follicle-stimulating and luteinizing hormones (FSH, LH) in the blood flowing from the testicle, a slight decrease in their level in the blood flowing from the testicle was noted, apparently due to consumption in the tissues of the gonad (consumptive hormonopenia).

Conclusion. The testicular venous system is an important factor in regulating the level of sex hormones produced in the testicle. To a particular extent, this possibility of regulation is present on the side of the left testicle, due to the greater capacity of the vascular bed and the presence of arterio-mesenteric “tweezers”, which acts as a valve.

If a patient has a varicocele, the level of sex hormones in the blood of the pampiniform plexus may increase tens or hundreds of times, which can serve as an objective criterion for the severity of the varicocele.

Conclusions.

1. Morphometric studies have shown that the veins of the pampiniform plexus are represented by vessels of the so-called “weak type”, the wall of which is additionally thinned compared to the veins of the cremaster plexus due to pathological mechanisms of action in varicocele.

2. The level of concentration of sex hormones in the blood of the venous basins of the testicle, determined during the Marmar operation, can serve as a criterion for the severity of varicocele and the development of relapse of the disease.

3. The preliminary data obtained on the study of the level of sex hormones in the blood with varicocele indicate the need for further study of the role of “hormonal pressure” in the etiology and pathogenesis of varicose veins of the spermatic cord.

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3.1~7岁急性肾衰竭强化治疗特点

FEATURES OF INTENSIVE THERAPY OF ACUTE RENAL FAILURE AT THE AGE OF 3.1-7 YEARS

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抽象的。根据对 17 名 3.1-7 岁少尿伴急性肾功能衰竭阶段接受血液透析体外排毒的儿童进行每小时氧饱和度监测的研究,第 2 组和第 3 组静脉输液量有一定增加趋势 结果表明,第 2 组儿童的日排尿率比第 1 组儿童高 200%,第 3 组儿童的利尿率显著低于第 1 组 29%。抗凝治疗在透析间期更为积极。第 1 组相对于第 2 组增加了 60%,并且相对于第 3 组有增加的趋势(表 1,图 8)。同时,第 2 组需要的止血治疗程度是第 1 组的 6 倍。在强化治疗的前 18 天内,第 3 组的肠外水给药量为每天 200-400ml,并没有改善肾脏的排泄活性。与第 3 组相比,第 1 组和第 2 组的利尿纠正相对更为积极。第 3 组的儿童在第 13 - 20、29、29 天时显示出血血浆白蛋白输注量增加的趋势(图 3)。30.第 3 组的抗生素治疗明显比第 1 组有效 35%,略高于第 2 组。各组之间在抗炎、血管扩张剂治疗或膜保护剂的施用方面没有显著差异。

关键词:重症监护,急性肾功能衰竭,儿童。

Abstract. *Based on a study of hourly monitoring of oxygen saturation in 17 children undergoing extracorporeal detoxification by hemodialysis in the phase of oligoanuria with acute renal failure at the age of 3.1-7 years, a certain tendency towards an increase in intravenous infusion in groups 2 and 3 was revealed, accompanied by higher rates of daily urination by 200% in children of group 2, and in group 3 there were significantly lower diuresis rates by 29% than in group*

1. *Anticoagulant therapy turned out to be more active in the interdialytic period in group 1 relative to group 2 by 60% and tended to increase relative to group 3 (Table 1, Fig. 8). At the same time, hemostatic therapy turned out to be necessary to a greater extent in group 2 than in group 1 by 6 times. The volume of parenteral water administration in group 3 in the range of 200-400 ml per day during the first 18 days of intensive therapy did not improve the excretory activity of the kidneys. A relatively more active diuretic correction was noted in groups 1 and 2 than in group 3. A tendency towards an increase in hemo-plasma-albumin transfusion was revealed (Fig. 3) in children of group 3 on days 13 – 20, 29, 30. Antibiotic therapy was significantly more active in group 3 than in group 1 by 35%, slightly higher than in group 2. There were no significant differences in anti-inflammatory, vasodilator therapy, or administration of membrane protectors among the groups.*

Keywords: *intensive care, acute renal failure, children.*

Relevance. Mortality in acute renal failure (ARF) in children ranges from 10 to 40%. In the classical form of hemolyticouremic syndrome (HUS), the prognosis is favorable, in the atypical form it is unfavorable. The transition to chronic renal failure after acute renal failure in 10-20% is observed in the first 3-5 years after renal acute renal failure. Clinical trials have not proven the effectiveness of loop diuretics, dopamine, mannitol, which are often used for the treatment and prevention of acute renal failure. There is no convincing evidence that drug therapy for acute renal failure effectively reduces the need for hemodialysis and reduces the duration of dialysis treatment; risk of death. Recommendations for the treatment of acute renal failure consist of syndromic correction of homeostasis, dialysis-filtration treatment methods, prevention and treatment of complications of acute renal failure [6]. Due to the lack of information on intensive care during the phase of oligoanuria during hemodialysis in childhood, we assessed the volume and quality of treatment in preschool children.

Goal of the work. To study and give a comparative assessment of intensive therapy for acute renal failure in the phase of oligoanuria and pre-preschool age.

Material and research methods. Indications for hemodialysis (renal replacement therapy (RRT)) were: anuria for more than 24 hours with a progressively worsening condition of the patient; increase in urea level more than 20 mmol/l. Data from hourly monitoring of hemodynamic parameters and body temperature were studied in 17 children with acute renal failure admitted to the ICU of the Russian Research Center for Emergency Medicine with anuria from 1 to 3 days at the age of 3.1 to 7 years. Before admission to the clinic, all patients received anti-inflammatory therapy aimed at treating pneumonia, acute respiratory infections, acute respiratory infections. Due to severe progressive respiratory failure, patients received invasive mechanical respiratory support. All patients underwent

hemodialysis, under the control of hemodynamics, acid-base balance, respiratory system, supportive, antibacterial, anti-inflammatory, syndromic corrective intensive therapy in accordance with existing recommendations in the literature. A favorable outcome with restoration of full functional activity of the kidneys and discharge from the hospital was observed in 13 children (groups 1 and 2), unfavorable outcome – in 4 children (group 3). The first group consisted of patients (5) who received intensive therapy in the ICU for up to 10 days, the second group included children (8) with a favorable outcome after intensive therapy for 11–45 days. Data from daily intensive care monitoring are presented. The study of drug correction was carried out taking into account the frequency of administration in a therapeutic age dosage of anti-inflammatory (dexamethasone, prednisolone, non-steroidal anti-inflammatory drugs), antibiotic therapy (broad-spectrum antibiotics with correction based on the results of bacteriological control), stress-limiting (sedatives, sibazone, Arduan, ketamine, profol, barbiturates), vasodilators (farmadipine, noshpa, enalapril, aminophylline), diuretics (furosemide), membranotropic (l-lysine escinate, B vitamins, citicoline) correction. According to indications in the process of intensive therapy during hemodialysis, the indications included the introduction of glucose (calories) as an energy substrate, compensation of the deficit of VCB (erythrocyte mass, albumin), and, according to indications, FFP. The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic means (M) and errors of means (m). To assess the significance of differences between two values, the parametric Student's test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of paired correlations. The critical significance level was taken equal to 0.05.

Results and its discussion. As presented in Table 1, there was a slight tendency towards an increase in infusion therapy in groups 2 and 3; no significant differences in the average daily volumes of parenteral fluid during the observation period were detected depending on the severity of the condition. Higher rates of daily urination were found by 200% in children of group 2 relative to the first, and in group 3 significantly lower rates of diuresis by 29% than in group 1. A relatively more active anticoagulant therapy was found in the interdialytic period in group 1 relative to group 2 by 60% and a tendency to increase relative to group 3 (Table 1, Fig. 8). At the same time, hemostatic therapy turned out to be necessary to a greater extent in group 2 than in group 1 by 6 times. Perhaps the combination of more aggressive anticoagulant therapy in group 2 with the use of hemostatic therapy (sodium etamsylate) according to indications turned out to be quite an effective way to combat the tendency to thrombus formation in acute renal failure in children aged 3.1-7 years, when the anticoagulant effect of heparin was excessive in the interdialysis period was actually corrected by the introduction of a hemo-

static agent. Antibiotic therapy was significantly more active in group 3 than in group 1 by 35%, slightly higher than in group 2. Noteworthy is the significantly more limited volume of diuretic correction with furosemide in group 3 relative to group 1 by almost 9 times, compared to group 2 by 80% (Fig. 4). There were no significant differences in the volume of vasodilator, anti-inflammatory, analgesic-sedative correction.

Table 1.

Treatment during the oligoanuria phase at the age of 3.1-7 years

Treatment	1 group	2 group	3 group
Parenteral, ml/day	182,7±61,9	312,1±96,8	221,6±88,0
Daily diuresis, ml per day	235±164	705±258*	164,9±89,5 ^{'''}
Colloids, ml per day	28,0±17,4	60,2±38,2	76,0±47,4
Kcalories per day	20±15	9±6	14±10
Vasodilators, frequency per day	4,2±0,6	3,8±0,9	3,9±0,7
Heparin, frequency per day	3,5±0,7	1,4±0,7*	2,4±0,6
Antibiotics, multiplicity per day	2,2±0,3	2,6±0,4	3,0±0,4*
Anti-inflammatory, multiplicity per day	1,2±0,8	1,3±0,6	1,2±0,4
Painkillers, frequency per day	0,5±0,7	0,9±0,5	0,6±0,5
Furosemide, multiplicity per day	1,0±0,4	0,9±0,4	0,1±0,07 ^{'''}
Hemostatics, frequency per day	0,1±0,05	0,7±0,3*	0,1±0,05 ^{'''}

*-difference is significant relative to group 1

^{'''}- significant relative to the indicator in group 2

In modern literature, the advisability of intravenous infusion therapy remains controversial. Severe diffuse edema, often with signs of cardiac decompensation, respiratory failure, acute secondary encephalopathy with increased intracranial pressure in conditions of preserved functional activity of the kidneys, is an indication for limiting infusion therapy. However, one of the leading pathogenetic mechanisms of kidney damage is ischemia of the renal parenchyma, nephron dysfunction caused by a hypovolemic state, causing a significant decrease in renal blood flow and perfusion characteristics. In clinical practice, a more severe course of the disease is often observed when it is limited to the enteral method of replenishing fluid deficiency. At the same time, the diuretic effect occurs with infusion therapy of even small volumes of liquid parenterally. In the process of studying intensive care data, restoration of the excretory activity of the kidneys in group 1 with parenteral administration of 300-200 ml per day (Fig. 1, 2) on days 3 - 5 in a daily amount of 120 ml. With an increase in the volume of intravenous infusion to 400 ml in group 2 on the 3rd day, an increase in daily diuresis was revealed to 500 ml. In group 2, with a tendency to increase the volume of intravenous infusion

on days 19–27 to 500-700 ml per day, an increase in the daily volume of urination was observed to 1500 ml with a gradual decrease to 500 ml per day on the 28th day. However, the volume of parenteral administration of water in group 3 in the range of 200-400 ml per day during the first 18 days of intensive therapy did not contribute to improvement or stimulation of the excretory activity of the kidneys, when the amount of urine did not exceed 100 ml per day for 19-30 days (Fig. 2) intensive care with almost daily hemodialysis. Thus, the absence of the effect of the indicated volume of fluid stimulating urinary activity is due to more severe structural and functional disorders in the kidneys in children of group 3.

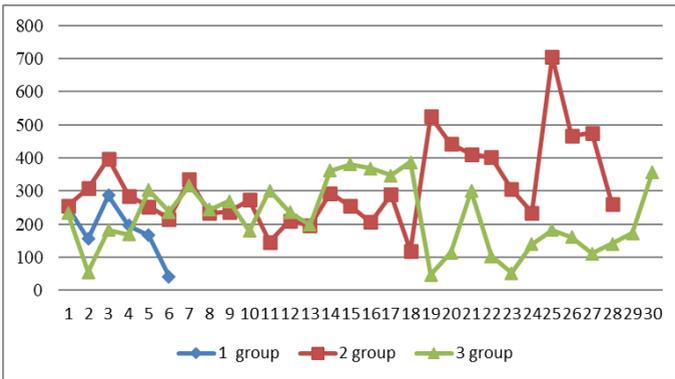


Figure 1. Parenteral infusion therapy in ml per day

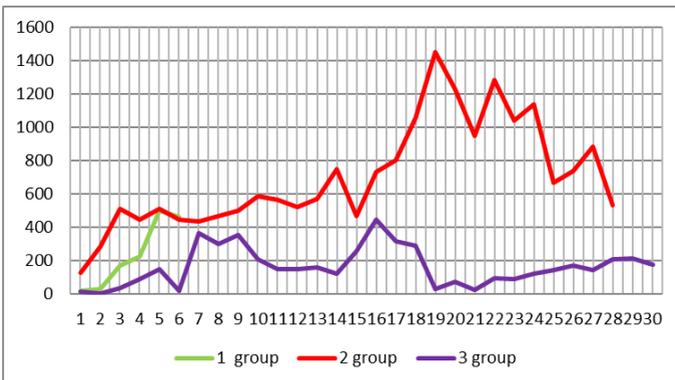


Figure 2. Volume of diuresis in ml per day

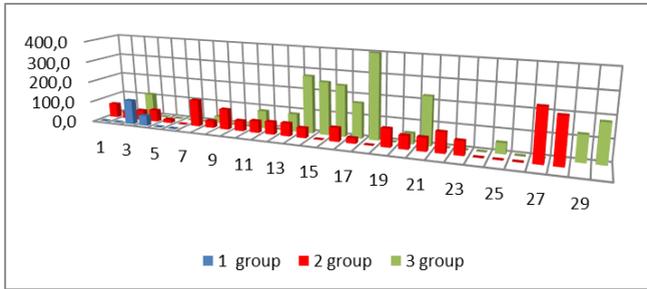


Figure 3. Hemo-plasma-albumin transfusion in ml per day

A tendency towards an increase in hemo-plasma-albumin transfusion was revealed (Fig. 3) in children of group 3 on days 13 – 20, 29, 30.

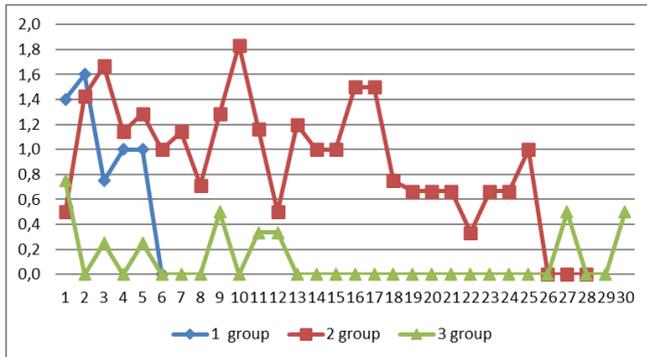


Figure 4. Diuretics, frequency of administration per day

A relatively more active diuretic correction was noted in groups 1 and 2 than in group 3 (Fig. 4).

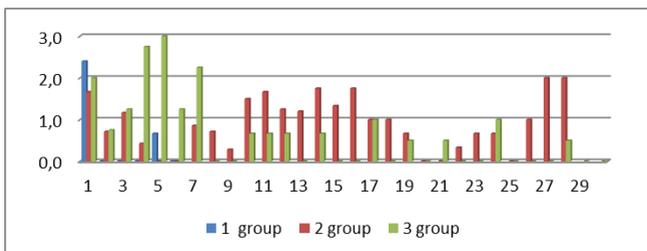


Figure 5. Dynamics of stress-limiting therapy

Stress-limiting therapy prevailed in group 3 on days 1, 4-7, in group 2 on days 1, 10-16, 27-28 (Fig. 5).

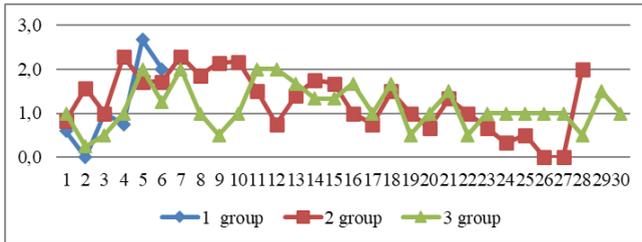


Figure 6. Anti-inflammatory therapy

No significant differences in anti-inflammatory and antibacterial therapy were found between groups (Fig. 6, 7).

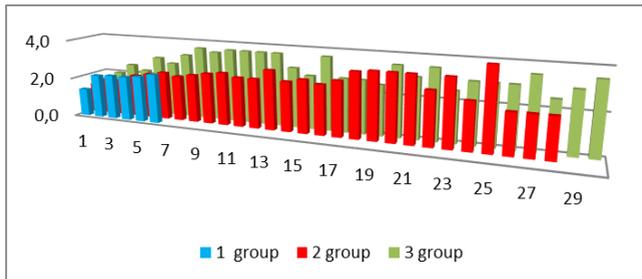


Figure 7. Antibacterial therapy

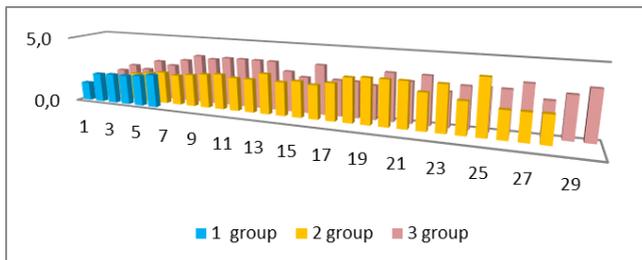


Figure 8. Anticoagulants

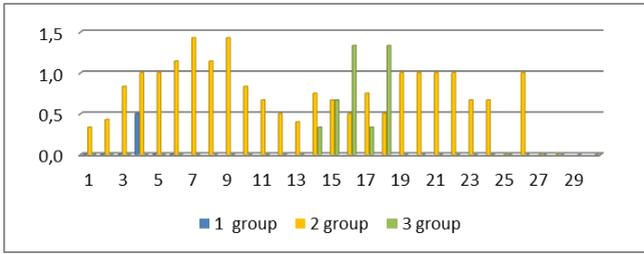


Figure 9. Hemostatics

The administration of hemostatic agents significantly prevailed in patients of group 2 (Fig. 9).

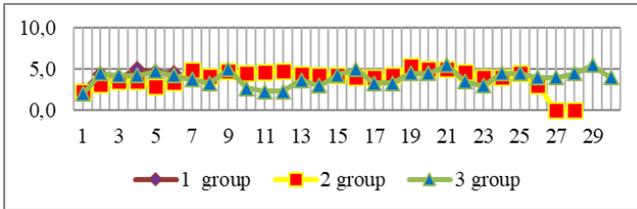


Figure 10. Vasodilators

There were no significant differences in the volume of vasodilator therapy (Table 1, Fig. 10) and the introduction of membrane protectors (Fig. 11) between groups.

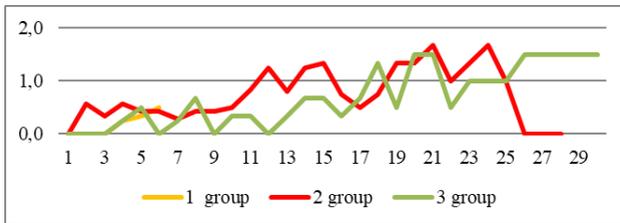


Figure 11. Membrane protectors

Conclusion. In the process of intensive therapy of children with acute renal failure, a certain tendency was revealed towards an increase in intravenous infusion in groups 2 and 3, accompanied by higher rates of daily urination by 200% in children of group 2, and in group 3 significantly lower rates of diuresis by 29% than in group 1 group. Anticoagulant therapy was more active in the interdialytic

period in group 1 relative to group 2 by 60% and tended to increase relative to group 3. At the same time, hemostatic therapy turned out to be 6 times more active in group 2 than in group 1. The volume of parenteral water administration in group 3 in the range of 200-400 ml per day during the first 18 days of intensive therapy did not improve the excretory activity of the kidneys. A relatively more active diuretic correction was noted in groups 1 and 2 than in group 3. A tendency towards an increase in hemo-plasma-albumin transfusion in children of group 3 on days 13 – 20, 29, 30 was revealed. Antibiotic therapy was significantly more active in group 3 than in group 1 by 35%, slightly higher than in group 2. There were no significant differences in anti-inflammatory, vasodilator therapy, or administration of membrane protectors among the groups.

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评估住院外科医生的工作生活质量
**ASSESSING THE QUALITY OF WORKING LIFE OF
HOSPITALIZED SURGEONS**

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抽象的。现在众所周知，工作生活质量可以直接影响员工的总体福祉和安全。显然，外科医生面临着许多压力因素，这可能会恶化心理健康并影响外科手术的过程。工作生活质量(QWL)是一个反映工人对其工作生活条件满意度的概念。它会影响绩效、生产力，如果被忽视，还会导致员工职业倦怠。本研究的目的是使用沃尔顿问卷评估多学科医院外科医生的工作生活质量。这项研究是在萨拉托夫和恩格斯多学科医院的外科医生中进行的。使用包含35项的沃尔顿问卷来评估工作生活质量。使用单变量和多变量二元逻辑回归和独立学生t检验来分析数据。共有74名外科医生参与了这项研究，平均年龄为38.9岁(±4.3)，平均工作经验为8年(±4.33)。大多数人(89.2%)认为他们的QWL为平均水平。被选为对整体QWL能力发展和共同生活空间影响最大的标准分别获得受访者的最高和最低分数。除了改善外科医生使用的工作场所、工具、设备和仪器外，确保影响工作生活质量的所有因素的全面改善也势在必行。

关键词：职业健康、公共卫生、工作生活质量。

Abstract. *It is now known, the quality of working life can directly affect both general well-being and safety of the employee. Evidently surgeons are exposed to numerous stress factors, which may deteriorate mental health and have impact on the course of surgical operations. Quality of working life (QWL) is a concept that reflects worker's satisfaction with the conditions of their work life. It can influence the performance, productivity and — when neglected — cause professional burnout of an employee. The purpose of this study was to evaluate the surgeons' quality of work life in multidisciplinary hospitals using the Walton questionnaire.*

This research was carried on among surgeons of multidisciplinary hospitals in Saratov and Engels. The quality of working life was assessed using the 35-item Walton questionnaire. Univariate and multivariate binary logistic regressions and independent Student's t-test were used to analyse the data. A total of 74 surgeons participated in the study, with a mean age of 38.9 years (± 4.3) and an average work experience of 8 years (± 4.33). The majority (89.2%) had assessed their QWL as average. The criteria chosen as the most influential on the overall QWL Development of abilities and Common living space received the highest and lowest scores from the respondents, respectively. In addition to improving the workplaces, tools, equipment and instruments used by surgeons, ensuring a comprehensive improvement of all factors affecting the quality of working life is imperative.

Keywords: Occupational health, public health, quality of working life.

Introduction. Traditional approaches to management based on scientific management theory proposed by Frederick Taylor have always been criticised for neglecting personal values and failing to meet higher level human needs. Now, such approaches are hardly effective in achieving organisational objectives since values, beliefs and needs of employees have undergone radical changes. An average employee nowadays opts for more meaningful and enjoyable work. In this regard, QWL criteria such as career advancement, purpose, integrity, opportunity to develop skills, personal responsibility and autonomy, remuneration and recognition, social interactions and availability of feedback are attracting more and more attention in optimising the work process [1]. In other words, employees seek occupational satisfaction and the standards of work environment, which has in turn established the quality of working life as an independent concept. The term Quality of working life (QWL), proposed and coined by sociologists and physiologists, reflects the degree to which a working environment is favourable or unfavourable to an employee. QWL is a broad concept that can be influenced by many factors. Task integrity and significance, autonomy and the presence of feedback have been deemed to be the most important factors affecting the quality of work life by scholars [2]. Contributing factors can be divided into two groups: external and internal [3]. Remuneration, working hours and working conditions are some of the external factors, while the nature of work, skill diversity and social environment are among the essential internal factors that affect the QWL, as well as engagement, motivation, higher-level needs, job and life satisfaction, happiness and self-assessed anxiety levels [4]. Meanwhile, the major components may differ within different occupational groups [5, 6]. It has been reported that job security, benefits, training, career ladder and are core factors of QWL among industrial workforces [7]. Studies highlighted safe working environment, fair deal, personal

growth to be the most important components for employees of a service-providing corporation [8]. Whereas information technology professionals chose health and well-being, competence development and work-life balance as most influential [9, 19]. To assess the quality of working life there is a specifically designed scale that includes nine components: a supportive work environment, corporate culture and climate, personal relationships and cooperation, training and development, remuneration and rewards, working conditions, job satisfaction and security, autonomy and availability of necessary resources [6]. Studies have shown that improving the QWL can increase efficiency and job satisfaction, as well as reduce the rate of accidents at work [1, 9]. Maintaining the high quality of working life reduces the number of employee complaints and absenteeism rates [2]. At the same time, a low QWL accelerates employee turnover, the emergence of symptoms of professional burnout, and can also lead to overall mental health degradation among employees [10]. Cognitive disorders, usually preceding human error, as well as caused by low QWL [11]. Sudhir, P. et al. proved the influence of quality of work life on psychological well-being [12]. There is evidence of a direct relationship between both quality of work life and job satisfaction [1, 9] and between job satisfaction and productivity [13]. It has also been found that a low level of quality of working life leads to job dissatisfaction, professional burnout and complaints among employees. Taking into account the specifics of surgeons' work activity associated with a high level of neuro-emotional tension, the organisation of work processes and their implementation, communication with patients and their relatives, the **aim of this** study was to investigate the quality of working life of surgeons of multi-specialty hospitals in Saratov and Engels using the Walton questionnaire.

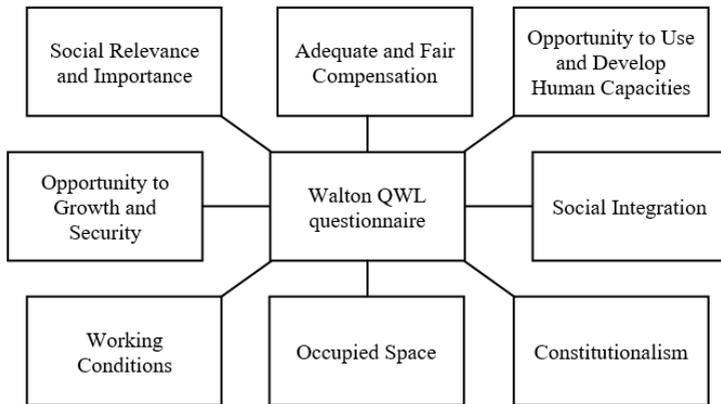


Figure 1. Quality of working life. Walton questionnaire [8,14]

Materials and methods. This study was conducted among surgeons working in multi-specialty hospitals and involved 74 surgeons with at least one year of work experience, without comorbidities. Participation in the study was completely voluntary, and all respondents have signed an informed consent form. Personal and professional information, including age and work experience, daily and weekly working hours was collected using special questionnaires that participants filled out independently.

To assess the quality of working life, we used the Walton questionnaire, which has been utilised by many scientists to measure the QWL in various professional groups [2, 3, 8, 14, 15]. For the purposes of the study the questionnaire — consisting of 8 sections and a total of 35 questions — was adapted and translated into Russian (Figure 1, Table 1).

Table 1.
Criteria of the quality of working life

Quality of working life. Walton’s model	
1. Adequate and fair monetary compensation: - fair remuneration for labour; - payroll balance; - participation in achieving results; - fringe benefits.	2. Safe and healthy working environment: - personal health; - weekly rest; - workload during the day; - technological support; - modernity of equipment.
3. Development of abilities and skills: - autonomy; - significance of the tasks; - multitasking; - performance evaluation; - assigned responsibility.	4. Career growth and security: - professional development; - training; - suspension; - learning incentives.
5. Social integration: - discrimination; - relationships with colleagues; - teamwork; - compromises; - value and realisation of ideas.	6. Constitutionalism: - employee rights; - freedom of expression; - discussions and norms; - respect in the collective.
7. Personal space: - impact of work on family life; - opportunity for leisure activities; - work-life balance.	8. Social relevance: - pride in their labour; - the image of the workplace; - integration in society; - the quality of the organisation’s services; - human resource utilisation policy.

All the criteria considered in this model comprehensively cover the majority of situations, that can happen at work and are also a widely used tool in assessing the quality of working life worldwide. Respondents were prompted to answer questions based on a 5-point Likert scale, where the answer “not at all satisfied” corresponds to 1 point, and “completely satisfied” equals 5 points. The higher the total number of points, the higher the quality of working life indicator. A result that falls below 58 points indicates the low quality of working life, from 59 to 118 — average, and above 118 — high (Table 2). Univariate and multivariate binary logistic regressions and independent Student’s t-test were used to statistically analyse the data.

Table 2.
Likert scale

Scale	0%	25%	50%	75%	100%
Level of satisfaction	Completely dissatisfied	Unsatisfied	Satisfied/Unsatisfied	Satisfied	Completely satisfied
Evaluation	1	2	3	4	5

Results The mean age and inpatient experience of the participants were 37.92 ± 5.30 and 7.0 ± 4.23 years respectively. The results of the conducted QWL polling and criterion list are presented in Table 3.

Table 3.
Professional characteristics of the study population

Parameter	N±n
Age (mean ± standard deviation), years	38.9 ± 4.30
Inpatient experience as a surgeon (mean ± standard deviation), years	8.00 ± 4.33
Daily working hours (mean ± standard deviation)	11.14 ± 3.21
Weekly working hours (mean ± standard deviation)	85.50 ± 28.73
Level of quality of working life (n (%))	n (%)
Low	5 (6.7)
Average	66 (89.2)
High	3 (4.1)
Quality of working life (mean ± standard deviation)	N±n
Adequate and fair remuneration	7.65 ± 2.81
Safe and healthy working environment	13.65 ± 4.24
Skills development	16.9 ± 3.51
Career growth and security	10.87 ± 3.01
Social integration	10.84 ± 3.45
Constitutionalism	10.00 ± 3.48

Occupied space	6,01 ± 2,53
Social relevance and importance	13,57 ± 4,06
Total number of points	88,77 ± 19,01

Overall, the quality of working life score averaged 88.7 (±19.19) points. Satisfaction with the opportunities to *develop skills* ranked highest among the respondents, with an average score of 16.19 (±3.51). The parameters representing *adequate and fair remuneration* and *occupied space* received the lowest scores, with an average of 7.65 (± 2.81) and 6.16 (± 2.53) respectively. Thus, the work of the studied group of surgeons provides ample opportunities to acquire new skills and knowledge and consequently practice them. At the same time, respondents found the financial compensation for their performance lacking or inadequate and underlined the difficulty of finding work-life balance as many surgeons have at least double employment at several institutions. There is practically no free time for leisure and family. It is important to emphasise that the high scores in the sections “Social relevance” and “Safe and healthy working environment” of 13.57 (± 4.06) and 13.65 (± 4.24) points allow us to conclude that the working conditions of this group of doctors in hospitals are acceptable and modern, they are satisfied with the workload during the day and the technological support of their professional activities.

Respondents feel the necessity and importance of their labour, feel pride in their job, own social status and the public image of their medical institution. The parameters “Career development”, “Social integration” and “Constitutionalism” scored about 10 points on average. The findings indicate that surgeons are optimistic about their career prospects and content with the current levels of independence, self-expression, and employee rights at the workplace.

Discussion

It is now known that the quality of work life is a factor that largely determines the performance, satisfaction and productivity of many employees [7, 12, 15]. It should be taken into consideration that surgeons may be exposed to various harmful chemical, ergonomic and biological factors that may jeopardise their health and safety [16, 17, 18, 19]. Work stress may also mediate these detrimental effects. Previous surveys of hospital personal have found a noteworthy relationship between QWL and job stress [9].

However, the QWL may also significantly determine undesirable outcomes including anxiety, depression, stress and disability [6, 9]. Although a large number of studies have been devoted to explore satisfaction with working conditions and occupational stress factors among surgeons, the impact of QWL is currently understudied. The main purpose of the present study was to explore the QWL among surgeons. As shown in Figure 2, the results of the study revealed that the majority

of surgeons (89.2%) had an average QWL, 4.1% of respondents reported their quality of working life as high and 6.7% as low.

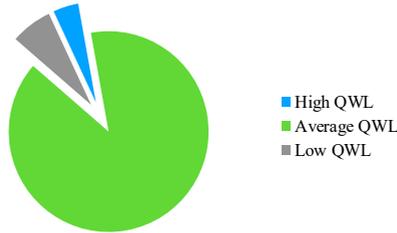


Figure 2. Quality of working life of surgeons of multidisciplinary hospitals

The study also found that when assessing the quality of working life using the Walton questionnaire, skill development was rated the highest among all eight parameters of measuring QWL. This may indicate that their work provides sufficient opportunities to acquire new skills and expertise and utilise them in their work life. Adequate and fair remuneration and Occupied space received the lowest scores. This may to some extent indicate that these criteria are related to the ability of employees to find a balance between work and personal life, which allows us to conclude that the surveyed surgeons found it difficult to separate their personal and working time, they also drew attention to inadequate financial compensation, insufficient number of benefits.

Safety and healthy working environment and social relevance were the other parameters of measuring the quality of working life. According to our data, the majority of respondents indicated that their working conditions are currently acceptable and modern, and their labour is socially significant and they feel proud of their profession. It should be noted that the same pattern of interdependence between working conditions and social aspects in workers was established by other authors [1, 6, 10, 12, 20].

Conclusion

The analysis of subjective assessment of the surgeons QWL in multi-specialty clinics, conducted using the Walton questionnaire, allowed us to conclude that the quality of working life of surgeons is currently at the average level. At the same time, some measured parameters — adequate and fair remuneration and occupied space — received the lowest number of points, which may reflect dissatisfaction with the evaluation of their labour, lack of time for rest and family. The obtained data also allows us to conclude that to improve the quality of working life among operating surgeons it is crucial to empower employees, increase salaries, strengthen mutual obligations to improve the working environment and the quality of working life.

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使用马丁-库舍列夫斯基试验评估西伯利亚患有冠心病和缺铁性贫血的二龄妇女的中心血流动力学

ASSESSMENT OF CENTRAL HEMODYNAMICS OF WOMEN OF THE SECOND MATURE AGE IN SIBERIA WITH CORONARY HEART DISEASE AND IRON DEFICIENCY ANEMIA USING THE MARTINE-KUSHELEVSKY TEST

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抽象的。 目的: 解决以改善健康为导向的治疗性体育教育(物理治疗)的可能性问题, 描述患有冠心病的秋明第二成熟期女性心血管系统(CVS)的反应 没有心力衰竭迹象的心脏病(CHD)和缺铁性贫血(IDA), 以马丁内特-库舍列夫斯基试验的形式进行标准剂量的体力活动。 材料与方法。 我们检查了 26 名第二成年女性, 她们正在秋明州 FSBHI RCH No. 2 接受冠状动脉疾病和缺铁性贫血治疗。 作者首次在心脏病学领域将人类个体发生的第九个时期有条件地划分为相等的 5 年段: 36 至 40 岁、41 至 45 岁、46 至 50 岁和 51 至 55 岁。 CV 反应的类型是使用标准 Martinet-Kushelesky 测试确定的。 结果。 已经确定, 在以马丁内特-库谢列夫斯基试验形式进行体力活动后, 中枢血流动力学的反应是明确的, 因为高血压类型在所有女性中占主导地位。 随着女性年龄的增长, 心率明显下降, 收缩压升高, 治疗时应考虑到这一点。

关键词: 第二成年女性, 冠心病, 缺铁性贫血, Martinet-Kushelesky 试验。

Abstract. Purpose: to resolve the issue of the possibility of engaging in therapeutic physical education (physical therapy) with a health-improving orientation, to characterize the reactions of the cardiovascular system (CVS) of women during the second mature age of Tyumen, suffering from coronary heart disease (CHD) without signs of heart failure and iron deficiency anemia (IDA) to standard dosed physical activity in the form of the Martinet-Kushelevsky test. **Material and methods.** We examined 26 women of the second adulthood who were receiving treatment at the FSBHI RCH No. 2 in Tyumen for coronary artery disease and iron deficiency anemia. For the first time in cardiology, the authors conditionally divided the ninth period of human ontogenesis into equal 5-year segments: from 36 to 40 years, from 41 to 45 years, from 46 to 50 years and from 51 to 55 years. The type of CV response was determined using the standard Martinet-Kushelevsky test. **Results.** It was established that after dosed physical activity in the form of the Martinet-Kushelevsky test, the responses of central hemodynamics were unambiguous, since the hypertensive type predominated in all women. As women increase in age, there is a significant decrease in heart rate and an increase in SBP, which should be taken into account during treatment.

Keywords: women of the second adulthood, coronary heart disease, iron deficiency anemia, Martinet-Kushelevsky test.

Relevance. In our country, scientific research has been conducted for many years on the rehabilitation treatment of patients with a combination of coronary heart disease and iron deficiency anemia [1, 9, 10]. One of the pressing problems of modern medicine is polymorbidity [4, 5, 6, 8, 13, 17, 18], when 3–5 diseases are diagnosed during a clinical examination of patients. The most common multimorbid pathology is cardiological, which is often combined with anemic syndrome of varying severity of IDA.

Latent deficiency of iron and IDA, i.e. iron deficiency conditions significantly increase the risk of development and progression of CVD diseases [2, 11, 15, 16].

According to severity, WHO experts have adopted the following classification of IDA [14]:

1. Mild anemia – hemoglobin concentration in the blood from 120 to 90 g/l;
2. Moderate anemia – hemoglobin concentration in the blood from 89 to 70 g/l;
3. Severe anemia – hemoglobin concentration in the blood is less than 69 g/l.

In the literature available to us, the issue of the state of central hemodynamics in women of the second adulthood, suffering from coronary artery disease and iron deficiency anemia, living in Siberia, after undergoing dosed physical activity in an outpatient rehabilitation period, has not been sufficiently studied. We believe that only through stress testing can and should be an objective assessment of the functional capabilities of the central hemodynamics of women suffering from cor-

onary artery disease and iron deficiency anemia when prescribing rehabilitation treatment with exercise therapy.

Let us note that to assess the functional state of the cardiovascular system of patients with coronary artery disease and iron deficiency anemia, the Martinet-Kushelevsky test, which is simple to perform but sufficient in terms of reliable information, is used in the therapeutic clinic of our institution. The test characterizes not only the functionality of the heart as the only hemodynamic pump, but also the arterial vessels, i.e. the circulatory apparatus as a whole [7, 12].

Purpose: to characterize the reactions of the cardiovascular system of women of the second adulthood, suffering from coronary heart disease in combination with iron deficiency anemia, to dosed physical activity in the form of the Martinet-Kushelevsky test.

Material and methods. We examined 26 women of the second adulthood (48.6 ± 1.8 years) undergoing outpatient treatment at the Federal State Budgetary Institution No. 2 of Tyumen for a combination of coronary artery disease without signs of heart failure and iron deficiency anemia. From the anamnesis it was established that women have been living in Tyumen for three generations. We adhered to the classification of human ontogenesis adopted in 1965, according to which the period of the second mature age lasts from 36 to 55 years, i.e. is 20 years. We consider it incorrect to judge the health of a woman, for example, 36 years old, and compare her with a woman aged 55 years. That is why, for the first time in cardiology, we divided the period of the second mature age into equal 5-year periods of time: from 36 to 40 years (37.3 ± 1.6 ; $n = 7$), from 41 to 45 years (42.4 ± 1.5 ; $n = 7$), from 46 to 50 years (48.9 ± 1.3 ; $n = 6$) and from 51 to 55 years (52.2 ± 1.4 ; $n = 6$). To determine the type of reaction of the cardiovascular system to dosed physical activity and to select a mode of physical activity, women were subjected to a standard Martinet-Kushelevsky test - 20 squats in 30 s. Heart rate was determined by palpation on the radial artery. Blood pressure was measured using the Korotkoff method using a Microlife BP A2 tonometer.

The research results were processed on a personal computer using modern electronic programs (Statistika) [3]. The significance of the differences was assessed using Student's t-test, and the differences were considered significant at $p < 0.05$.

The principles of voluntariness, individual rights and freedoms guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 "On the Ethics Council" are observed. The study was conducted in accordance with the ethical standards set out in the Declaration of Helsinki and the European Community Directives (8/609EC) and the informed oral consent of the women.

Results and discussion. We especially note that we consider one of the conditions for outpatient rehabilitation treatment, at the request and consent of women, to conduct the Martinet-Kushelevsky test, which allows, firstly, to determine the type of central hemodynamics to dosed physical activity. Secondly, which we consider especially important for this group of women, only reliable information about their functional state allows one to begin restorative treatment with exercise therapy. Thirdly, when a woman is well informed about her functional capabilities, she will treat the treatment given to her with understanding and attention.

It should be noted that after dosed physical activity at 4 minutes of the recovery period, not all women showed a favorable (normotonic) type of response based on heart rate and blood pressure (Table 1).

Table 1.

Central hemodynamics in women of the second adulthood suffering from coronary artery disease and iron deficiency anemia, during the Martinet-Kushelevsky test (M±m)

Index		Age, years			
		36-40 n = 7	41-45 n = 7	46-50; n = 6	51-55 n = 6
Heart rate, rest, beats/min		80,8±1,4	79,2±1,3	78,0±1,3	76,9±1,4
Age change		–	- 1,6	- 1,2	- 1,1
SBP, rest, mm Hg		133,2±2,2	135,6±2,4	137,2±2,4	138,9±2,5
Age change		–	+ 2,4	+ 1,6	+ 1,7
DBP, rest, mm Hg		80,9±1,4	81,6±1,4	81,9±1,5	82,5±1,5
Age change		–	+ 0,7	+ 0,3	+ 0,6
Recovery period after physical activity	1 minute:				
	Heart rate	163,6±2,5	161,5±2,4	159,6±2,6	157,4±2,3
	SBP	170,8±3,4	172,3±3,4	173,2±3,6	174,7±3,5
	DBP	78,1±1,3	78,8±1,4	80,6±1,5	80,8±1,5
	4 minute:				
	Heart rate	87,8±1,6	80,6±1,7	79,3±1,9	78,1±1,7
SBP	138,1±3,3	140,8±3,5	141,2±3,6	144,6±3,5	
DBP	78,4±1,3	79,9±1,4	80,8±1,5	81,3±1,4	

Assessing the basic indicators of central hemodynamics of women for the period from 35 to 55 years, studied in a state of physical rest, we note that over 20 years, heart rate and SBP changed significantly ($p < 0.05$), while DBP did not undergo significant changes. For example, heart rate (Fig. 1) in absolute values over the period from 35 to 55 years became less frequent by 3.9 beats/min.

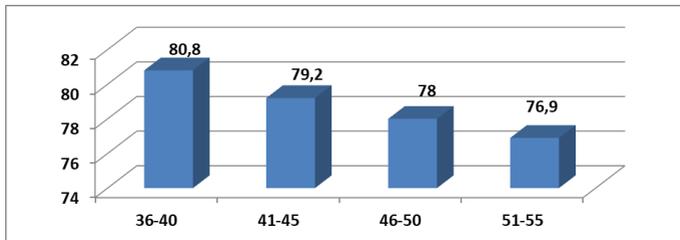


Figure 1. Heart rate values at rest within one age period of ontogenesis in women of the second mature age suffering from coronary artery disease and iron deficiency anemia.

Over the same time period, SBP (Fig. 2) increased by 5.7 mm. rt. Art., which is statistically significant ($p < 0.05$).

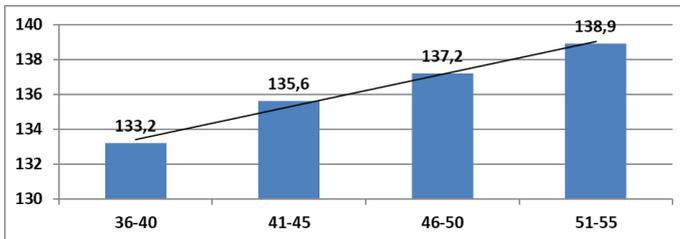


Figure 2. SBP values at rest within the same age period of ontogenesis in women of the second mature age suffering from coronary artery disease and iron deficiency anemia.

Characterizing DBP in women of the studied age in a state of physiological rest, we note that it tended to increase in accordance with the increase in their passport age (Fig. 3).

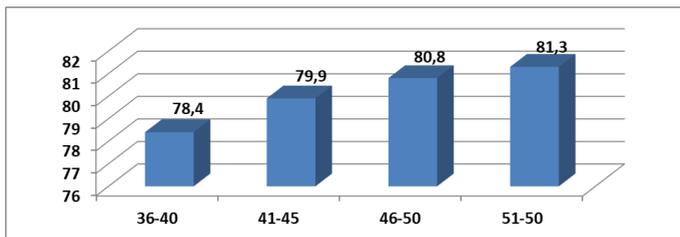


Figure 3. DBP values at rest within one age period of ontogenesis in women of the second mature age suffering from coronary artery disease and iron deficiency anemia.

It is noteworthy, firstly, that over a period of 20 years, neither heart rate, nor SBP, nor DBP at physical rest went beyond the limits of physiological normative values, which allowed us to conduct the Martinet-Kushelevsky test with dosed physical activity. Secondly, what we consider especially significant, at 1 minute of the recovery period, the heart rate in all women exceeded 100% of the initial value, which we regarded as a hypertensive (unfavorable) type of response (Fig. 4). Thirdly, at the 4th minute of the recovery period, we did not note an adequate response of central hemodynamics to physical activity, because the heart rate in all women was significantly ($p>0.05$) higher than the state of physical rest.

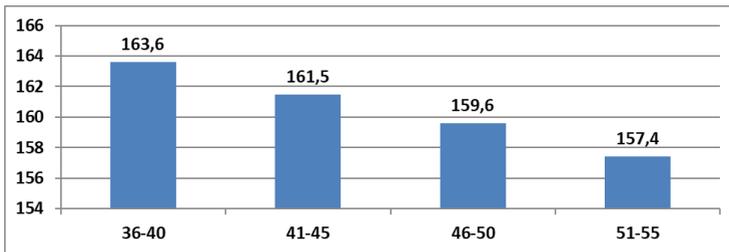


Figure 4. Heart rate values at 1 minute of recovery after dosed physical activity within one age period of ontogenesis in women of the second adulthood suffering from coronary artery disease and iron deficiency anemia.

As women's passport age increased, heart rate had a significant tendency to decrease, while SBP tended to increase. Thus, the heart rate in women 55 years old in absolute values was lower by 6.2 beats/min. compared to women 35 years old.

After dosed physical activity, SBP at 4 minutes of the recovery period in all women was significantly ($p>0.05$) different from SBP values at rest, exceeding it by more than 35 mm. rt. Art. (Fig. 5).

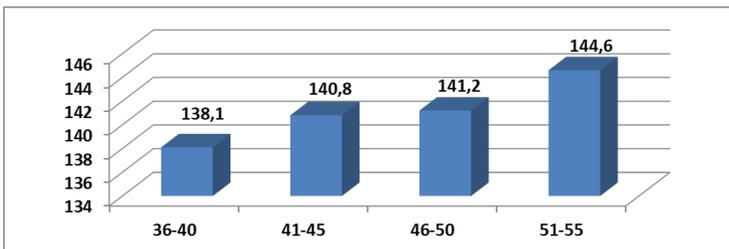


Figure 5. SBP values at 4 minutes of recovery after dosed physical activity within the same age period of ontogenesis in women of the second adulthood suffering from coronary artery disease and iron deficiency anemia.

DBP, in comparison with the state of physiological rest, did not significantly change at 1 and 4 minutes of the recovery period ($p>0.05$).

Taking into account the presence of a hypertensive type of central hemodynamics in response to dosed physical activity, we kept a self-monitoring diary for each woman, in which the women noted their heart rate and blood pressure throughout the day and week. We believe that the presence of an unfavorable type of central hemodynamic reaction to physical activity should not be an obstacle to exercise therapy, which is not only possible, but also necessary to carry out. At the same time, firstly, under close medical supervision, and, secondly, taking into account the individual tolerance of each lesson.

Based on the study, the following conclusions can be drawn.

1. Early diagnosis of the functional state of the cardiovascular system in women with a combination of coronary artery disease and iron deficiency anemia at the stage of outpatient treatment should become the rule for starting complex rehabilitation treatment, and the standard Martinet-Kushelevsky test should be a marker for assessing the functional capabilities of central hemodynamics. The presence of an unfavorable type of reaction of the cardiovascular system to dosed physical activity should not serve as a refusal to carry out physical therapy exercises for women in the second adulthood who suffer from coronary artery disease and iron deficiency anemia.

2. Considering that the period of the second adulthood lasts 20 years, we recommend dividing it into the following equal periods of time: from 35 to 40 years, from 41 to 45 years, from 46 to 50 years and from 51 to 55 years. Thus, the doctor will have the opportunity to make adjustments to the treatment program in accordance with the individual morphofunctional characteristics of women.

3. Our proposed conditional division of the period of second adulthood into equal 5-year periods of time and the use of the Martinet-Kushelevsky test in each of them showed that as the passport age increases, heart rate significantly becomes less frequent, while SBP increases.

Conflict of interest. The authors declare no conflict of interest.

Research transparency. The study had no sponsorship. The authors are solely responsible for submitting the final version of the manuscript for publication.

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秋明市患有冠心病和缺铁性贫血的二龄妇女的耐力系数
**ENDURANCE COEFFICIENT IN WOMEN OF THE SECOND
MATURE AGE IN TYUMEN WITH A COMBINATION OF
CORONARY HEART DISEASE AND IRON DEFICIENCY ANEMIA**

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注解。 本文对秋明州 28 名接受门诊康复治疗的第二成熟年龄 (48、61、9) 岁女性的中心血流动力学最重要指标之一——耐力系数 (EC) 的研究进行了比较分析 患有冠心病 (CHD) 和缺铁性贫血 (IDA) 的患者, 以及 30 名同龄女性 (47.8 ± 1.7 岁), 检查时没有任何躯体疾病。 作者首次在心脏病学领域将第二个成年期分为 5 年时间段: 36 至 40 岁、41 至 45 岁、46 至 50 岁和 51 至 55 岁。 已经确定, 作为第二成熟女性心血管系统 (CVS) 活动指标的 EC 处于标准值水平。

关键词: 女性, 第二成年, 冠心病, 缺铁性贫血, 耐力系数。

Annotation. *The article provides a comparative analysis of the study of one of the most important indicators of central hemodynamics - the endurance coefficient (EC) in 28 women of the second mature age (48,61,9) years old in Tyumen, receiving outpatient rehabilitation treatment for a combination of coronary heart disease (CHD) and iron deficiency anemia (IDA) and 30 women (47.8 ± 1.7 years) of the same age who did not have any somatic diseases at the time of examination. For the first time in cardiology, the authors divided the period of the second*

adulthood into 5-year periods of time: from 36 to 40 years, from 41 to 45 years, from 46 to 50 years and from 51 to 55 years. It has been established that EC as an indicator of the activity of the cardiovascular system (CVS) in women of the second mature age is at the level of normative values.

Keywords: *women, second adulthood, coronary heart disease, iron deficiency anemia, endurance coefficient.*

Relevance. For many years, EC as a criterion for the level of a person's adaptive capabilities has attracted the attention of specialists in various fields [7, 8, 11]. As for studying the level of EC in women of the second adulthood, permanently residing in the south of Western Siberia, with a combination of IHD and IDA of mild to moderate severity, then, firstly, there are no such studies in the literature available to us. Secondly, the issue of EC values depending on the division of a given age period, lasting 20 years, into equal 5-year time periods has not been previously considered.

Purpose of the study: to assess the level of endurance coefficient in women of the second mature age living in the south of Western Siberia with a combination of IHD and IDA.

A common human pathology is ischemic heart disease, which is often combined with iron deficiency anemia. In recent decades, according to the World Health Organization, iron deficiency conditions are one of the most common diseases [2, 10, 15]. It is generally accepted that this polyetiological disease is associated with iron deficiency due to impaired supply, absorption or increased losses [5, 13]. IDA significantly increases the risk of development and progression of various diseases, including CVS [4, 9]. According to severity, WHO experts have adopted the following classification of IDA [14]:

1. Mild anemia – hemoglobin concentration in the blood from 120 to 90 g/l;
2. Moderate anemia – hemoglobin concentration in the blood from 89 to 70 g/l;
3. Severe anemia—hemoglobin concentration in the blood is less than 69 g/L.

We studied the level of EC in two groups of women. The first group (MG - main group) included 28 women of the second mature age (48.4 ± 2.9 years), undergoing outpatient treatment at the Federal State Budgetary Institution Regional Clinical Hospital No. 2 of Tyumen for a combination of chronic coronary artery disease without signs of heart failure with IDA. The second group (CG - control group), using a random sampling method, consisted of 30 women of the same age (47.8 ± 1.7 years) who did not have clinically and instrumentally confirmed diseases of the cardiovascular system and blood at the time of the examination.

When assessing the age of women, we adhered to the scheme of age periodization of human ontogenesis, adopted at the VII All-Union Conference on Problems of Age-Related Morphology, Physiology and Biochemistry of the Academy of

Pedagogical Sciences of the USSR in Moscow in 1965. According to this periodization, the period of the second mature age lasts from 36 to 55 years, i.e. 20 years. It is quite natural to assume that during this period of life in women, for example, at the age of 36 years, morphofunctional indicators not only can, but should also differ from the age, for example, 54 years. Considering that in the literature available to us we have not found studies characterizing the level of AP in women living in Tyumen, we divided the second period of adulthood into intervals of 5 years. MG: from 36 to 40 years (38.3 ± 1.7 ; $n = 8$), from 41 to 45 (43.4 ± 1.6 ; $n = 6$) years, from 46 to 50 (47.2 ± 1.5 ; $n = 7$) years and from 51 to the age of 55 (52.5 ± 1.6 ; $n = 7$) years. CG: from 36 to 40 years (38.6 ± 1.6 ; $n = 8$), from 41 to 45 (44.2 ± 1.7 ; $n = 8$) years, from 46 to 50 (48.1 ± 1.7 ; $n = 7$) years and from 51 to the age of 55 (52.8 ± 1.5 ; $n = 7$) years.

From the anamnesis it was established that the duration of the combined disease of coronary artery disease and iron deficiency anemia was 6.2 ± 0.8 years and was established from the first episode of angina pectoris and a blood test.

In accordance with the clinical examination rules adopted by the Federal State Budgetary Healthcare Institution OKB No. 2 of Tyumen, all women receiving outpatient treatment underwent a comprehensive clinical, biochemical and instrumental examination. In this report we focus only on the results of studying the level of EF. The study of EF was carried out by calculation using the Kwaas formula: $EF = (HR \times 10) / PD$,

where: HR – heart rate (bpm), SBP and DBP – systolic and diastolic blood pressure (mm Hg).

Score: 16 – normal; > 16 – weakening of the CVS activity; < 16 – increased activity of the cardiovascular system.

Heart rate was calculated by palpation on the radial artery within one minute. We used the auscultatory method of measuring blood pressure, proposed by the Russian surgeon Nikolai Sergeevich Korotkov in 1905 and which is currently the only official method of non-invasive blood pressure measurement, approved by the World Health Organization in 1935 [3, 6, 12]. We used the Microlife BP A2 tonometer.

The results of the study were processed statistically. The significance of differences was assessed using Student's t test [1]. The principles of voluntariness, individual rights and freedoms guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 "On the Ethics Council" are observed. In addition, the ethical standards set out in the Declaration of Helsinki and the European Community Directives (8/609EC) and the women's verbal consent were followed.

Results and discussion. From the anamnesis it was revealed that due to illness and an increase in the passport age, the level of physical activity in all women decreased, which is expressed in the fact that women in the OG walked an average of 1.86 ± 0.32 km during daylight hours, and women in the CG 3.17 ± 0.28 km ($p < 0.05$). It was also found that 78% of women in the OG and 63% of women in the CG led a sedentary, mostly sedentary lifestyle associated with the conditions of professional activity. In addition, 57% of women in the OG and 34% of women in the CG noted the presence of domestic and work-related stressful situations. 18% of women in the OG and 21% of women in the CG had a night work schedule. The duration of night sleep in 53% of women in the OG was 8 hours, in 41% – 7 hours and in 6% less than 6 hours. The duration of night sleep in 62% of women in the CG was 8 hours, in 33% - 7 hours, and in 5% - 6 hours.

The formula for calculating CV includes basic indicators of central hemodynamics (HR, SBP and DBP), which we studied in women in a state of physiological rest while sitting in a chair (Table 1). Let us note that in women of the second mature age, central hemodynamic parameters were at the normative values characteristic of age. As the age of women in the MG increased, the heart rate became lower by 4.7 beats/min, and the SBP increased by 5.8 mm Hg, DBP exceeded 80 mm Hg by 3.8 mm Hg. In women in the CG, these indicators changed by 3.4 beats/min and 3.9 mm, respectively Hg, by 2.3 mm Hg

Table 1
*Basic indicators of central hemodynamics
women in the MG and CG period of the second mature age at rest ($M \pm m$)*

Group	HR	SBP	DBP	PP	EC
36 – 40 years old					
MG	84,8±1,4	133,8±2,4	78,6±1,3	55,2	15,36
CG	78,8±1,3	129,5±2,2	77,4±1,2	52,1	15,12
Difference	6,0	4,3	1,2	3,1	0,24
41 – 45 лет					
MG	82,4±1,4	135,4±2,5	79,7±1,2	55,7	14,79
CG	77,3±1,3	130,2±2,4	78,0±1,3	52,2	14,72
Difference	5,1	5,2	1,7	3,5	0,07
46 – 50 years old					
MG	81,2±1,3	137,9±2,4	82,5±1,4	55,4	14,65
CG	76,3±1,2	131,5±2,4	78,9±1,3	52,6	14,51
Difference	4,9	6,4	3,6	2,5	0,14
51 – 55 лет					
MG	80,1±1,3	139,6±2,3	83,8±1,4	55,8	14,35
CG	75,4±1,1	133,4±2,4	79,7±1,3	53,7	14,04

Difference	4,7	6,2	4,1	2,1	0,31
Average values					
MG	82,12±1,35	136,67±2,40	81,15±1,32	55,52	14,79
CG	76,95±1,22	131,15±2,25	78,50±1,27	52,65	14,61
Difference	5,17	5,52	2,65	2,87	0,18

As for EC, in women of the compared groups it was within the normative values. It is noteworthy that, firstly, among women in the OC this indicator in absolute values was greater than among women in the CG. Secondly, as the passport age increased, it tended to decrease (Fig. 1).

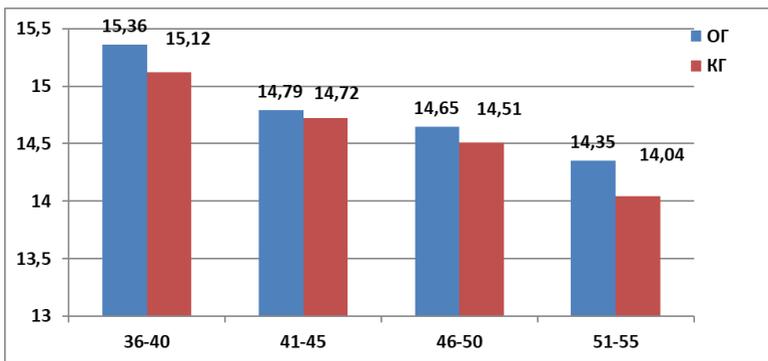


Figure 1. Age values of the level of endurance coefficient of women from the MG and CG within the period of the second mature age.

Thus, based on the study, we can conclude that EC in women of the second mature age of the MG and CG depends on several combined factors. Firstly, from their passport age. The conditional division of the 9th period of ontogenesis, carried out for the first time in cardiological practice, into four time intervals of equal duration showed that as the passport age increased in all women, the EC was at the level of normative values. Secondly, the presence of IHD and IDA creates the preconditions for physical inactivity, hypokinesia and stressful situations, which cannot but affect the central hemodynamics of women.

Conflict of interest. The authors declare no conflict of interest.

Research transparency. The study had no sponsorship. The authors are solely responsible for submitting the final version of the manuscript for publication.

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肿瘤免疫治疗的发展: 成功的临床研究和应用前景

**DEVELOPMENT OF IMMUNOTHERAPY IN ONCOLOGY:
SUCCESSFUL CLINICAL STUDIES AND PROSPECTS FOR
APPLICATION**

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National Medical Research Center for Oncology named after

N.N. Blokhin

抽象的。免疫疗法是一种治疗肿瘤疾病的创新方法,其基础是激活患者的免疫系统来对抗癌细胞。近年来,多项成功的临床研究证明了免疫治疗在多种癌症中的高效性。免疫疗法的关键机制包括阻断免疫反应抑制剂、CAR-T细胞的使用、癌症疫苗接种和免疫检查点的使用。免疫疗法的使用前景包括扩大其在其他治疗方法之外的使用、根据肿瘤概况和患者的免疫状态开发个体化治疗选择方法,以及研究联合治疗方案。预计未来免疫疗法的发展将取得进一步突破,可显著改善癌症患者的预后和生活质量。

关键词: 免疫疗法、肿瘤学、临床研究、前景、免疫反应抑制剂阻断、CAR-T细胞、癌症疫苗接种、免疫检查点。

Abstract. *Immunotherapy is an innovative approach in the treatment of oncological diseases based on the activation of the patient's immune system to fight cancer cells. In recent years, a number of successful clinical studies have been conducted demonstrating the high effectiveness of immunotherapy in various types of cancer. The key mechanisms of immunotherapy include blocking immune response inhibitors, the use of CAR-T cells, cancer vaccination and the use of immune checkpoints. The prospects for the use of immunotherapy include the expansion of its use in addition to other treatment methods, the development of an individual approach to the choice of therapy based on the tumor profile and the immune status of the patient, as well as the study of combined treatment regimens. Further breakthroughs in the development of immunotherapy are expected ahead, which can significantly improve the prognosis and quality of life of patients with cancer.*

Keywords: *immunotherapy, oncology, clinical studies, prospects, blocking of immune response inhibitors, CAR-T cells, vaccination against cancer, immune checkpoints.*

Immunotherapy is a type of treatment that uses the body's own immune system to fight certain diseases, including some types of cancer. The basic principle of immunotherapy is to stimulate or modulate the immune system so that it can recognize and attack tumor cells [2].

The term “checkpoint” is used to refer to these inhibitory mechanisms in the context of cancer immunotherapy [9]. Activation of checkpoints on the surface of immune cells limits or removes the inhibitory signal, resulting in a renewed immune response against cancer cells. Immunotherapy using checkpoint inhibitors has become an effective treatment for several types of cancer [5].

Basic principles of action of various forms of immunotherapy:

1. Immune checkpoint inhibitors: The body's normal immune system has mechanisms called “checkpoints” that prevent inappropriate activation of immune cells and maintain immune homeostasis. However, cancer cells can use these checkpoints to evade detection and attack by the immune system. Checkpoint inhibitors block the interaction between checkpoints and their receptors on immune cells, allowing the immune system to recognize and attack cancer cells.
2. Immune stimulants: This type of immunotherapy involves the use of various drugs or methods that stimulate the immune system and enhance its ability to fight cancer. This may involve the use of cytokines (eg interleukin-2 and interferons) that activate immune cells and promote their action. Vaccines are also used to present components of cancer cells to the immune system so it can recognize and attack them.
3. Cellular immunotherapy: This type of immunotherapy involves the use of various types of immune cells as independent drugs. For example, CAR-T cell (chimeric antigen receptor T-cell) immunotherapy involves extracting a patient's T cells, modifying them in the laboratory to create specific receptors that can recognize specific cancer cell antigens, and then injecting these modified cells into the patient to fight the cancer.

All of these immunotherapy methods are aimed at activating or increasing the activity of the body's immune system to more effectively fight cancer cells. They represent a new direction in cancer treatment and show significant potential for increasing survival and improving the quality of life of patients [4].

James Allison and Tasuku Honjo made significant discoveries in the field of immunology related to the mechanisms of “inhibition” of the immune system. Ellison's research focused on the protein CTLA-4 (cytotoxic lymphocyte-associated antigen 4), which acts as a brake on immunity. He discovered that activation of CTLA-4 on the surface of T lymphocytes suppresses their activity and prevents an inappropriate immune response [2].

Tasuku Honjo, in turn, discovered a protein called PD-1 (programmed death 1), which also has the ability to “inhibit” the immune response. PD-1 works by binding to its ligands (PD-L1 and PD-L2), which are expressed on the surface of other cells. This interaction leads to inhibition of T-lymphocyte activity and a weakened immune response [2].

Immune surveillance of cancer is an important process by which the immune system can identify and destroy nascent tumor cells [1]. Typically, when tumor cells invade healthy tissue, the immune system can recognize and destroy them based on tumor associated antigens (TAAs). However, tumor cells can evade the immune system through various mechanisms called immune escape. There are four main mechanisms:

- 1) reducing immunogenicity by down-regulating the expression of surface antigen;
- 2) up-regulation of surface immune checkpoints to suppress T cell activity;
- 3) recruitment of suppressor immune cells, such as myeloid-derived suppressor cells (MDSCs) and regulatory T cells (Tregs), as well as cytokines to form a suppressive immune microenvironment;
- 4) release of acidic and toxic metabolites that inhibit the activity of immune cells in the tumor microenvironment.

Cancer is the second leading cause of death in humans after cardiovascular and cerebrovascular diseases, and the number of patients continues to increase. Cancer treatment has advanced from surgical resection, radiation therapy, chemotherapy, and targeted drug therapy to immunotherapy. Cancer immunotherapy reactivates the body’s immune system to produce antitumor effects and thereby kills and eliminates tumor cells. Immunotherapy is a promising treatment option. Unlike traditional therapy, immunotherapy uses certain cytokines, chemokines and immune cells to alter the tumor microenvironment, which can lead to lasting effects and prevent relapse. The advent of immunotherapy changed the standards and concept of tumor treatment [6].

Immune checkpoints refer to immunosuppressive molecules. Physiologically, immune checkpoints are important for maintaining immune tolerance, regulating immune responses, and preventing tissue damage. Tumors can use ICT to their advantage to evade detection and destruction by the body’s immune system. They can increase the expression of immunosuppressive molecules on their surface or in tissues near the tumor. This allows the tumor to create a specific immune environment that suppresses the activity of effector immune cells, such as cytotoxic T lymphocytes, and facilitates its undetected development [7].

Immune checkpoint inhibitors, such as antibodies, can be used to block or bypass the immunosuppressive signals sent by the tumor. This leads to activation of immune cells and strengthening of the body’s immune response against the

tumor. Such drugs, such as anti-PD-1 (programmed death 1) or anti-CTLA-4 (cytotoxic lymphocyte-associated antigen 4), have become important tools in cancer immunotherapy to improve the effectiveness of the immune response and achieve better treatment outcomes. However, it should be noted that ICT inhibitors may have side effects due to negative effects on tissues that normally regulate immune responses. Therefore, the use and therapeutic strategy with ICT inhibitors must be carefully regulated and tailored to each patient, taking into account the characteristics of their disease and immune status [11].

Consider an example of the use of PD-1 blocking immunotherapy in the treatment of melanoma. In 2014, the FDA approved the first immunotherapy drug, which involves blocking the PD-1 (programmed cell death-1) protein, to treat melanoma, a type of skin cancer. Immunotherapy using a drug called pembrolizumab (also known as Keytruda) has been a breakthrough in treating this type of cancer. In clinical trials, pembrolizumab has been shown to improve survival in patients with metastatic melanoma and demonstrate durable clinical responses even in patients with advanced disease [8]. The drug activates the body's immune system, allowing it to recognize and attack cancer cells. Thanks to successful clinical trials, PD-1 blockade immunotherapy has become a standard treatment for patients with metastatic melanoma and has also spurred the development of similar immunotherapy drugs and research in other types of cancer [5].

Immunotherapy may be used in combination with other cancer treatments. A combination approach that combines different treatments can be effective in fighting cancer, especially when individual treatments can complement each other and enhance the antitumor effect. Immunotherapy, which works by stimulating the immune system to fight cancer cells, can be used in combination with treatments such as surgery, chemotherapy, radiation therapy and targeted therapy. For example, immunotherapy may be used before surgery to reduce swelling and improve surgical outcomes. Combining immunotherapy with chemotherapy, radiation therapy, or targeted therapy can enhance the effect and improve patient response to treatment [12].

It is worth saying that although immunotherapy has demonstrated significant clinical benefits, not all patients respond to it or develop resistance over time. Mechanisms of resistance include loss of antigen expression, activation of alternative immune checkpoints, and an immunosuppressive tumor microenvironment [10]. Studying these resistance mechanisms and developing strategies to overcome them are active areas of research aimed at improving the effectiveness of immunotherapy. Immunotherapy initially showed significant success in hematologic malignancies, especially some types of leukemia and lymphoma. However, efforts are currently focused on expanding the use of immunotherapy in solid tumors, including lung, breast, colorectal, and pancreatic cancers. Overcoming the unique

challenges associated with solid tumors, such as tumor heterogeneity and mechanisms of immune evasion, remains a priority in this area of research [4].

One of the great aspects of immunotherapy is the potential for durable responses and long-term benefits. Some patients experience long periods of disease control or even complete remission, offering the possibility of long-term survival. Understanding the factors that contribute to sustained response and identifying strategies to improve persistence are important to maximizing the clinical impact of immunotherapy. Immunotherapy generally has a favorable safety profile compared with traditional treatments, but immune-related side effects may occur. These diseases, which affect various organs, are the result of activation of the immune system. Prompt recognition and management of these toxicities is essential to minimize their impact and ensure the safety and well-being of patients receiving immunotherapy [5].

It is worth mentioning that cancer immunotherapy focuses on the development of agents that activate or enhance immune system recognition and destruction of cancer cells. It can be either passive or active. Passive therapy is based on the adaptive transfer of immunomodulators (including cytokines), tumor-specific antibodies or immune cells, while active immunotherapy, on the other hand, stimulates the patient's immune system to enhance the antigen-specific antitumor effect using the body's own immune cells. Immunotherapy can be extended further and is divided into non-specific and specific types: Non-specific immunotherapy involves the administration of cells or substances that do not target a specific antigen. In contrast, active specific immunotherapy involves activating the immune system to produce a T-cell response to tumor-associated antigens.

In conclusion, it is worth noting that various immune evasion mechanisms can counteract the body's immune response, which becomes more complex as cancer progresses. Cancer immunotherapy can kill and eliminate tumor cells using the immune system, thus becoming another revolutionary treatment option after surgical resection, radiation therapy, chemotherapy and targeted therapy. Currently, no one doubts that cancer is associated with a disruption of the immune system, more precisely, immunological surveillance against oncogenic viruses or abnormal cells. In modern oncology, the role of immunology is great not only because it provides new methods for diagnosing, monitoring and treating cancer or correcting complications of traditional treatment. Now in oncology, the basis of the cancer treatment strategy is the principle of "complementary oncology therapy" [6], which implies the mutually reinforcing therapeutic effect of existing traditional and immunological treatment methods, taking into account the etiopathogenetic significance of each method. Immunological treatment methods, in this case, are present at all stages of antitumor treatment, but at each stage they perform different tasks.

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加纳卫生机构专职卫生工作者的工作条件和职业发病率评估的卫生方面
**HYGIENIC ASPECTS OF ASSESSMENT OF WORKING
CONDITIONS AND OCCUPATIONAL MORBIDITY OF ALLIED
HEALTH WORKERS OF HEALTH FACILITIES IN GHANA**

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抽象的。专职专业人员约占加纳所有医护人员的 27%。尽管它们对于提供医疗保健很重要，但在职业健康和安全性问题上，加纳政府和研究人员却很少关注它们。研究对象是联合专家；工作环境；加纳的卫生设施。共有 297 名受访者参与了此次调查。使用 SPSS 分析响应。疟疾、乙型肝炎和结核病是加纳专职医疗保健提供者中的主要传染病，心血管疾病是主要的非传染性疾病。由于 COVID-19 的爆发，2020 年受访者中传染病病例数最高 (54.2%)，非传染性疾病病例数最低 (36.7%)。缺乏方法和技术、设备 由于加纳缺乏记录和调查职业病病例的系统，加纳对工作条件进行评估的规定和规定有限，因此研究有限。为了挽救患者的生命，确保相关专业人员可接受的工作条件，并确保加纳卫生系统的效率和可持续性，鼓励政府为其健康制定和实施全面、明确和自信的健康和安全政策 工人。

关键词：工作条件； 新冠肺炎； 传染性疾病； 非传染性疾病； 相关专家。

Abstract. *Allied professionals make up about 27% of all healthcare workers in Ghana. Although they are important for the provision of health care, on the matter of occupational health and safety, the Ghanaian government and researchers pay little attention to them. The objects of the study were allied specialists; working conditions; health facilities in Ghana. A total of 297 respondents took part in the survey. Responses were analysed using SPSS. Malaria, hepatitis B and tuberculosis are the leading communicable diseases among Ghana's allied health care providers, and cardiovascular disease is the leading non-communicable disease. Due to the outbreak of COVID-19, the highest number of cases of infectious diseases (54.2%) and the lowest cases of non-communicable diseases (36.7%) among the respondents were recorded in 2020. The lack of methods and*

techniques, equipment and regulations governing the conduct and evaluation of working conditions, as well as the lack of a system for recording and investigating cases of occupational diseases in Ghana, have limited research. To save the lives of patients, ensure acceptable working conditions for related professionals, and ensure the efficiency and sustainability of the health system in Ghana, the Government is encouraged to develop and implement a comprehensive, unambiguous, and assertive health and safety policy for its health workers.

Keywords: *working conditions; COVID-19; infectious diseases; noncommunicable diseases; Related specialists.*

Introduction

Health-care workers and allied health workers in Ghana do not have specialized health facilities to which they can turn when they encounter diseases suspected of being work-related. There are no national data on the epidemiology and registration of occupational diseases. Much of what is known about occupational diseases are scientific articles, most of which are conducted by individuals, and the results of such studies are limited in scope and may not reflect the true state of occupational diseases in the country.

Materials and methods

We conducted an online sociological survey among allied professionals living and working in forty-two medical institutions in Ghana. In this regard, in order to identify the main risk factors that have an adverse impact on the health of medical personnel, we conducted a comprehensive hygienic assessment of the working conditions of medical workers, carrying out their labor activities in the main professions of medical organizations. This article is an excerpt from a larger study that focused on both healthcare professionals and allied health professionals in Ghana (1,083 respondents in total). Thus, in this article, we are talking about 297 allied health specialists.

Results and discussions

Due to the intensity of the work process of related specialists, the working conditions were assessed as harmful of 1-3 degrees. The state of working conditions of these specialists is determined by administrative and managerial activities. Harmful working conditions of the third degree (3,3) were reported by ambulance drivers. The working conditions of laboratory assistants are classified as hazardous working conditions of the second degree (3.2).

The average allied professional in Ghanaian health care settings, especially laboratory technicians and ambulance drivers, work in heavy work processes characterized by working in a fixed, uncomfortable position, 50% or more during the workday. Harsh working conditions are also characterized by forced bending, standing, lifting and moving weights from 10 kg to 20 kg, regional and local load on the muscles of the shoulder girdle, hands, fingers (Fig. 1).

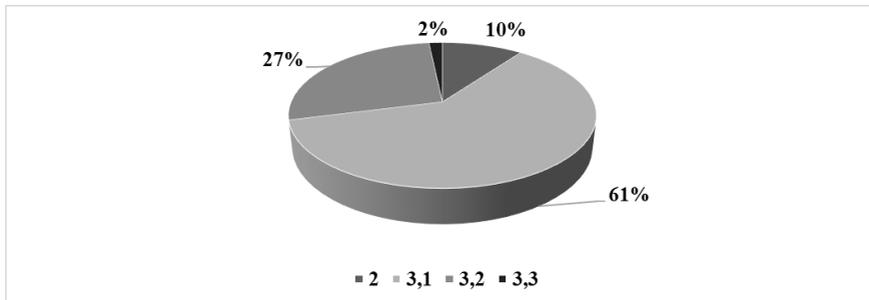


Figure 1. Characteristics of the working conditions of related specialists according to the degree of harmfulness

In Ghana, the results of this study show an upward trend in the incidence of noncommunicable diseases, including cardiovascular, respiratory, and diabetes mellitus, among allied health care professionals from 2018 to 2019, but in 2020 the trend decreased by 11%, which may be due to the greater attention given to the COVID-19 pandemic, the first cases of which were reported in the country in March 2022 [2]. The attention given to the pandemic and related restrictions on the movement of people, including full and partial lockdowns in several cities in the country, has led to a reduction in testing and diagnosis of noncommunicable diseases. Similar results were obtained from a WHO survey conducted in some European countries [4]. Cases of noncommunicable diseases among allied health-care professionals in Ghana increased dramatically by 10% in 2021 and 3% in 2022. The rate of increase in cases of noncommunicable diseases among allied health care providers since the major outbreak of COVID-19 in 2020 is alarming and requires serious measures to be addressed.

The highest peak in the spread of infectious diseases among allied healthcare professionals in Ghana was recorded in 2020 due to the outbreak of the COVID-19 pandemic. In addition to the COVID-19 pandemic, hepatitis B and tuberculosis are the leading diseases among allied healthcare professionals in Ghana. Due to the nature of his work, constant contact with patients, bodily fluids and sharp objects that may pose a serious threat to them, laboratory technicians were the very category of related professionals infected with these diseases. In addition, reflecting the overall high prevalence of malaria in Ghana, it has been recorded as one of the highest cases among allied professionals (Fig. 2).

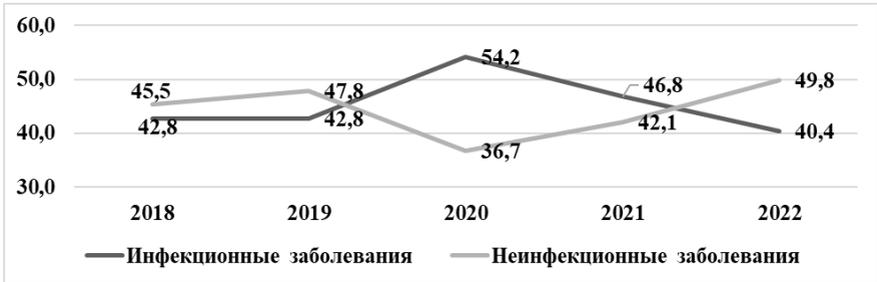


Figure 2. Trends in communicable and noncommunicable diseases among related professionals in Ghana, % (2018–2022)

Conclusion

The results of the study showed that a significant proportion of related professionals in health facilities in Ghana are exposed to severe hazardous working conditions. Malaria, hepatitis B, HIV infection, and tuberculosis are common infectious diseases among them. Cardiovascular disease is the most common non-communicable disease among professionals, followed by respiratory tract infections and diabetes.

Thus, the impact of harmful working conditions on the staff of medical institutions, the lack of information about the existing risks of harm to health at the workplace, the lack of a system for registration and control of occupational diseases, ineffective measures to preserve and improve the health of related specialists, both at the level of medical organizations and at the level of the government of Ghana, have been identified as problems to be solved.

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在其值相关的情况下使用移动平均算法检测时间序列无序性
**DETECTION OF TIME SERIES DISORDER USING THE
MOVING AVERAGE ALGORITHM UNDER CONDITIONS OF
CORRELATION OF ITS VALUES**

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注解。考虑使用移动平均算法或 MA 算法检测高斯时间序列的数学期望（无序）的自发突变的问题。值得注意的是，该算法的实际使用所需的概率特征仅在时间序列的元素（其观测值）不相关的情况下才具有必要的完整性。这项工作的目的是确定受控时间序列的观测值（计数） x_i 的即使相对较弱的相关性对于检测疾病的 MA 算法的属性及其有效性的影响程度。使用模拟方法，MA 算法的主要统计特征是在时间序列值的相关性水平为 $\rho = 0.05$ 的条件下确定的，即传统上被解释为实际不存在相关性并且需要使用各种统计方法时要考虑到这一点。已经确定，就所考虑的 MA 算法的属性而言，这种相关性的存在会导致其效率平均下降约 7%，在以下情况下使用该算法时必须考虑到这一点：实践。

关键词：根据数学期望的时间序列无序性、移动平均算法、MA 算法的概率特征、相关观测值。

Annotation. The problem of detecting a spontaneous abrupt change in the mathematical expectation (disorder) of a Gaussian time series using the Moving Average algorithm or MA algorithm is considered. It is noted that the probabilistic characteristics of this algorithm, necessary for its practical use, are known with the necessary completeness only for the case when the elements of the time series (its observations) are uncorrelated. The purpose of this work is to identify the degree of influence of even relatively weak correlation of observations (counts) x_i of a controlled time series on the properties of the MA algorithm for detecting a disorder and its effectiveness. Using the simulation method, the main statistical characteristics of the MA algorithm were determined under conditions of correlation of time series values at the level of $\rho = 0.05$, i.e. at a level that has traditionally been interpreted as the practical absence of correlation and

the need to take it into account when using various statistical methods. It has been established that, in relation to the properties of the MA algorithm under consideration, the presence of such a correlation leads to a decrease in its efficiency by an average of about 7%, which must be taken into account when using the algorithm in practice.

Keywords: *disorder of time series according to mathematical expectation, moving average algorithm, probabilistic characteristics of the MA algorithm, correlated observations.*

Introduction. The task of the fastest and most accurate determination of the moment of change in the properties of certain monitoring and control objects, the nature of the processes occurring in them, usually called the task of detecting a disorder in real time, arises, for example, when identifying dynamic objects, in technical and medical diagnostics, automated monitoring systems for various purposes.

To date, a very large number of different algorithms for the rapid detection of discord have been proposed [1 - 3]. All of them are based on calculation from observed discrete values x_i ($i = 1, 2, \dots, n, \dots$) at the rate with their receipt of the values of some decisive function $g_i = g_i(x_i, x_{i-1}, x_{i-2}, \dots)$. This function is calculated recursively based on the value of the decision function at the previous step and the next measured value x_i . The calculated value g_i is then compared with a given threshold level h . If $g_i < h$, then it is considered that there is no disorder and the control process continues; if $g_i \geq h$, then a signal about the presence of a disorder is given (alarm signal). In this case, it is important that the detection algorithm has certain optimal properties - for example, in the sense of minimizing the average delay time in detecting a disorder $\bar{\tau}_{\text{del}}$ with a fixed average interval between false alarms \bar{T}_{fa} .

The complexity of the problem under consideration gives rise to a variety of algorithms used to solve it. Currently, one of the most popular is the moving average algorithm or MA-algorithm (MA - Moving Average), which is due to the fact that for a number of options its properties have been well studied, i.e. studied to a level that allows the synthesis of a control algorithm taking into account the specific requirements of the user. To carry out such a synthesis, sufficiently complex studies must first be carried out in order to obtain dependencies of the form $h = \varphi(\bar{T}_{\text{fa}})$ и $\bar{\tau}_{\text{del}} = \psi(\bar{T}_{\text{fa}})$ for different values of the possible disorder δ and parameters of the decision function.

At the same time, in its study, as in the study of other similar algorithms, as one of the main premises, as a rule, the assumption is used that the observed discrete values x_i of the time series are uncorrelated. This significantly limits the scope of practical application of the algorithm. Indeed, in practice, the researcher initially

deals with analog signals and in order to convert them into digital form, the signal sampling step in time Δt must be selected.

It is traditionally believed that when choosing a step Δt , based on the condition $\Delta t \geq \tau_k$, where τ_k is the maximum correlation interval determined using the normalized autocorrelation function by using the relation $|\rho_{xx}(\tau \geq \tau_k)| \leq 0.05$, the resulting discrete values of x_i can be considered as practically uncorrelated [4; 5]. Such a categorical judgment of a general nature, however, raises great doubts due to the wide variety of tasks and methods for analyzing time series, their specific processing and subsequent application of the results.

The purpose of this work is to identify the degree of influence of even relatively weak (at the level of $\rho = 0.05$), correlation of observations (counts) x_i of a controlled time series on the properties of the MA algorithm for detecting a disorder and its effectiveness - including in comparison with the case of no correlation .

Main part. The subject of consideration in the work is the MA-algorithm for detecting an abrupt change in the mathematical expectation of a Gaussian time series from the initial stable level m_0 to the expected level m_1 . The decision function of this algorithm has the following form: $g_i = (x_i + x_{i-1} + \dots + x_{i-N+1})/N$, $i \geq N$, where N is the width of the smoothing window.

The research method is simulation modeling, which provides all the information necessary for the synthesis of a controlling MA algorithm with specified properties under conditions of correlation of neighboring samples x_i . To generate them, the relation $x_i = (u_i + au_{i-1}) / \sqrt{1+a^2}$ is used, where u_i, u_{i-1} are uncorrelated random numbers that obey a normalized Gaussian distribution (they can easily be obtained, for example, using the well-known Box-Muller method [6]). The sequence of values x_i generated in this way will also obey a normalized Gaussian distribution with a correlation coefficient ρ given by the value of the parameter a in accordance with the formula: $\rho = a / (1+a^2)$. For the value $\rho = 0.05$, parameter a is equal to 0.05013.

The plan for conducting the simulation experiment included the selection of ranges of change and gradations of values of all parameters specified during the experiment:

- average interval between false alarms: $\bar{T}_{fa} = 100; 250; 500; 1000$;
- values of the width of the smoothing window of the decision function: $N = 1; 2; 3; \dots; 16$;
- options for the magnitude of the disorder $\delta = |m_1 - m_0|$: 0.5; 1.0; 1.5; 2.0; 2.5; 3.0;
- values of the degree of correlation of readings: $\rho = 0.05$ and $\rho = 0$ (the case of uncorrelated xi);
- the number of repeated experiments of the simulation experiment, ensuring the necessary accuracy in obtaining the final results: $L = 10^4 - 10^6$.

The following are the main results obtained using the simulation experiment, divided into three blocks depending on the specific research problem solved in each of them.

1. For a given $\rho = 0.05$ and various \bar{T}_{fa} the dependences of the decisive threshold h on the width of the averaging window N are found:

$$h = 2,3939 - 0,0661 N + 0,0013 N^2 \text{ for } \bar{T}_{fa} = 100;$$

$$h = 2,7058 - 0,0487 N + 0,0008 N^2 \text{ for } \bar{T}_{fa} = 250;$$

$$h = 2,9240 - 0,0396 N + 0,0006 N^2 \text{ for } \bar{T}_{fa} = 500;$$

$$h = 3,1281 - 0,0319 N + 0,0004 N^2 \text{ for } \bar{T}_{fa} = 1000.$$

2. For the values under consideration \bar{T}_{fa} the values of the average delay intervals $\bar{\tau}_{del}$ in the detection of disorder are determined depending on N for a given disorder value δ ($\rho = 0.05$). The results obtained are presented in the form of 4 tables. A fragment of one of them for option $\bar{T}_{fa} = 250$ is presented below as an example.

Table 1.

Values $\bar{\tau}_{del}$ as a function of N and δ at $\bar{T}_{fa} = 250$ ($\rho = 0,05$)

N	$\delta = 0,5$	$\delta = 1,0$	$\delta = 1,5$	$\delta = 2,0$	$\delta = 2,5$	$\delta = 3,0$
1	63,74	20,60	8,23	4,09	2,42	1,68
2	45,55	12,88	5,39	3,08	2,21	1,85
3	37,03	10,28	4,73	3,06	2,42	2,09
4	32,06	9,11	4,58	3,23	2,64	2,30
5	29,14	8,60	4,65	3,45	2,86	2,48
6	27,07	8,29	4,79	3,65	3,05	2,63
7	25,52	8,18	4,99	3,86	3,21	2,77
14	21,10	8,96	6,25	4,87	4,03	3,46
15	20,84	9,12	6,39	4,98	4,12	3,52
16	20,88	9,34	6,53	5,09	4,20	3,60

Analysis of the tabular data shows that for a certain combination of indicators δ and \bar{T}_{fa} there is a value of N at which the average delay time in detecting a disorder $\bar{\tau}_{del}$ is minimal. In table 1, these N values are highlighted in bold. They can be called optimal in the sense of ensuring the highest performance of the disorder detection algorithm.

For the first time, the presence of this kind of optimal N_{opt} values was revealed for the case of uncorrelated readings [7]; Obviously, this also occurs for correlated time series. Full information about the selected optimal values of N_{opt} for various δ and \bar{T}_{fa} is given in Table. 2, and the corresponding values $\bar{\tau}_{del}$ - in table 3.

Table 2.

N_{opt} values for optimal setting of the MA detection algorithm

$\bar{T}_{fa} = 100$						$\bar{T}_{fa} = 250$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
13	6	3	2	1	1	15	7	4	3	2	1
$\bar{T}_{fa} = 500$						$\bar{T}_{fa} = 1000$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
16	9	5	3	2	1	16	10	6	3	2	2

Table 3.

Values $\bar{\tau}_{del}$ at optimal settings of the MA detection algorithm

$\bar{T}_{fa} = 100$						$\bar{T}_{fa} = 250$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
14,5	6,33	3,69	2,49	1,87	1,41	20,8	8,20	4,59	3,06	2,21	1,68
$\bar{T}_{fa} = 500$						$\bar{T}_{fa} = 1000$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
27,2	9,71	5,31	3,43	2,46	1,95	35,8	11,3	6,03	3,87	2,75	2,11

3. For the optimized version of the MA algorithm, its efficiency indicator $E = \bar{T}_{fa} / \bar{\tau}_{del}$ was calculated. The calculation results are presented in table. 4.

Table 4.

Values of the efficiency indicator E of the optimal MA algorithm ($\rho = 0.05$)

$\bar{T}_{fa} = 100$						$\bar{T}_{fa} = 250$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
6,9	15,8	27,1	40,1	53,5	70,8	12,0	30,5	54,5	81,8	113	148
$\bar{T}_{fa} = 500$						$\bar{T}_{fa} = 1000$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
18,4	51,5	94,1	146	203	256	27,9	88,3	166	258	363	473

It is obvious that with an increase in the magnitude of the disorder δ and values \bar{T}_{fa} the efficiency of the MA algorithm increases, which, in principle, is typical in practice for all sequential disorder detection methods.

To determine the degree of influence of the correlation of readings x_i on the efficiency of the disorder detection algorithm, a table similar to Table 4 was constructed, but for the case of uncorrelated readings (Table 5).

Table 5.

Values of the efficiency indicator E of the optimal MA algorithm ($\rho = 0$)

$\bar{T}_{fa} = 100$						$\bar{T}_{fa} = 250$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
7,4	16,9	29,1	44,8	56,8	75,0	12,9	32,6	58,5	87,5	119,8	158,8
$\bar{T}_{fa} = 500$						$\bar{T}_{fa} = 1000$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
19,8	55,2	101	156	218	273	30,5	95,4	179	273	392	499

To analyze the degree of influence of the correlation of time series samples on optimized MA detection algorithms, use the relative efficiency indicator $C = E_{opt}(\rho) / E_{opt}(0)$, where $E_{opt}(0)$ is the value of the Eopt indicator in the absence of correlation, and $E_{opt}(\rho)$ – when its presence ($\rho = 0.05$). The values of the index C for various δ and \bar{T}_{fa} and are indicated in Table. 6.

Table 6.

Values of the relative efficiency indicator C of MA algorithms.

$\bar{T}_{fa} = 100$						$\bar{T}_{fa} = 250$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
0,93	0,94	0,93	0,89	0,94	0,94	0,93	0,94	0,93	0,93	0,94	0,94
$\bar{T}_{fa} = 500$						$\bar{T}_{fa} = 1000$					
$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$	$\delta=0,5$	$\delta=1,0$	$\delta=1,5$	$\delta=2,0$	$\delta=2,5$	$\delta=3,0$
0,93	0,93	0,93	0,93	0,93	0,94	0,91	0,93	0,93	0,95	0,93	0,95

Data analysis table. 6 shows that, almost regardless of the values \bar{T}_{fa} the efficiency of the MA algorithm for detecting a disorder decreases on average by about 7% due to the correlation of the time series samples at the level of $\rho = 0.05$.

Conclusion. The moving average algorithm (MA algorithm) is considered as a means of quickly detecting the disorder of a Gaussian time series in terms of mathematical expectation. Using the simulation method, its main statistical characteristics were determined under conditions of correlation of time series values at the level of $\rho = 0.05$, i.e. at a level that has traditionally been interpreted as a virtual absence of correlation and the need to take it into account. It has been established that in relation to the properties of the considered MA algorithm for detecting a disorder, this is not entirely true: its efficiency decreases on average by about 7%, which, of course, must be taken into account when constructing the corresponding control procedure.

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土壤过程水分传递数学模型分析
**ANALYSIS OF MATHEMATICAL MODELS OF THE PROCESS
MOISTURE TRANSFER IN SOIL**

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抽象的。信息和控制系统“智能花园”代表综合技术解决方案，旨在优化和简化花园或农田的维护。这些系统结合了传感器、控制器、网络设备和软件等各种组件，以提供对园艺各个方面的完全控制。

关键词：数学模型、信息管理系统、园艺。

Abstract. *Information and control systems “Smart Garden” represent integrated technological solutions, designed to optimize and simplify the maintenance of a garden or agricultural plot. These systems combine various components such as sensors, controllers, network devices and software, to provide complete control over various aspects of gardening.*

Keywords: *mathematical models, information management systems, gardening.*

Introduction

Moisture transfer in the soil is a key process that affects the growth and development of plants, as well as the quality of the soil in general. Understanding this process is critical for irrigation management and minimizing soil and environmental damage caused by poor water management [1].

A soil's ability to hold and transfer water is one of its key functions and depends on many factors, including soil texture, organic matter, temperature and pressure. Moisture is transferred in the soil through a process known as moisture transfer, which can occur either in the form of flow or diffusion. The process of moisture transfer in soil is determined by the laws of physics and can be described mathematically.

In traditional irrigation systems, watering decisions are made based on the farmer's observations and intuition. However, given the complexity of soil moisture transfer and its effect on plants, this approach often results in over- or under-watering. This not only harms plants, but also leads to inefficient use of water [2,3].

In light of the above problems, automated Smart Garden control systems are becoming increasingly popular. They use sensors to monitor soil moisture levels and automatically adjust watering based on this data. However, the effectiveness of these systems largely depends on the accuracy of their mathematical models of moisture transfer in the soil.

Developing a mathematical model of soil moisture transfer for a Smart Garden system can significantly improve irrigation efficiency, optimize water use, and maintain plant health and productivity.

Review of existing models of soil moisture transfer

Richard's model. This is the basic model used to describe moisture transfer under heterogeneous, saturated and unsaturated conditions. The Richards model is based on the conservation of mass equation, also known as the Richards equation, which describes the movement of moisture in a porous medium depending on its potential energy gradient.

The equation has the form:

$$\partial\theta/\partial t = \nabla \cdot [K(\theta)\nabla h] + S,$$

where θ is soil moisture, t is time, $K(\theta)$ is the soil water conductivity function, h is the hydraulic potential, ∇ is the gradient operator, S is the source or sink of water (for example, rainfall or evaporation).

Richards' model takes into account the heterogeneity of a porous medium and variations in its hydraulic properties, such as permeability and water-holding capacity, at different points in space. This allows us to take into account the heterogeneous distribution of moisture and water flow in a porous medium, and also takes into account the different phases of water in a porous medium, such as saturated (contained in the pores) and unsaturated (moving through the porous medium). The Richards equation takes into account the transition of moisture between these phases, which makes it possible to describe the processes of saturation and drainage of a porous medium. However, solving the Richards model causes certain difficulties in choosing numerical methods.[4]

Darcy's model. The model is a simplified version of the Richards model, which is used to describe water flow in saturated soil. It assumes that the soil is always completely saturated with water, that is, all its pores and spaces between the particles are filled with water. This assumption is based on the fact that in this case the hydraulic resistance of the soil is determined only by its physical properties, such as porosity and permeability.

The main parameter used in the Darcy model is the hydraulic gradient, which determines the direction and intensity of water flow in saturated soil. The hydraulic gradient is the difference in hydraulic head (hydrostatic water pressure) between two points divided by the distance between those points. If the hydraulic gradient is positive, then the flow of water will be directed from a point with a higher hydraulic head to a point with a lower hydraulic head.

The Darcy model simplifies the mathematical description of water flow using the Darcy equation, which establishes a proportional relationship between the speed of water flow and the hydraulic gradient. This equation is used in hydrogeology to describe groundwater flow [5]:

$$Q = -KA(dh/dx),$$

where Q is the water flow, K is the filtration coefficient, A is the cross-sectional area, dh/dx is the hydrostatic pressure gradient.

It should be noted that the Darcy model is simplified and assumes complete saturation of the soil with water. In reality, the soil may not be completely saturated, but only partially, and there may be air spaces between the particles. In such cases, more complex models that take into account changes in soil saturation are used to more accurately describe water flow.

Green-Ampt's model. This model is based on the assumption that there is a wet zone in the soil that expands as water penetrates the soil. This zone is separated from the rest of the soil by a boundary at which a sharp change in humidity occurs. The water in this zone is under pressure that is less than atmospheric pressure, and this pressure causes water to move into the soil.

The basic equation of the model relates the infiltration rate to these parameters and time [6]:

$$Z = K(t - t_p) + (\psi m / K) \ln (Kt / \psi m + 1)$$

where: Z is the depth of the moisture front, t is time, t_p is the time of onset of saturation, K is the hydraulic conductivity of the soil, ψm is the potential of the soil matrix at the moisture front.

It is worth noting that the Green-Ampt model, although a useful tool, has its limitations. It assumes that all soil parameters are constant in time and space, which is not always true. In addition, it does not take into account the effect of gravity on the movement of water in the soil.

Philip's model. A model that describes the process of water infiltration into soil. It is used to describe the process of moisture transfer where water reaches the soil surface from rain or irrigation and then penetrates into the soil.

Philip's model is an equation that describes the rate of water infiltration into soil as a function of time. In general it looks like this:

$$I(t) = S t^{(-1/2)} + At,$$

where: $I(t)$ - infiltration rate at time t ; S is a parameter that describes the sorption capacity of the soil (it is also called the sorption constant); A is a constant infiltration rate, which is achieved after a long time; t - time.

At the beginning of the infiltration process, the rate of water infiltration into the soil increases rapidly, but over time it slows down and eventually reaches a constant value A . This value depends on the properties of the soil and the magnitude of the water flow.

Philip's model is widely used in hydrology and agronomy for modeling the processes of water infiltration into the soil and for calculating the water balance in soil profiles.

This model is limited to describing the process of water infiltration into the soil and may not be sufficient to describe more complex processes of moisture transfer.

Van Genuchten-Mualem's model. This model describes the relationship between water saturation, water potential, and soil conductivity. It is a widely used model to describe water potential and hydraulic conductivity in soil as a function of water saturation. This model is based on the assumption that water and air can coexist in the soil in different proportions, and that these proportions can influence the ability of the soil to conduct water [7].

Van Genuchten-Mualem's model equation:

$$\theta(\psi) = \theta_r + (\theta_s - \theta_r) / [1 + (\alpha|\psi|^n)^m] \quad K(\psi) = Ks [1 - (\alpha|\psi|^{(n-1)})^m]^2 / [1 + (\alpha|\psi|^n)^m]^{(m/l)}$$

where: θ - soil water capacity, ψ - water potential, θ_r , θ_s - residual and saturated soil moisture, respectively, α , n , m - parameters determined by soil properties, K - hydraulic conductivity, Ks - saturated hydraulic conductivity, l - a parameter related to the shape of the conductivity curve.

Note that the model is the most complex of those listed and can describe more complex processes of moisture transfer in heterogeneous and unsaturated conditions. However, due to its complexity, it can be difficult to solve and require more data for calibration.

Fractal models. In the context of soil moisture transport, refers to an approach that uses concepts of fractal geometry to describe the complex structure and behavior of soil.[8]

Fractals are geometric structures that have the property of self-similarity, that is, their structure remains unchanged when the scale changes. This property makes fractals useful for describing objects and phenomena in nature that have complex, irregular structures, such as clouds, mountains, trees and, of course, soil.

In soil moisture transfer processes, fractal models can be used to describe the way water moves through complex, irregular soil structure. This may include descriptions of the interaction of water with soil particles, processes of water adsorption and desorption, and processes of evaporation and condensation.

However, it is worth noting that fractal models are relatively complex and require significant computing resources to implement. Additionally, they require a detailed understanding of fractal geometry and related mathematical concepts.

Conclusion

The development of a mathematical model of moisture transfer in the soil is an important step in the creation of Smart Garden information and management systems, since it allows one to predict and control the level of moisture in the soil

based on various parameters, such as climatic conditions, soil type, plant characteristics and other factors. Sensors installed in the soil will constantly monitor moisture levels, and the data obtained will be used to adjust the water supply through the irrigation system. This will optimize the use of water resources and prevent waterlogging or drying out of the soil, which can negatively affect plants.

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用于评估振动对移动机器人视频系统附加元件影响的近似数学模型
**APPROXIMATE MATHEMATICAL MODEL FOR ASSESSING THE
INFLUENCE OF VIBRATIONS ON ATTACHED ELEMENTS OF A
MOBILE ROBOT VIDEO SYSTEM**

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Modern information technologies provide great opportunities for conducting research on complex technical systems based on their mathematical models. It should be taken into account that a detailed model does not always make it possible to obtain results adequate to the processes occurring in the systems. This is due to the complexity of constructing a detailed model and adjusting its parameters to ensure the required level of compliance of the model with the properties of the system elements. For this reason, simplified mathematical models of systems and processes that describe their operation remain relevant and in demand. Such models make it possible to analytically obtain solutions to a number of applied problems of analysis and synthesis. At the same time, the researcher has the opportunity to visually imagine and “feel” the physical processes occurring in the system.

One of the current areas for the application of mathematical modeling methods is the creation of robotic systems that are being intensively implemented in various spheres of human activity: from military and special applications to agriculture and the provision of consumer services. A robotic mobile complex is an unmanned vehicle that can move in space and perform certain functions determined by its specialization. The development of mobile robotic systems is proceeding both along the path of creating unique (mechanized) platforms and using the chassis of serial automobile and tractor equipment. Thus, one of the first domestic mobile robots was created on the basis of the chassis of the Belarus-132 serial mini-tractor produced by “Smorgon Aggregate Plant” OJSC in 2015. (Fig. 1), [1, 2].



Figure 1. General view of the robotic complex based on the “Belarus-132” chassis

The complex includes the following attachments: video system for driving; on-board computer; telecommunication system; special technological equipment (radio-controlled fire monitor for fire extinguishing).

When developing and installing mounted elements, one has to deal with a number of problems, one of which is vibrations (oscillations) of the platform that occur during engine operation, as well as when the platform moves on uneven surfaces. These vibrations can have an undesirable effect on the installed equipment, and primarily on the video system. Schematically, the vertical component of vibrations and the resulting images of the object on a conventional screen are presented in Fig. 2.

When solving problems of positioning and navigation of a mobile robot using a video system, a number of questions and related problems arise. Let’s name just a few of them. For example, what formal apparatus can be used to describe such oscillations in order to study them? Is it possible to identify the frequency, amplitude and spatial patterns of vibrations of a video system in order to propose means of damping them? How to determine the limiting (threshold) values of oscillation parameters, the excess of which leads to failure of tracking (determination of current coordinates)? These issues, as well as possible solutions to them, will be considered in this work.

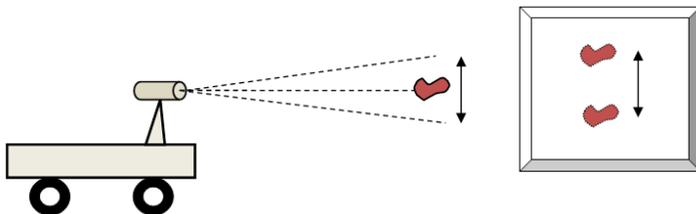


Figure 2. Shift of the object image on a conventional screen due to vertical vibrations of the platform

Vibrations of mobile platforms

The problems of studying the reliability and performance of products installed on moving platforms under conditions of random vibration loads can be solved using full-scale tests, in which the product is installed on the corresponding vehicle and then the process of movement along the corresponding surface is realized at a given trajectory and speed. However, full-scale tests with high reliability of the results are very expensive and require large human, material and time costs. These problems can also be successfully solved using electrodynamic vibration stands or based on mathematical modeling.

A number of works are devoted to the study, modeling and taking into account of such oscillations [3, 4]. In particular, work [4] sets out the fundamentals of the theory of modeling and virtual design of multi-legged wheeled chassis, including a detailed consideration of the problems of studying the vibrations of various structural elements of multi-legged machines. It is advisable to take the obtained results of experimental studies as a basis when constructing mathematical models of the robotic complexes being developed.

To determine the statistical characteristics of random vibrations of a moving platform (car body), it is necessary to have a mathematical expression for the correlation function of the source of vibration loading (microprofile of the road) and the transfer function from the road to the vertical movement of the sprung mass [3].

When studying the oscillations of mobile machines, random processes with standard correlation functions or their approximations are considered [4]. The impact of surface irregularities on a mobile machine can generally be considered as an irregular disturbance. Since the mobile machines themselves have an inherent oscillation frequency for each of them, they emit those disturbance frequencies that are close to their own oscillation frequency. The resulting movement is called “irregular rolling” [5], which is an oscillatory process with a random amplitude and a random period. The correlation function of such a process is usually approximated by the expression

$$R_x(\tau) = D_x e^{-\alpha|\tau|}, \quad (1)$$

where D_x - process dispersion $X(t)$, α - damping parameter.

Another common type of correlation function for a stationary random process $X(t)$ is the exponential-cosine correlation function

$$R_x(\tau) = D_x e^{-\alpha|\tau|} \cos \omega_0 \tau, \quad (2)$$

where ω_0 - resonant frequency.

Analysis of correlation functions (1) and (2) shows that random processes with such correlation functions have derivatives with infinite variance (not differentiable in the usual sense). The third type of correlation function of a stationary random process, which has the following form, does not have this drawback [5, 6]

$$R_x(\tau) = D_x e^{-\alpha|\tau|} (\cos \omega_0 \tau + \gamma \sin \omega_0 |\tau|), \quad (3)$$

Stationary random process $X(t)$ with correlation function (3) at $\gamma = \frac{\alpha}{\omega_0}$ let's differentiate and the variance of its derivative is finite.

Formula (3) is the most convenient for approximating a process of the “random motions” type. It corresponds to a spectral density of the form

$$S_x(\omega) = \frac{2D_x \alpha}{\pi} \frac{\beta^2}{\beta^4 + 2(\alpha^2 - \omega_0^2)\omega^2 + \omega^4}, \quad (4)$$

where $\beta^2 = \alpha^2 + \omega_0^2$.

For specific road surfaces, the parameters of the correlation function are determined experimentally and are given in a number of sources [3, 4, 6]. For example, for an asphalt pavement $\alpha = 8, D_x = 1$; for a country road $\alpha = 4, D_x = 9$; for a road surface in poor condition $\alpha = 2, D_x = 50$.

Sometimes, for practical calculations by simulating oscillatory processes occurring during the movement of mobile platforms (multi-support machines), various types of approximations of correlation functions are used. For example, in [4] the formula is given

$$R_x(\tau) = A_1 \sigma_1^2 e^{-\alpha_1|\tau|} + A_2 \sigma_2^2 e^{-\alpha_2|\tau|} \cos \beta \tau. \quad (5)$$

The parameters of the correlation function (5) $A_1, A_2, \sigma_1, \sigma_2, \alpha_1, \alpha_2, \beta$, obtained experimentally for various surfaces of motion of a multi-support machine, are given in the relevant sources, including [4].

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数字中的生命
LIFE IN NUMBERS

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抽象的。在大阿纳多尔斯基林业学院（1953–1957年）、沃罗涅日林业学院（1957–1962年）、在鄂木斯克地区担任林业员时（1962–1964年）、在沃罗涅日林业研究生院 在研究所（1964–1967），甚至在沃罗涅日国立大学的教员（1981–1984），以及在苏联和俄罗斯不同地区的科学工作中，作者的生活都与森林息息相关。在工作期间，他对所做的事情和时间进行了书面草图，以便以后评估结果。起初，这些草图是在笔记本上画的。然后，他和许多其他人一样，接触了丹尼尔·格拉宁（Daniil Granin）的书《这种奇怪的生活》（This Strange Life）[1974]。本书讲述了苏联科学家亚历山大·柳比谢夫一生的记录系统，让他能够更加理性地利用命运分配的时间，做很多有用的事情。从1976年开始阅读这本书时，这些笔记的作者也决定使用时间核算的思想。他所做的总结如下。在他的同事、苏联和俄罗斯制造商的帮助下，他成功地进行了五十个新的田间实验，培育出了数十个最好的杂交品种和几个专利品种。此外，还进行了分析研究，并个人或共同撰写了370多篇出版物，包括16本专著和22本教科书、方法建议和指南。不同数据库中的科学文章总数包括：Web of Science 和 Scopus 中 - 20 篇；其他国外数据库（AGRIS、Google School、Ulrich）- 8；在高级认证委员会的名单中，未包含在以前的数据库中，- 25；在俄罗斯科学引用索引列表中，未包含先前列表中的出版物，- 18。一些创建的对象和出版物见附录 1-5。

关键词：时间核算系统、劳动科学负荷系数、田间实验对象、分析学、森林新品种和杂交种。

致谢：对于所收到和创造的一切，作者感谢自己所在单位的老师、同事和助手，以及帮助铺设实验设施、关心和保障实验设施的制造企业员工。

Abstract. *At the Veliko-Anadolsky Forestry College (1953-1957), the Voronezh Forestry Institute (1957-1962), at the beginning of his work as a forester in the Omsk Region (1962-1964), at the graduate school of the Voronezh Forestry Institute (1964-1967) and even at the Faculty of the Voronezh State University*

(1981-1984), as well as in scientific work in different regions of the Soviet Union and Russia the author's life was connected with the forest. During the work, he carried out written sketches of what was done and when, in order to later evaluate what came out of it. At first, these sketches were made in notebooks. And then he, like many others, got into the hands of Daniil Granin's book "This Strange Life" [1974]. This book describes the system of recording the life time of the Soviet scientist Alexander Lyubishchev, which allowed him to use the time allotted by fate more rationally and do a lot of useful things. When reading this book since 1976, the author of these notes also decided to use the idea of time accounting. What he did is summarized below. With the help of his colleagues, Soviet and Russian manufacturers, he managed to create fifty new field experiments, bring out dozens of the best hybrids and several patented varieties. In addition, analytical studies have been conducted and more than 370 publications have been personally or co-authored, including 16 monographs and 22 textbooks, methodological recommendations and guidelines. Out of the total number of scientific articles in different databases included: in Web of Science and Scopus – 20; in other foreign databases (AGRIS, Google School, Ulrich) – 8; in the list of the Higher Attestation Commission, not included in the previous databases, – 25; In the list of Russian Scientific Citing Index, not included publications in the previous lists, – 18. Some of the created objects and publications are presented in appendices 1-5.

Keywords: time accounting system, labor scientific load factor, field experimental objects, analytics, new forest varieties and hybrids.

Acknowledgments: For everything received and created, the author thanks his teachers, colleagues and assistants from organizations where he had to work, and employees of manufacturing enterprises who helped to lay experimental facilities, performed care in them and carried out security.

Brief description of accepted time expenditure items

Having started work, the author decided not only to take into account when, what happened, and how long it took. Permanent and temporary accounting units were allocated in advance.

18 units were classified as constant items of time consumption:

1. Wake time.
2. Physiological needs (sleeping, washing, eating, etc.).
3. Active time.
4. Creative work: observations, planning, creation and care of experimental objects, records of results and their generalization, publications, etc.
5. Necessary additional work: orders or rental of transport, moving, etc.
6. Support work: purchasing materials, purchasing and setting up tools, etc.

7. Organizational work: agreements with production enterprises, colleagues - partners from other departments of our institute, other scientific and educational institutions, etc.
 8. Community service: participation in various community events
 9. Communication with loved ones, friends and colleagues.
 10. Family.
 11. Household matters.
 12. Time used to travel to and from work.
 13. Recreation: artistic reading, shows, nature, relaxation, etc.
 14. Journaling.
 15. Useless work (from my point of view, which still has to be done).
 16. Time imbalance (when accounting units are rounded, the total amount may be greater or less).
 17. Laziness (and it happens).
 18. Disease and treatment (we are all human).
- Temporary expenditures include:
- Specific publications of the current year
 - Bookmarking, observations, measurements and processing of results obtained this year.
 - Reports on scientific work of the current year.
 - Reviews of publications and dissertations of other researchers.
 - Time spent working in different scientific institutions.
 - Work on electronic computers and computers.
 - Work on additional tasks of the administration.
 - Household chores, etc.

All this material was compiled annually on a monthly, quarterly, semi-annual and yearly basis. Since in this manuscript the main time expenditure is devoted to labor costs, they will be discussed in the subsequent presentation. By dividing the time worked by the number of calendar working days per year, the daily workload was obtained. And dividing the same amount of time worked by the amount of official working time, that is, without taking into account vacations, weekends, holidays, etc., made it possible to calculate the so-called scientific labor load coefficient developed by the author (KTNN).

Streamlining previous scientific material

Everything that was written down in previous notebooks and notebooks was also translated into this format by the author. And before presenting the actual time spent, they were calculated starting from the last two years of graduate school and for subsequent years of work in scientific and higher educational institutions of the country, that is, in the period from 1966 to 1975. Over these 10 years, he came up with the following calculation (Table 1):

As it can be seen from table 1, despite the inclusion of all annual calendar days (working days, vacation days, weekends and holidays) in the total, the total number of working hours per day for the decade under study was 5.8 hours.

Many Internet sources note that Charles Darwin worked 4.5 hours a day. Unfortunately, the author did not find a link whether this applied to all calendar days of the year, or excluding holidays and weekends. In table 1 meant all calendar days of the decade.

Table 1.
Estimated lifetime from 1966 to 1975.

No. pp	Time expenditure item	Volume of time spent over 10 years (3650 days)	Number of hours in a day
1	Waking time	55854.5	15.3
2	Physiological needs	8895.5	2.4
3	Active time	46959	12.9
4	Creative work	9920.5	2.7
5	Additional work required	5305	1.5
6	Support work	1812	0.5
7	Organizational work	1289	0.4
8	Social work	1716	0.5
9	Communication	1691.5	0.5
10	Family	3796.5	1.0
eleven	Household affairs	1367.5	0.4
12	Road to work and back	5768.5	1.6
13	Rest: a) reading, radio	2631.5	0.7
	b) with loved ones	1000.0	0.3
	c) spectacles	1579.0	0.4
	d) nature	950.0	0.3
	e) miscellaneous	4495.5	1.2
14	Journaling	899.0	0.2
15	Useless but necessary work	1127.5	0.3
16	Time imbalance	684.0	-
17	Laziness	975	0.3
18	Disease and treatment	828.5	0.2
	Sum	46959	12.9
	Work time	21170	5.8

As for the time spent in the decade under study, they are selectively presented in Table. 2.

Table 2.

Time spent on individual work in 1966-1975.

Time expenditure item	Volume of time spent over 10 years (3650 days)	Number of hours in a day
Doctoral thesis	1700	0.5
Hybridization	250	0.1
Research reports	4000	1.1
Variety testing	1500	0.4
Foreign scientific relations	270	0.1
Abstracting of foreign literature in RJ [1964]and translations of other foreign publications	800	0.2

Everything that was presented in tables 1 and 2, as stated above, was transferred from notebook entries. But they are also of some interest for accounting for various items of time use.

Analysis of actual time recording since 1976

Further, this work took into account what was actually recorded in 1976 and later, up to the present. Since the beginning of these records it has already passed 48 years.

In the proposed manuscript, it is impossible to fully analyze the results obtained for all sections and years due to the huge volume. Therefore, as noted above, let's focus on the main thing: the time spent on official scientific work. That is, generalized to the totality of permanent sections 4, 5, 6, 7, 8, 12 and 15. As an example, we can cite the entire amount of time spent for three years 1983, 2000 and 2020 (tables 3 – 4). In them, the analysis was carried out only on the scientific work of these permanent sections.

Since in recent years (since 2019) many of the authors' colleagues, including him, have been enrolled at 0.75 working rates, this had to be taken into account when calculating the workload for 2020.

As it can be seen from table 3, the actual scientific workload in 1983 exceeded the legal working time by 1.66 times. In 2000 – 1.59 times; and in 2022 – 2.22 times.

Table 3.

Estimated lifetime in some years for fixed expenditure items

№.№ pp.	Time expenditure item	Volume of time spent in 1983		Volume of time spent in 2000		Volume of time spent in 2020	
		Number of hours per year	Number of hours in a day	Number of hours per year	Number of hours in a day	Number of hours per year	Number of hours in a day
1	Waking time	6078.5	16.7	5933.0	16.2	6179.25	16.9
2	Physiological needs	986.25	2.7	1110.25	3.0	1244.5	3.4

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3	Active time	5092.25	14.0	48222.75	13.2	4934.75	13.5
4	Creative work	431.25	1.2	873.75	2.4	1405.5	3.8
5	Additional work required	2450.75	6.7	1072.0	2.9	292.0	0.8
6	Support work	31.75	0.1	113.0	0.3	97.0	0.3
7	Organizational work	46.0	0.1	3.5	-	0.75	-
8	Social work	79.0	0.2	14.25	0.1	3.75	-
9	Communication	204.75	0.6	105.5	0.3	79.0	0.2
10	Family	222.75	0.6	466.25	1.0	195.25	0.5
eleven	Household affairs	191.75	0.5	243.0	0.7	583.25	1.6
12	Road to work and back	148.5	0.4	257.5	0.7	82.75	0.2
13	Rest: a) reading, radio	281.0	0.8	367.75	1.0	208.5	0.6
	b) with loved ones	145.0	0.3	33.0	0.1	11.0	-
	c) shows and television news	417.0	1.1	598.25	1.6	1113.5	3.0
	d) nature	259.75	0.8	248.0	0.7	72.25	0.2
	e) other things	112.25	0.3	124.75	0.3	63.25	0.2
14	Keeping a diary and summary tables.	19.0	0.1	61.0	0.2	134.0	0.4
15	Useless but necessary work	16.0	0.1	-	-	-	-
16	Time imbalance	11.75	-	20.5	0.1	3.0	+0.1
17	Laziness	0.5	-	-	-	-	-
18	Disease and treatment	43.75	0.1	217.5	0.6	590.0*	1.6
	Sum	5092.25	14.0	4822.75	13.2	4934.75	13.5
	Actual working hours per year	3124.25	8.6	2333.7	6.4	1881.75	4.9
	Legal working time of year	1885.0		1471.1		846.0*	
	Scientific Workload Coefficient (SRLC)	1.66		1.59		2.22	

*Reduced legal working hours are due to COVID disease.

The high CTNN in 2020 is associated with a transfer of 0.75 rates. That is, the habit of working a certain time during most of the day has remained, but the legal burden for which salaries are paid has decreased.

Some specific types of work were carried out in each of these years are shown in Table. 4.

Table 4
Time spent on individual work in different years.

Time expenditure item	Volume of time spent in 1983		Volume of time spent in 2000		Volume of time spent in 2022	
	Number of hours per year	Number of hours per day	Number of hours per year	Number of hours per day	Number of hours per year	Number of hours per day
Doctoral thesis	283.0	0.8	-	-	-	-
Administrative work	1214.25	3.3	-	-	96.25	0.3

Publications	387.25	1.1	816.0	2.2	1202.25	3.3
Business trips	221.75	0.6	86.25	0.2	-	-
Research reports	17.0	-	90.25	0.2	44.25	0.1
VSU Evening University in Mathematics	775.0	2.1	-	-	-	-
Variety testing	1500	0.4	-	-	58.5	0.1
Foreign scientific relations	5.0	-	327.5	0.9	25.0	0.1
Abstracting of foreign literature in the Abstract USSR magazine [1964] and translations of other foreign publications	800	0.2	-	-	4.5	-
Mastering and working on a computer	-	-	648.75	1.8	1493.25	4.1
Teaching work at Petrozavodsk State University	-	-	2319.75	6.3	-	-
Admission to the Russian Academy of Natural Sciences as a full member	-	-	49.5	0.1	-	-
All-Russian Research Institute of Forest Genetics, Breeding and Biotechnology (formerly Central Research Institute of Forest Genetics and Breeding)	4427.25	12.1	-	-	2923.75	8.0

Actual CTNN in a particular year for 48 years are presented in table. 5.

Table 5
Actual scientific workload ratio in specific years

Years	KTNN	Years	KTNN	Years	KTNN	Years	KTNN	Years	KTN
1976	1.10	1986	1.17	1996	1.40	2006	1.67	2016	1.42
1977	1.00	1987	1.20	1997	1.50	2007	1.53	2017	1.8
1978	1.00	1988	1.17	1998	1.58	2008	1.31	2018	1.81
1979	1.00	1989	1.23	1999	1.58	2009	1.44	2019	2.16
1980	1.00	1990	1.00	2000	1.59	2010	1.45	2020*	1.55
1981	1.31	1991	0.99	2001	1.32	2011	1.40	2021	1.80
1982	1.50	1992	0.72	2002	1.21	2012	1.25	2022	2.22
1983	1.60	1993	0.63	2003	1.51	2013	1.42	-	-
1984	1.15	1994	0.73	2004	1.47	2014	1.11	-	-
1985	1.26	1995	0.87	2005	1.58	2015	1.35	-	-

*Covid is a disease

As can be seen from the data in Table 5, the KTNN from 2017 to 2022 ranged from 1.8 to 2.22, with the exception of 2020, when the author had to recover from Covid-2019.

In addition to using time wisely, the author believes it is very important to take examples from his teachers and hardworking peers. Among such people who made a significant contribution to forestry are academicians A.S. Yablokova [1949, 1965], I.S. Melekhova [1980] and V.A. Dragavtseva [1973]. The selfless worker, the former director and co-authors [1973], as well as the unforgettable teachers of the author, professors of the Voronezh Forestry Institute Oscar Gustavovich Kapper [1954] and Mikhail Mikhailovich Veresin [1963], also belong to this series. We can name our other prominent scientists and colleagues and acquaintances of the author, but he does not risk naming them, so as not to miss or offend anyone. However, the grateful memory of them is always with him.

– What the author personally managed to do over the past years, we can briefly note the following. With the help of his colleagues, Soviet and Russian producers, he managed to create fifty new field experiments, develop dozens of the best hybrids and several patented varieties. In addition, he conducted analytical studies and prepared more than 370 publications personally or in co-authorship, including 16 monographs and textbooks, *22 textbooks, methodological recommendations and instructions*.

– Of the total number of scientific articles, the following are included in various databases:

1. In Web of Science and Scopus – 20;
2. To other foreign databases (AGRIS, Google School, Ulrich, etc.) – 8;
3. The list of Higher Attestation Commissions not included in previous databases includes 25;
4. The RSCI list includes 18 publications that were not included in the previous lists.
5. In addition, the results obtained up to 2019 are presented in more detail by the author in his brochure [Tsarev, 2019].

Conclusion

– At one time, at scientific seminars of the Central Research Institute in Voronezh, the author tried to promote taking into account the scientific workload among colleagues. Most were quite skeptical about it and only a few started using it. The author believes that personally, with statistically normal abilities and capabilities, he was able to rationally distribute time, which is always in short supply.

– Careful attitude to working time allowed the author to create the above-mentioned new field experiments, carry out hybridization work, develop new varieties and select promising hybrids, prepare a number of textbooks and publications.

For everything he has received and created, the author always thanks his teachers, colleagues and assistants from the organizations where he had to work, and the employees of production enterprises who helped set up the experimental facilities, carried out their maintenance and provided security.

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