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МАТЕРИАЛЫ XVIII МЕЖДУНАРОДНОЙ НАУЧНО-ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ НА АНГЛИЙСКОМ ЯЗЫКЕ

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ECONOMIC EFFICIENCY OF USING MODERN OILFIELD CHEMICALS IN OIL PRODUCTION

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Abstract. The article discusses the economic efficiency of using modern oilfield chemicals in the process of oil production. The research is aimed at assessing the impact of innovative chemical compositions (polymers, surface-active substances, corrosion inhibitors) on increasing oil recovery and reducing operating costs.

Keywords: economic efficiency, oilfield chemical reagents, oil production, enhanced oil recovery, corrosion inhibitors, production cost, profitability, production intensification, polymer flooding, field exploitation.

ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ СОВРЕМЕННЫХ НЕФТЕПРОМЫСЛОВЫХ ХИМИЧЕСКИХ РЕАГЕНТОВ В ДОБЫЧЕ НЕФТИ

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Аннотация. В статье рассматривается экономическая эффективность применения современных нефтепромысловых химических реагентов в процессе добычи нефти. Исследование направлено на оценку влияния инновационных химических составов (полимеров, поверхностно-активных веществ, ингибиторов коррозии) на повышение нефтеотдачи пластов и снижение эксплуатационных затрат.

Ключевые слова: экономическая эффективность, нефтепромысловые химические реагенты, добыча нефти, повышение нефтеотдачи, ингибиторы коррозии, себестоимость добычи, рентабельность, интенсификация добычи, полимерное заводнение, эксплуатация месторождений.

Modern oil production is impossible without the use of petroleum chemicals that protect equipment, improve product quality, and increase oil recovery. The use of chemical reagents can significantly reduce the cost of oil production and refining, as well as minimize losses associated with undesirable processes such as corrosion, formation of emulsions and sediments. This article discusses the main types of oilfield chemical reagents, their impact on the economic performance of oil production and the profitability of their use, as well as examples of use in Russian practice [1, p. 13].

Modern chemical technologies are aimed at solving the key problems of the oil industry. The main types of oilfield reagents include:

1. Demulsifiers – contribute to the destruction of water-oil emulsions, which reduces the cost of transportation and purification of oil. In Russia, companies such as Rosneft and LUKOIL are actively using demulsifiers to reduce product waterlogging (not only these companies use demulsifiers, all use demulsifiers). The introduction of modern demulsifiers has reduced cleaning costs by 30 % and reduced the percentage of impurities, which has improved product quality and increased its market value.

2. Corrosion inhibitors – protect equipment and pipelines from destruction, prolonging their service life and reducing repair costs. For example, Surgutneftegaz uses special inhibitors to protect oil pipelines in regions with high corrosion activity. The effective use of corrosion inhibitors led to a 35 % reduction in the cost of unplanned repairs, which in monetary terms amounted to more than 1.2 billion rubles annually.

3. Salt deposition inhibitors – prevent the formation of deposits in equipment and on the inner walls of pipelines, reducing the cost of cleaning them. Companies operating in conditions of complex geochemistry, such as Tatneft, are actively implementing such technologies. Long-term testing in Tatneft's laboratories made it possible to select optimal inhibitor formulations, which reduced the frequency of equipment flushing by 1.5 times and reduced operating costs by 18 %.

4. Depressant additives – improve oil fluidity at low temperatures, reducing heating and transportation costs. In the conditions of Western Siberia, where low temperatures can cause oil to thicken, the use of depressant additives has significantly reduced costs. At Rosneft, the introduction of depressurizing additives led to a 22 % reduction in energy consumption, which allowed the company to save about 750 million rubles per year [2, p. 112].

5. Polymers and surfactants (surfactants) – increase oil recovery by increasing the oil recovery coefficient. For example, surfactants are actively used in Bashkiria to increase well productivity. The use of polymer formulations made it possible to increase the oil recovery coefficient from 30 % to 45 %, which provided additional production of 2.5 million tons of oil per year and increased the company's revenues by 4.7 billion rubles.

Modern research in the field of oilfield chemistry is aimed at creating new reagents with improved characteristics that can increase the efficiency of oil production while reducing costs. Leading Russian research centers and oil companies are actively implementing innovative chemical compounds that enhance oil recovery and reduce operating costs [3, p. 54].

1. Nanotechnology in oilfield chemistry

The use of nanoparticles in corrosion inhibitors and demulsifiers significantly increases their effectiveness. In particular, the development of the Skolkovo Institute of Science and Technology in cooperation with Rosneft has shown that the use of nanodeemulsifiers reduces the phase separation time by 1.5 times, which led to an increase in oil processing speed and a 20 % reduction in purification costs.

2. Biopolymer reagents

In recent years, there has been a tendency to use environmentally friendly biopolymers that are highly efficient and have less impact on the environment. For example, Bashneft is testing biopolymer salt deposition inhibitors, which can reduce equipment cleaning costs by 25 %, as well as avoid fines for wastewater pollution.

3. Hydrophobic reagents for mining intensification

Gazprom Neft has conducted a series of tests of new hydrophobic additives that increase reservoir permeability and increase the oil recovery rate. As a result of their use, oil production at individual fields increased by 8 %, and total savings due to reduced costs for maintaining reservoir pressure amounted to about 300 million rubles per year.

4. Combined formulations for enhanced oil recovery

The development of complex chemical compositions combining the properties of surfactants, polymers, and nanoparticles allows for a synergistic effect. For example, Tatneft has implemented a technology that uses such formulations to increase oil mobility in reservoirs, which led to a 12 % increase in the extraction coefficient, an increase in well flow rate and additional production of 1.8 million tons of oil over two years [4, p. 472].

Digitalization of chemical reagent application processes

Modern technologies of digital modeling and artificial intelligence can significantly improve the efficiency of oilfield chemistry applications. The introduction of intelligent control systems at LUKOIL has reduced the consumption of chemical reagents by 15 % due to accurate monitoring of oil parameters and automatic real-time dosage adjustments. This not only reduced the cost of purchasing reagents, but also increased the stability of technological processes.

Key indicators are used to assess the economic feasibility of using petroleum chemistry:

1. Reducing the cost of oil production. For example, the use of corrosion inhibitors can reduce equipment repair costs by 20-30 %, and the use of demulsifiers reduces oil transportation and purification costs. Gazprom Neft has managed to reduce production costs by 18 % due to the optimized use of chemical reagents. As a result, more than 500 million rubles per year were additionally saved.

2. The growth of oil production. The use of polymers and surfactants in oil recovery enhancement technologies makes it possible to increase recoverable oil reserves by 10-15 %. For example, the introduction of surfactants in the fields of the Khanty-Mansiysk Autonomous Okrug allowed to increase production by 12 %. By the end of the year, additional production amounted to over 1.2 million tons of oil.

3. Reducing energy costs. For example, depressurized additives can reduce energy consumption for pumping oil in the cold season, which has been proven at the Ros-Neft fields in the Yamalo-Nenets Autonomous District. During the testing, a 28 %

reduction in energy consumption was revealed, which allowed saving up to 150 million rubles annually.

4. Reducing the cost of environmental measures. The use of biopolymers and environmentally friendly chemicals reduces the risks of environmental pollution and potential penalties. Bashneft managed to reduce pollutant emissions by 25 % by replacing traditional reagents with biodegradable analogues, which avoided additional environmental charges.

Modern technologies in oilfield chemistry provide a significant increase in the efficiency of oil production processes, a reduction in operating costs and an increase in environmental safety. One of the key areas of development was the improvement of chemical reagents, which make it possible to increase the oil recovery coefficient, minimize corrosion processes and optimize the transportation of hydrocarbons. Leading Russian oil and gas companies are actively implementing new methods of reagent application, focusing on a combination of scientific developments and digital technologies.

One of the most promising directions is the use of modified surfactants that improve the dispersion properties of oil, reduce its viscosity, and increase the efficiency of hydrocarbon extraction from the reservoir. In the laboratories of large petrochemical enterprises, innovative formulations are being developed taking into account the specifics of various fields, which makes it possible to achieve maximum effect at minimal cost. The practical application of such technologies has already yielded positive results, demonstrating an increase in oil recovery by 10-15 % compared to traditional processing methods [5, p. 65].

In parallel, biopolymer formulations are actively being developed, which are highly resistant to changes in temperature and chemical composition of reservoir fluids. The use of biopolymers allows not only to reduce the amount of chemicals consumed, but also to reduce the negative impact on the environment. In addition, due to the natural biodegradability of such reagents, the volume of oil waste is reduced, which reduces the cost of their disposal and minimizes the risk of contamination of water bodies. Russian enterprises focused on environmentally sound technologies are actively working in this direction, developing new drugs that can be used in difficult climatic conditions and in fields with high water availability.

Modern oil production is impossible without the use of petroleum chemicals that protect equipment, improve product quality, and increase oil recovery. The use of chemical reagents can significantly reduce the cost of oil production and refining, as well as minimize losses associated with undesirable processes such as corrosion, formation of emulsions, and sediments. This article discusses the main types of oilfield chemical reagents, their impact on the economic performance of oil production, and the profitability of their use, along with examples from Russian practice.

The evolution of oilfield chemistry is increasingly intertwined with global trends toward sustainability and digitalization. As environmental regulations tighten worldwide, Russian companies are prioritizing the development of biodegradable and low-toxicity reagents to align with international standards. For instance, Novatek’s recent pilot project in the Arctic utilized biodegradable surfactants derived from plant-based raw materials. These reagents not only reduced the environmental risks in fragile

tundra ecosystems but also improved oil recovery rates by 15 %, demonstrating that ecological responsibility and economic efficiency can coexist. Similarly, Tatneft has introduced a line of “green” corrosion inhibitors synthesized from renewable resources, which reduced toxic waste generation by 40 % in the Almetyevsk fields while maintaining the same protective efficiency as traditional formulations. Such innovations are critical for accessing premium markets like the EU, where sustainability certifications increasingly influence purchasing decisions.

Another transformative trend is the integration of smart technologies into chemical reagent design. Adaptive formulations that respond to real-time reservoir conditions are gaining traction. Gazprom Neft, for example, is testing thermoactive demulsifiers in the Orenburg region, where seasonal temperature fluctuations historically complicated emulsion breakdown. These demulsifiers adjust their molecular structure based on ambient heat, accelerating phase separation by 25 % and reducing dosage requirements by 40 %. This innovation alone has cut annual operational costs by 200 million rubles, highlighting the potential of “intelligent” chemicals to optimize processes autonomously. Meanwhile, in Western Siberia, Rosneft has deployed pH-sensitive polymers that thicken in high-salinity environments, effectively sealing water-injection zones to prevent unwanted water breakthrough. This technology has increased sweep efficiency by 18 % in mature fields, adding 1.3 million tons of recoverable oil reserves over three years.

Collaboration between academia and industry is accelerating the commercialization of next-generation reagents. The Skolkovo Institute of Science and Technology, in partnership with Transneft, recently developed a hybrid inhibitor combining organic compounds with graphene-based nanocoatings. Tested on pipelines in Eastern Siberia, the inhibitor demonstrated a 50 % longer protective lifespan than conventional products, reducing replacement frequency and saving 30 % in maintenance costs. Similarly, Tomsk Polytechnic University’s joint venture with LUKOIL has yielded a biopolymer for controlling paraffin deposits in low-temperature reservoirs. Field trials in the Yamal Peninsula showed a 35 % reduction in paraffin-related downtime, translating to annual savings of 450 million rubles. These partnerships not only mitigate R&D risks but also ensure that laboratory breakthroughs are swiftly adapted to real-world challenges, such as extreme climates or complex reservoir geochemistry.

Digitalization is further amplifying the economic impact of oilfield chemicals. AI-driven platforms, such as Rosneft’s RN-Chat, analyze vast datasets to predict optimal reagent dosages and application timelines. At the Priobskoye field, machine learning algorithms reduced demulsifier consumption by 20 % while maintaining emulsion stability during transportation. Similarly, Surgutneftegaz has implemented IoT sensors to monitor pipeline corrosion in real time, enabling dynamic adjustments of inhibitor injections. This approach slashed unplanned repairs by 45 % in the Khanty-Mansiysk region, saving 2.1 billion rubles annually. Such technologies not only lower costs but also enhance process reliability, ensuring consistent product quality and reducing the risk of environmental incidents.

Looking ahead, the industry faces the dual challenge of maintaining profitability while transitioning to low-carbon practices. Innovations such as CO_2-responsive

polymers, which enhance oil displacement efficiency in carbon capture and storage (CCS) projects, are emerging as game-changers. Gazprom Neft's pilot in the Orenburg reservoir injected CO_2-saturated surfactants into depleted wells, increasing residual oil recovery by 12 % while sequestering 50,000 tons of CO_2 annually. Additionally, the rise of circular economy models is prompting companies like Bashneft to recycle spent reagents into raw materials for construction or agriculture, reducing waste disposal costs by 30 %. These advancements underscore the sector's ability to adapt to global energy transitions without sacrificing competitiveness.

In conclusion, the strategic application of modern oilfield chemicals remains a cornerstone of efficient hydrocarbon extraction. By embracing sustainability, smart technologies, and collaborative innovation, Russian companies are not only reducing costs and boosting production but also positioning themselves as leaders in a rapidly evolving global market. The continued integration of advanced chemistry with digital tools and environmental stewardship will be pivotal in balancing economic growth with planetary health, ensuring the long-term viability of the oil industry in an era of energy transformation.

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THE IMPACT OF ROBOTIZATION ON PRODUCTION AND EMPLOYEE SAFETY

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Abstract. This article examines the impact of robotization on production performance, enterprise efficiency, and employee safety. An analysis of the production of AvtoVAZ cars is presented, as well as a study of profitability before and after the use of robots. The rating of regions on the introduction of robotics is considered and the main problems of employee safety solved by full or partial automation are identified.

Keywords: robotization, automation, safety, efficiency, modern technologies, statistics.

ВЛИЯНИЕ РОБОТИЗАЦИИ НА ПРОИЗВОДСТВО И БЕЗОПАСНОСТЬ СОТРУДНИКОВ

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Аннотация. В данной статье рассматривается влияние роботизации на производительность производства, эффективность предприятия и безопасность сотрудников. Представлен анализ производства автомобилей «АвтоВАЗ», а также исследование рентабельности до и после использования роботов. Рассмотрен рейтинг регионов по внедрению робототехники и определены основные проблемы безопасности сотрудников, решаемые с помощью полной или частичной автоматизации.

Ключевые слова: роботизация, автоматизация, безопасность, эффективность, современные технологии, статистика.

Each enterprise, always striving to improve its efficiency and productivity, constantly needs to improve the quality of processes, which in turn leads to an improvement in the quality of products and services. Improving the quality of processes also reduces task completion time and optimizes costs, making it possible to control and manage resources, and, consequently, to extract economic benefits during

production. Improving the quality of processes is achieved through the analysis of current processes, the introduction of lean manufacturing principles, training and motivation of personnel, the introduction of quality management systems, automation and digitalization. However, it is worth noting that the proper level of process quality cannot be achieved without ensuring the safety of employees. It is robotics, acting as the main tool for ensuring safety and improving processes, that contributes to product improvement and production reaching the world level as a leader. The symbiosis of automated production and employee safety is the key to a successful enterprise.

Recently, it has been difficult to imagine life without robotics and artificial intelligence, which are becoming more and more embedded in our daily lives. Robotization is applicable in various industries: in the financial sector and the banking sector, in industrial enterprises and in educational institutions. It helps to reduce risks, optimize processes, ensure control and, above all, employee safety. Robotization becomes an excellent solution for any enterprise when solving routine tasks or difficult processes and also solves the problem of a shortage of qualified personnel.

Robots are being used all over the world, and enterprises in various fields are evaluating their benefits. Thus, according to the International Federation of Robotics (IFR), in 2023, the number of installed industrial robots in the world amounted to 600 thousand units. Asia is the leader among the regions, including China and Japan, which has been famous for the high quality of its products for more than a century. South Korea, Singapore, and Germany are the countries that began automating work in production at the end of the 20th century: 1,012 robots per 10,000 employees, 730 and 415, respectively [1].

The level of robotization in Russia is also growing. According to calculations by the HSE Institute for Statistical Research and Economics of Knowledge based on Rosstat data, in 2022, 19 % of all manufacturing organizations used automated lines and industrial robots. In 2023, these organizations used 12.8 thousand robots.

The growth of industrial robotics is associated with the desire to improve the quality of manufactured products, reduce risks and costs, and, as a result, reduce the cost of manufactured products. The Decree of the President of the Russian Federation "On the National Development Goals of the Russian Federation for the period up to 2030 and for the future up to 2036" defines the task of entering the top 25 countries of the world in terms of robotics density by 2030. According to calculations by the Russian Ministry of Industry and Trade, in order to solve this problem, enterprises need to increase the number of industrial robots used to 94 thousand by 2030. However, 30 % of companies noted that the lack of funding is a serious barrier to business development through robotization [2].

The top 10 regions in terms of the number of robots used are the Central, Volga, and Northwestern Federal Districts, which have developed industrial complexes. Despite the difference in the structure of the use of robots, these entities are united by the presence of their own automotive sites, cars and trucks (Tatarstan, Kaluga and Nizhny Novgorod regions), as well as buses (Nizhny Novgorod region, etc.). The leader in the number of robots is St. Petersburg (1.3 thousand). The city has three automobile factories. One industrial robot replaces 24 jobs. In the Samara region, mechanical engineering occupies a significant share in the structure of the volume of shipped

products of the manufacturing industry, according to Rosstat, 26.6 % for 2022. Table shows the rating of regions by the number of industrial robots used in the manufacturing industry.

Table – Rating of regions by the number of industrial robots

Subject	Amount			The share of machine-building industries in the total volume of shipped products of manufacturing industries in the region, %
	used industrial robots, units	replaced jobs		
		thousands of people	for 1 industrial robot, human	
St. Petersburg	1 347	31.8	23.6	14.2
Samara region	1 285	114.2	88.9	26.6
Moscow region	1 101	186.5	169.4	8.1
The Republic of Tatarstan	919	143.1	155.7	16.1
Kaluga region	770	41.8	54.3	15.9
Nizhny Novgorod region	691	118.2	171.1	20.7
Leningrad region	642	15.6	24.4	5.8
Moscow	602	116.9	194.1	5.1
Sverdlovsk region	505	195.8	387.8	10.4
Tula region	469	63.7	135.8	8.3

AvtoVAZ can be cited as a concrete example of an enterprise that successfully uses robotics and keeps up with the times. This company is the largest Russian manufacturer of passenger cars and light commercial vehicles. By the time of the current 2025, the company is introducing more and more robotic complexes. New robotic welding systems are installed in the LADA Iskra welding shop. This workshop is a completely new production facility with an area of more than 40 thousand square meters, and productivity reaches 30 bodies per hour. It has 17 automatic lines and 112 robots. In total, AvtoVAZ employs more than 1300 robots. They provide a high level of quality and productivity in body welding and painting workshops, in pressing production, on engine assembly lines and on the main conveyor. The level of robotization on the LADA Granta body welding line exceeds 85 %. Also, automatic outdoor vehicles are widely used, and at the Scientific and Technical Center (STC) robotics is used in cyclic testing of car components and assemblies for reliability and durability [3].

It is also worth noting that Russia is even ahead of the countries of the European Union in terms of the spread of industrial robotics, despite the lag in the intensity of

robotization, expressed in the size of the fleet of equipment involved. However, the prospect of expanding the robot fleet within the Russian Federation is very optimistic. The most important role in the formation of demand for industrial robotics is played by the state of the engineering industries, which are characterized by high added value and complexity of products, long service life.

Thus, the role of robotization in improving the quality of production processes, and therefore products and services, is obviously significant. And the higher the level of robotization of an enterprise, the higher its other indicators, such as efficiency, productivity and profit. But robotization has a special impact in the field of employee safety. Figure shows the main employee safety issues that robotics solves in an enterprise.

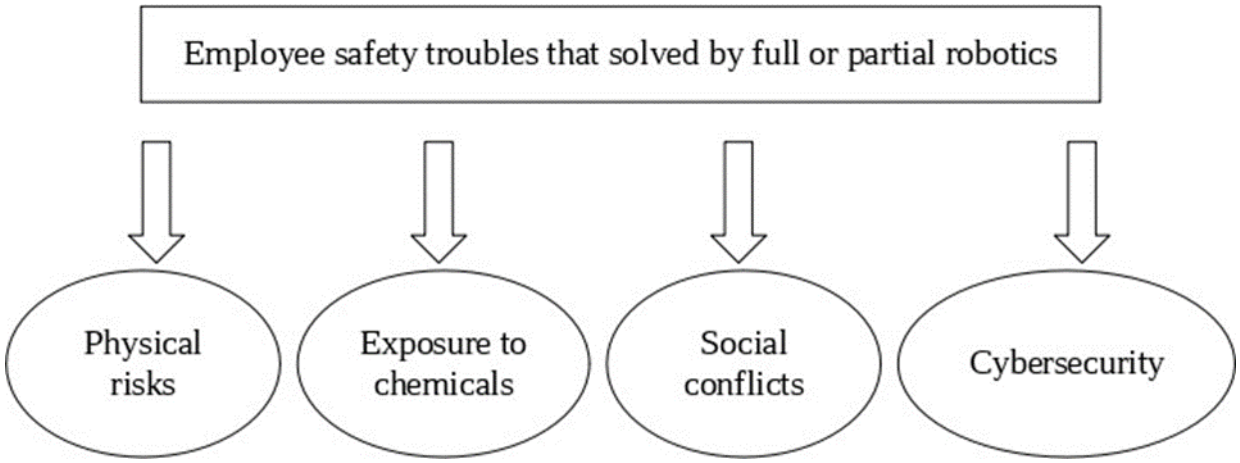


Figure – The main employee safety troubles

Robotization helps to improve the company's performance and reduce risks mainly due to the fact that the safety of employees is ensured by using robots to perform particularly complex and dangerous processes affecting human health. However, robots can not only replace humans in order to avoid the risks of death or harm to the health of an employee but can also be used for monitoring and forecasting. So, special software or artificial intelligence allows you to monitor the wearing of personal protective equipment or control dangerous areas, preventing situations that may lead to an accident. The systems also make it possible to predict risks by analyzing large amounts of security information, identifying trends and predicting possible problems. Neural networks are able to create or refine training programs for employees or even develop useful safety memos. Robotization can ensure the safety of employees from personal data leakage if the storage and control of personnel information at the enterprise is carried out using programs and systems protected by cybersecurity. With the help of robotics, it becomes possible to monitor the work environment, optimize work processes and personalized solutions customized to specific conditions and requirements.

However, the introduction of robotics in production should be rational and thoughtful, since there are not only positive examples, but also rather sad and disappointing experiences with robots. For example, the robotization of Amazon

warehouses has led to a 50 % increase in employee injuries and increased stress on people. Reveal analyzed injury data from Amazon warehouses in the United States from 2016 to 2019. In 2019, Amazon registered 14,000 injuries in 150 warehouses. This is a third more than it was in 2016, and almost twice the industry standard. The injury rate per 100 workers has been increasing annually since 2016. Before the advent of robots, workers walked through the warehouse for several kilometers in search of the right product. After the robots were introduced, their work task was to stand at the site and scan the things delivered by the robots. Due to the fact that the movements became monotonous and were performed without interruption, the body was under a lot of stress. The robots proved to be too efficient and delivered goods so quickly that the standards for humans more than doubled and continued to grow. With the advent of robots, their rate has increased from the previous 100 to 400 products per hour. Due to the drastic increase in workload, monotonous work and lack of breaks, the number of injuries began to increase. The solution to this problem could be either different work planning, or further development of robotization to reduce human involvement in the workflow [4].

Thus, robotization has a huge impact on both product production and employee safety. Ensuring employee safety leads to improved production processes and reduced risks, which in turn leads to improved product and service quality. Product quality is directly related to the quality of processes, which is achieved not only through optimization, but also by ensuring the safety of workers and taking care of their physical and psychological health. Undoubtedly, it is important that employees and robots are able to interact correctly in production to achieve a single goal – efficiency and high-quality products.

The impact of robotization on the efficiency and profitability of an enterprise can be accessed using the example of AvtoVAZ. In order to compare the company's performance before and after the active use of robotics and automation, it is necessary to consider the indicators for 2015 and 2023.

In 2015, when the company practically did not use robotics, revenue amounted to 176.482 billion rubles. According to the Avtomarketologist marketing agency, in 10 months of 2023 AvtoVAZ received 231.7 billion rubles from car sales and occupied 10.6 % of the market. The number of cars sold also varies, as automation has increased the number of products produced by 2024. In 2015, the company sold 269,000 vehicles, and in 2024 this figure was 352.6 billion rubles.

It was noted that the annual production volume of cars at AvtoVAZ enterprises in the future of 2030 could reach 700 thousand cars, subject to the successful implementation of modern technologies [5].

With the help of evaluation criterion – profitability – it is possible to evaluate the effectiveness of the company's activities for 2015 and 2024 and compare the values. The calculations were carried out using the formula:

$$GP = I – E,$$

where GP – gross profit, I – income received, E – expenses.

At the time of 2015, AvtoVAZ's revenue amounted to 176.5 billion rubles, and

its costs amounted to 73.9 billion rubles. In 2024: 231.7 billion rubles and 50 billion rubles, respectively. Thus, the gross profit was equal to:

$$GP(2015) = 102.6,$$
$$GP(2024) = 181.7.$$

Thus, it is obvious that the robotization of production significantly affects the results, especially economic ones. It allows you to reduce the cost of resources, including labor, increase productivity and bring the company to a leading position. Russian industries should massively apply automation of technological processes and use modern technologies to achieve success in the global market.

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HR BRAND OF INTERNAL AFFAIRS AGENCIES

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Abstract. The article examines the development of the HR brand of internal affairs agencies in the context of ESG strategies and social-ethical marketing. The study highlights the importance of improving the employer image of law enforcement agencies to attract qualified personnel, increase motivation, and strengthen public trust through transparency, communication, and the promotion of socially significant values and initiatives.

Keywords: HR brand, Internal affairs agencies, ESG strategy, social-ethical marketing, public image.

HR-БРЕНД ОРГАНОВ ВНУТРЕННИХ ДЕЛ

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Аннотация. В статье рассматриваются особенности формирования и развития HR-бренда органов внутренних дел в контексте реализации ESG-стратегий и применения социально-этического маркетинга. Акцент сделан на значении укрепления имиджа ОВД как работодателя с целью привлечения квалифицированных кадров, повышения мотивации сотрудников и укрепления общественного доверия за счет прозрачности, эффективной коммуникации и продвижения социально значимых ценностей и инициатив.

Ключевые слова: HR-бренд, органы внутренних дел, ESG-стратегия, социально-этический маркетинг, общественный имидж.

The term ESG (Environmental, Social, Governance) was officially introduced in the United Nations report "Who Cares Wins" (2004). In this document, Secretary-General Kofi Annan presented three principles of ethical investment: Environmental, Social, and Corporate Governance [1].

For any organization, maintaining a strong HR brand is of critical importance. It can be successfully developed within the ESG framework by employing tools such as socio-ethical marketing. An HR brand consists of tangible benefits (salaries, bonuses,

career growth, etc.) and intangible advantages such as corporate culture, internal atmosphere, and reputation in the labor market. The HR brand represents the image of a company as perceived by current and potential employees. Job candidates evaluate all pros and cons, compiling a list of advantages that they would gain by choosing a particular employer.

Internal affairs agencies (IAA) must also actively work on enhancing their HR brand. One key tool in this process is the provision of an expanded social package and favorable working conditions. According to the Federal Law "On Social Guarantees for Employees of the Internal Affairs Bodies of the Russian Federation and Amendments to Certain Legislative Acts of the Russian Federation" No. 247-FZ of July 19, 2011 [2], the issues of monetary allowances, benefits, and other financial payments related to IAA service, medical care, and sanatorium-resort treatment are legally regulated.

Thus, candidates for IAA service receive a range of benefits, which positively affect the HR brand of the organization. This, in turn, enhances the prestige of service, reduces staff turnover, and increases employee motivation. It is also essential to maintain effective communication within the system, as there are instances where employees are unaware of certain internal privileges that exist.

In developing a positive HR brand for the IAA, emphasis should be placed on the following areas:

Communicating opportunities and prospects of IAA service, including career advancement, professional training, and the development of competencies necessary for applying knowledge, skills, and personal qualities.

Improving the image of the service and enhancing public perception through positive media coverage of IAA employees and demonstrating public trust and support. This is crucial as public distrust affects the perception of the IAA as an employer. Social and ethical aspects such as transparency, honesty, and accountability must also be addressed.

Highlighting the social significance of IAA service, positioning it as work that contributes to public safety and law enforcement.

Engaging IAA employees in the HR branding process to ensure alignment between organizational values and employee expectations.

Considering contemporary trends, including the use of modern marketing strategies, especially socio-ethical marketing, active use of social media and other platforms to promote the HR brand and attract youth, as well as the integration of ESG strategies, which are gaining popularity in Russia.

Improving the IAA HR brand thus requires a comprehensive approach involving strategic planning, direct involvement of employees, and active engagement with society. Additionally, the HR brand should be grounded in values such as service, professional development, respect, and security, emphasizing that law enforcement work is not only a responsibility but also an opportunity to make a positive societal contribution.

It is worth noting that the ESG strategy is becoming increasingly prominent in Russia. IAA activities conducted within this framework can positively impact the service's prestige, public image, and HR brand.

The effectiveness of the ESG strategy is hard to imagine without transparency in its implementation. Socio-ethical marketing plays a critical role in this, focusing attention on a company's efforts to solve environmental problems, implement social projects, and promote a brand built on the principles of sustainable development.

Socio-ethical marketing can also be reflected in the activities of the IAA, aimed at fostering a safe social environment. Several key aspects and directions illustrate how IAA can interact with the ESG concept.

The first ESG principle is environmental protection. An analysis of Russian legislation reveals various measures to prevent environmental crimes and conduct preventative actions:

1. Enforcement against environmental crimes (Chapter 26 of the Criminal Code of the Russian Federation) [3].

2. Organizing and conducting environmental events with the participation of IAA personnel to improve ecological conditions and promote environmental stewardship, such as clean-up activities, tree planting, and environmental education for children and adults. For example, on October 3, 2024, in support of fostering a culture of environmental care, the police organized an event titled "A Day in the Forest: Let's Save the Forest Together." Officers emphasized the role such events play in fostering ecological responsibility and uniting citizens around the goal of environmental protection [4].

3. Cooperating with government bodies and public organizations in environmental protection initiatives. For instance, on September 23, 2023, cadets from the St. Petersburg University of the Ministry of Internal Affairs of Russia and students from a local youth center participated in the Eurasian Clean Cup – Clean Games on the coast of the Gulf of Finland, collecting about 500 kg of metal, plastic, and glass.

4. Conducting environmental education for the public through lectures, seminars, interactive games, exhibitions, contests, and other events aimed at increasing ecological literacy.

5. Promoting public environmental awareness through social advertising campaigns, such as posters, banners, and social videos highlighting specific environmental problems.

In addition to addressing environmental issues, the IAA provides various forms of social assistance:

1. Voluntary blood and plasma donations by IAA personnel for medical purposes.

2. Fundraising and humanitarian aid for vulnerable populations.

3. Preventative work to reduce offenses, including awareness campaigns and educational talks with adults and minors. For instance, the St. Petersburg University of the Ministry of Internal Affairs actively collaborates with sponsored organizations. Faculty members conduct lectures on traffic safety, the dangers of alcohol consumption, the importance of a healthy lifestyle, and more. Furthermore, the official website of the Ministry of Internal Affairs for the Republic of Bashkortostan features a section titled "Our Projects," highlighting socially important issues such as "Safe Summer," "Say No to Drugs," "No to Extremism," and others [5].

Monitoring environmental and social trends is essential, as new issues

continually emerge. The role of the IAA in socio-ethical marketing includes responding promptly to current threats and challenges. Transparency and openness in these efforts are critical. Publicizing such activities, primarily through social advertising, is vital as it serves as a powerful communication channel between IAA and the public.

Through this tool, IAA increases public awareness of pressing social issues, garners public support, and mobilizes collective action. Additionally, socio-ethical marketing and social advertising emphasize the IAA's commitment to transparency, thereby shaping a positive image of law enforcement personnel and strengthening public trust through openness and active engagement.

In conclusion, socio-ethical marketing within the ESG strategy should not be overlooked by IAA personnel. By using this tool, they can address numerous environmental and socially significant challenges, which will enhance public approval, increase the prestige of the service, and strengthen its HR brand. These efforts contribute to the development of the IAA as a socially responsible institution.

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STAFF TURNOVER: ANALYSIS OF THE CAUSES AND METHODS OF REDUCTION

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Abstract. The issue of staff turnover is a significant concern for modern businesses. An analysis of the various types and factors that contribute to staff turnover, including both objective and subjective elements, is essential for managers and human resources (HR) professionals. By calculating and examining the rate of staff turnover, organizations can optimize their HR processes and maintain valuable employees.

Keywords: staff, staff turnover, staff turnover rate, employment, management.

ТЕКУЧЕСТЬ КАДРОВ: АНАЛИЗ ПРИЧИН И МЕТОДОВ СНИЖЕНИЯ

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Аннотация. Проблема текучести кадров – одна из самых актуальных для современного бизнеса. Анализ различных видов и причин текучести персонала, начиная от объективных факторов до субъективных, крайне необходим руководителям и HR-специалистам. С помощью расчета и анализа коэффициента текучести кадров можно оптимизировать кадровые процессы и удержать ценных сотрудников.

Ключевые слова: персонал, текучесть кадров, коэффициент текучести кадров, трудоустройство, менеджмент.

Staff turnover is a coefficient that shows the number of employees who have left an organization over a given period. As a rule, it is counted for a year. But the period can also be different – for example, for a quarter or a month. It depends on the calculation goals and the specifics of the business. The indicator can be calculated for a specific department or position, as well as for the company as a whole [1].

Staff turnover can be normal and increased. The first one means a natural predictable update of the team. It is usually known in the company, and the selection

plan is formed based on its values. Increased turnover can reduce work efficiency, lead to loss of experience, and increase the cost of recruiting and training newcomers. It can also lead to a deterioration of the climate in the team.

The main reasons for changing jobs in Russia are shown in the Figure 1. The following reasons can be mentioned as reasons for increased staff turnover [2, p. 3]:

– **The salary is below the market.** If an employee feels that his job is not being paid well enough, he may consider other offers.

– **Lack of career prospects.** Staff who do not see opportunities for development may lose interest in their work and start looking for new options.

– **Uncomfortable working conditions.** For example, an uncomfortable workplace, low lighting, or noise can lead to specialists looking for more comfortable conditions.

– **Conflicts with colleagues or management.** Negativity in the team, such as fierce competition or the toxicity of the boss, can cause an employee to leave, which will affect the staff turnover rate.

– **Personal circumstances.** A change in an employee's family circumstances or health status, or his move to another city or country may affect his decision to leave.

– **Search for New Opportunities.** Employees may leave a company to explore new fields of work or acquire new skills. If a company fails to provide opportunities for employees to grow, the turnover rate may increase.

– **Adaptation.** Some employees may leave during the probationary period if they find the working conditions, number and nature of tasks, or team dynamics unsuitable.

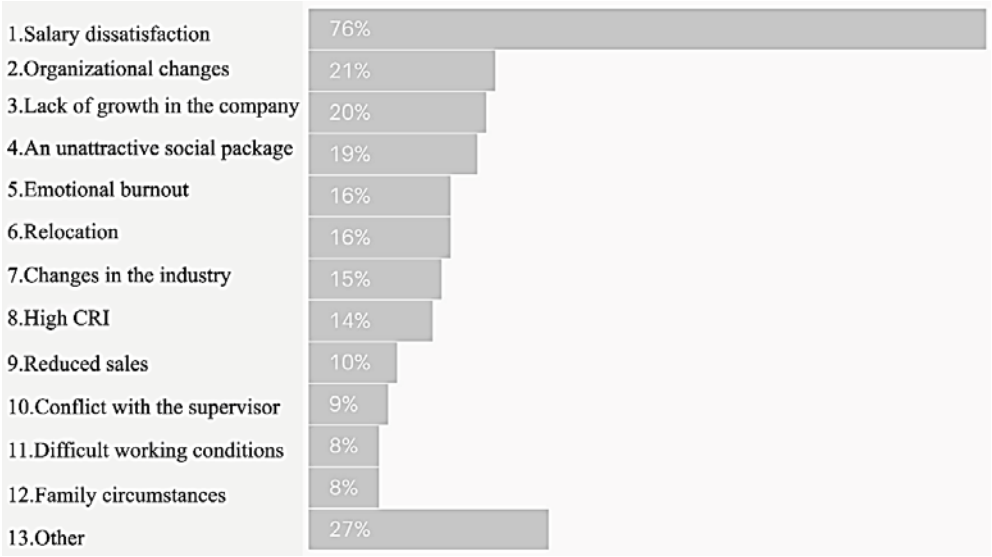


Figure 1 – The main reasons for changing jobs in Russia

Depending on the reasons for the departure of employees, staff turnover can be divided into four types [3, p. 2].

1. **Internal organization.** Staff movement within the organization, for example, promotion or transfer of an employee to another position or to another department.

Intra-organizational turnover can have both a positive and negative impact on the company's work. On the one hand, it allows staff to develop and acquire new skills, and on the other, it can lead to a decrease in the efficiency of specific departments.

2. **External.** Departure of specialists to other organizations. External turnover can lead to uneven efficiency of the company, loss of customers, increased recruitment costs and deterioration of the atmosphere in the team. However, provided that the HR department does a good job of hiring new staff, it can also contribute to the emergence of fresh ideas and experience in the team.

3. **Hidden.** Otherwise, it is called psychological staff turnover. In this case, the employees are formally on staff, but actually do not perform their duties or work inefficiently. Latent staff turnover may occur, for example, due to low salaries, personal problems, or emotional burnout of employees.

4. **Seasonal.** This type is associated with seasonal work, which happens, for example, in agriculture or tourism. In this case, the staff is hired for a certain period of time and dismissed when they are no longer needed. If the company has seasonal staff, its turnover must be calculated separately, otherwise a normal seasonal indicator may incorrectly affect the overall coefficient for the organization for the year.

The staff turnover indicator will help to analyze the arrival of staff in and out of the company. The formula for calculating the staff turnover ratio takes into account the ratio of the number of employees who quit and the average number of employees in the organization's staff over a certain period (Figure 2).

$$\frac{\text{Number of employees leaving during period}}{\text{Average number employed during period}} \times 100$$

Figure 2 – The formula for calculating the staff turnover ratio

According to Rosstat, more than 10.9 million workers stopped working in 2023, which is 0.9 % less than in 2022. In 2023, 54 % of the total number of employees left their jobs in the retail sector, 38 % in the hotel and tourism business, and 34 % in consulting (Figure 3) [4].

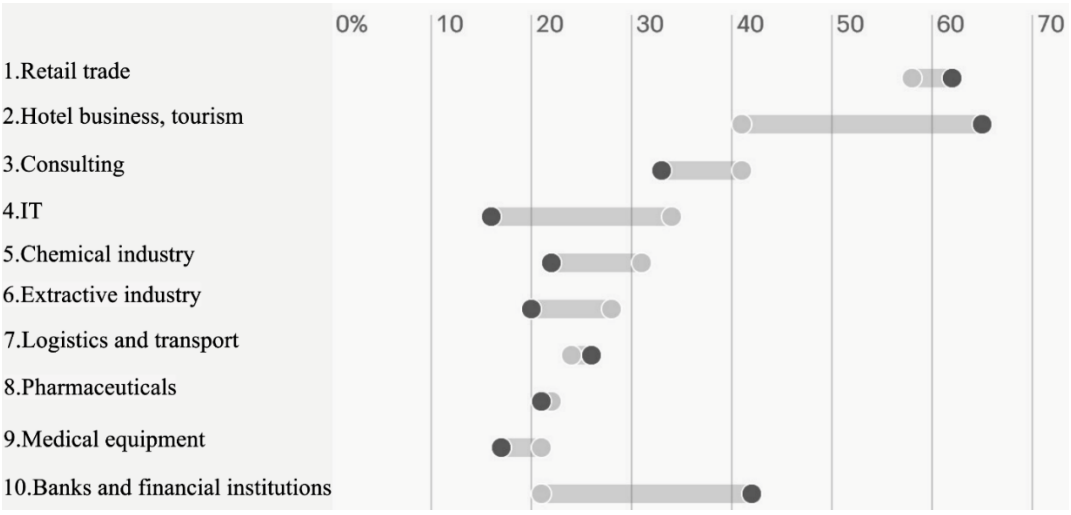


Figure 3 – Staff turnover by field in Russia in 2022 and 2023

There is no precise indicator of staff turnover, which is accepted as the norm for all companies. It depends on the specifics of the organization and can be completely different from sphere to sphere. But in general, it is considered the norm if from 3% to 7 % of employees change annually. However, there are certain categories of companies and positions for which the staff turnover rate is usually higher, and this is also considered the norm (Table).

Table – The norm of staff turnover rate for various industries

Categories of companies	**%**
IT	8-10%
Retail	up to 30%
Industry	10-15%
Horeca	up to 80%
Startups	up to 20%

If we consider the relationship between staff turnover and position, the higher the position, the lower the turnover rate: up to 2 % for top management and up to 30 % for ordinary specialists. During the initial period of employment, the risk of termination is even higher – up to 40 % per year [5, p. 3].

Before implementing measures to reduce staff turnover, it is essential to measure it accurately. This involves recording all separations, both for the organization as a whole and for specific departments and roles. It may be found that while some departments have a normal level of staffing, others have an increased turnover. It is also crucial to analyze the reasons for employee separations. For instance, if employees frequently leave a specific department due to conflict with their manager, it is necessary to address this issue separately.

To manage staff turnover effectively, the following approaches can be employed:

– **Exit interview.** It can be conducted by an HR manager or the recruiter who hired the employee. The task is to find out the real reasons for the dismissal. It is important to be friendly, ask open-ended questions, and maintain confidentiality.

– **Salary level analysis.** If the salary corresponds to the market level, and the staff understands the formula for calculating it and the possibility of bonuses, employees will be less interested in quitting. If the gap reaches 20-30 %, it is worth discussing with the management the possibility of a salary increase or considering what value or bonuses, in addition to income growth, can be offered to employees — for example, discounts on company products or VMI.

– **Career advancement.** Employees leave companies with clear career paths, opportunities for development and expansion of tasks less often. Therefore, training and professional development programs will help reduce staff turnover.

– **Improvement of conditions.** It is important to pay attention to the working conditions of the staff. Even simple things like a comfortable workplace, adequate lighting and ventilation, and a room for lunch and rest can reduce staff turnover.

– **Corporate culture.** Creating a positive atmosphere in an organization based on respect, trust, and cooperation makes working in it more attractive to staff.

– **Adaptation of beginners.** Competent onboarding and assistance to newcomers in the first days of work have a positive effect on staff turnover. If new employees feel supported, understand what to do and who to turn to for advice, they will be less willing to leave their new job [6, p. 2].

– **Working with supervisors.** It is important to hold regular meetings with the heads of departments and divisions to keep them informed about the level of staff turnover, possible problems and positions at risk. Brainstorming with them helps to come up with solutions that will keep the indicator within the norm.

– **Communication.** Regular communication with employees, collecting feedback and solving emerging problems can reduce staff turnover. These can be small pulse surveys on a specific topic or larger-scale studies, for example, on staff engagement. However, it is important to make sure that employees trust these surveys. To do this, it is important to tell them about the research results and take real action to solve the problems found.

In conclusion, it can be said that staff turnover is a complex issue affecting the efficiency and financial condition of any organization. It manifests itself in various forms, from the voluntary dismissal of highly qualified specialists to the forced separation from employees, and is caused by a wide range of reasons – from low wages and lack of career prospects to an unfavorable psychological climate and insufficient involvement in work processes. Understanding the types of turnover and correctly determining the staff turnover ratio is the first step towards effective management of this problem. The normal turnover rate varies depending on the industry and the size of the company, but constant monitoring and striving to reduce it are key success factors.

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THE IMPORTANCE OF ENGLISH LANGUAGE SKILLS IN ENHANCING CAREER OPPORTUNITIES

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Abstract. In this article, we will explore how knowledge of English language can influence career growth, improve communication, and expand a person's employment opportunities. It becomes not just an advantage, but a necessity for those who want to succeed in the IT field.

Keywords: English language, career growth, globalization, professional skills, job market, communication, business environment.

ВАЖНОСТЬ ВЛАДЕНИЯ АНГЛИЙСКИМ ЯЗЫКОМ ДЛЯ РАСШИРЕНИЯ ВОЗМОЖНОСТЕЙ КАРЬЕРНОГО РОСТА

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Аннотация. В данной статье мы рассмотрим, как знание английского языка может повлиять на карьерный рост, улучшить коммуникации и расширить возможности трудоустройства. Владение англицским языком становится не просто преимуществом, а необходимостью для тех, кто хочет добиться успеха в IT-сфере.

Ключевые слова: английский язык, карьерный рост, глобализация, профессиональные навыки, рынок труда, общение, бизнес-среда.

English stands out as the swiftest growing language in human history. Today it is spoken by approximately 1.75 billion people worldwide, constituting nearly a quarter of the world's population. The usefulness of the English language transcends everyday discourse. The language has firmly established itself as a universal method of communique in business and professional spheres. Mastering English isn't handiest a fascinating and interesting method however also an crucial step towards career advancement.

Knowledge of the English language is an important part of the education of a successful person. Today, this skill is almost universally found in the requirements for candidates in both government and private companies. People who are proficient not

only in their native language but also in at least one additional language leave a more positive impression on employers.

In the era of globalization, an increasing number of companies are endeavoring to expand their operations into international markets. The astute leaders of such organizations realize that having employees who speak English, the language of global business communication, is crucial to achieving success in the fiercely competitive international trade environment. Especially companies that deal with asset management, heavy machinery, education, and industrial equipment set the English language skills requirements.

Proficiency in English is necessary for plenty to investigate and, at instances, translate specialised literature, commands, and technical documentation, as well as for enterprise correspondence, negotiations, and verbal exchange. Incorporating the English language proficiency into the repertoire of professional skills can offer a multitude of advantages and open up a wide range of opportunities not available to monolinguals. In today's competitive job market, the English language is no longer considered an added bonus, but rather a requisite skill that employers are looking for as they explore new markets and territories [1].

In Russia and Belarus, employers price a terrific command of the English language, that's meditated in salaries. On common, specialists who suggest a high level of English skillability earn 10-15 % greater than their colleagues. This demonstrates corporations' willingness to invest in employees who possess this in-call for language ability. Five years in the past, information of the English language turned into a key choice criterion in 193,000 job postings. By 2022, the call for for English-talking experts had elevated by using extra than 25 %, reaching 250,000 vacancies. After another couple of years, this quantity soared to 398,000 (Figure 1) [2].

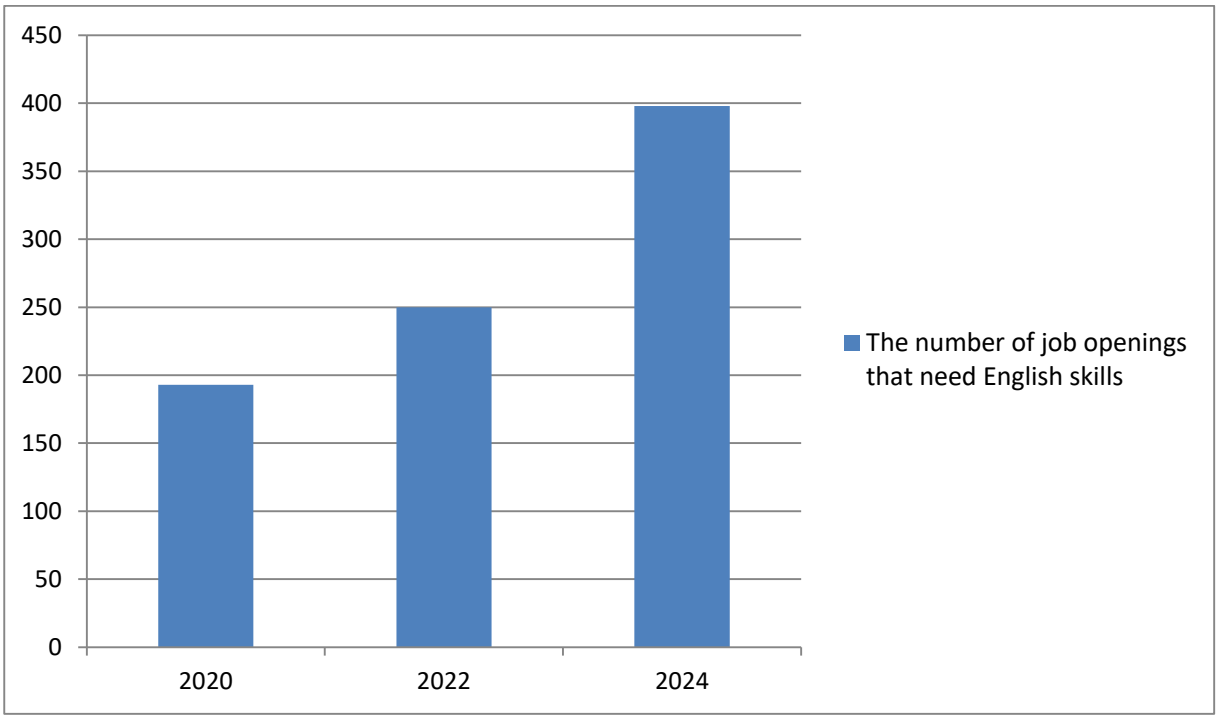


Figure 1 – The number of job openings that need English skills

Proficiency in English is mostly a obligatory requirement for experts within the fields of science, schooling, IT, advertising, procurement, and the humanities. Moreover, employers are inclined to offer higher salaries to candidates who talk a foreign language, and the distinction in earnings may be pretty substantial. For example, inside the IT sector, specialists without English proficiency usually acquire starting salaries of $700, while those who are gifted within the language can anticipate around $1,000. In the control field, the scenario is comparable: with out English, the beginning profits is $600, while with language skills, it starts offevolved at $900 (Figure 2).

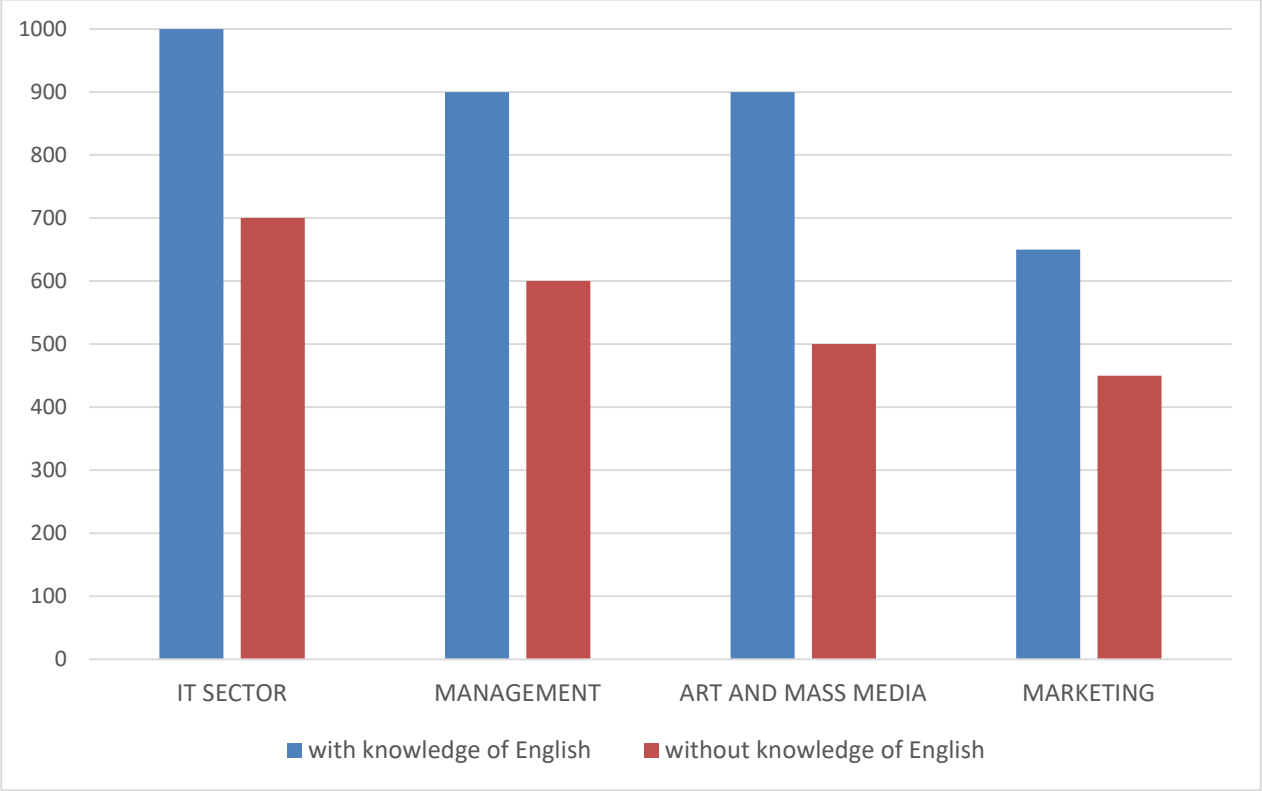


Figure 2 – Impact of English proficiency on salaries in Russia and Belarus

Over the past five years, the quantity of resumes wherein applicants indicated their level of English proficiency has remained surely unchanged. At the same time, the said degree of proficiency in foreign languages, in preferred, has multiplied.

The Common European Framework of Reference for Languages (CEFR) is the principle popular for classifying language skillability ranges and includes seven degrees, each defined through a hard and fast of key abilities and abilties: A0 – Starter/ Beginner, A1 – Elementary, A2 – Pre-Intermediate, B1 – Intermediate, B2 – Upper Intermediate, C1 – Advanced, C2 – Proficiency [3].

Candidates for positions within the IT area, senior management, marketing, procurement, art, and consulting most customarily emphasized their expertise of English (Figure 3).

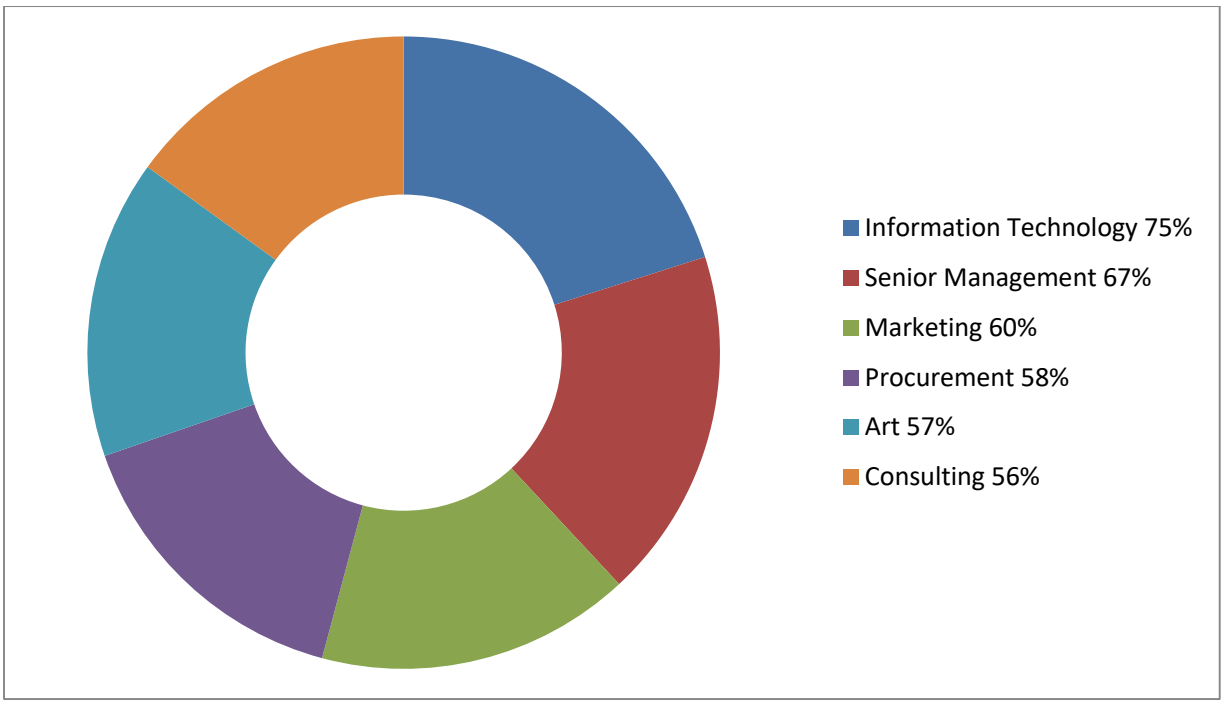


Figure 3 – Most of the resumes from candidates who know English came from these fields

Notably, there was an growth within the stage of language knowledge amongst similar categories of experts: applicants for senior control, procurement, IT, arts and media, in addition to advertising and marketing positions, have stepped forward their stage from A1 to B1 and C1 (28 %), meaning they have improved from beginner to intermediate and better.

Job seekers often overestimate their level of proficiency in a foreign language. For instance, in the field of IT generation, an employee with language abilties at the A1 degree requests a income of $1,000, at the same time as a consultant with C2 level talent values their offerings at $2,200. At the senior control stage, the difference is likewise considerable: a candidate with an A1 stage expects $690, while a candidate with a C2 stage targets for $1,500. In maximum expert fields, there may be a trend where the anticipated profits increases by 2-3 times depending on the level of English skillability [3].

The demand for English language proficiency is particularly high in the IT sector. 61 % of technical documentation is composed in English, highlighting the importance of English language skills in this sector. Moreover, a significant proportion of vacancies requiring English language skills are concentrated in the IT sector, accounting for almost a third (29 %) of all vacancies where this skill is listed as a requirement.

Statistics show that in technical professions, possessing English language skills, at least at an intermediate level, can lead to higher remuneration. For junior roles in technical fields, knowledge of the language can translate into a bonus of $100 – $150. The disparity becomes even more pronounced for middle-level developers, as those who possess upper-intermediate level proficiency can earn twice as much as their entry-level counterparts.

In non-technical occupations, English language proficiency plays a significant

role at a junior level. Fluency in English can enable to commence the career in the field with a median starting salary of $900. In contrast, a novice without a grasp of the language can expect to begin with a median starting salary of $500 [4].

Despite the escalating demand for English language abilities indicated in job requirements, no longer all companies are eager to assess it. Candidates inside the fields of IT, HoReCa (hospitality, restaurants, cafes, and catering), media, advertising, advertising and PR, design, and production will likely want to illustrate their foreign language skills at the primary interview.

It is worth noting that professional English language skills are specialised to facilitate communication in a strictly business environment, whether interacting with colleagues, clients, superiors or any other individuals relevant to the work process. Professional English language skills include a full understanding of business etiquette on the telephone and in correspondence, as well as the ability to write reports, participate in meetings and integrate easily into the day-to-day work routine [5].

The results of the study show a direct correlation between English language proficiency, the level of fluency, and salary, as well as indicating that language has become a fundamental skill alongside proficient computer skills, especially in IT, senior management, marketing, and procurement. However, questions remain regarding how candidates should confirm their language proficiency at the required level and how much more an employee who speaks English should earn compared to one who does not possess this skill.

Thus, strong English language skills can provide a clear competitive advantage over other applicants, thereby increasing the prospects of gaining the desired profession. Effective communication skills are essential in any professional field. By mastering the English language, individuals can enhance their ability to express their ideas, opinions and thoughts with greater clarity and precision. This, in turn, can help develop stronger relationships with colleagues and clients, ultimately leading to greater success in both the personal and professional spheres.

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УДК 338.2

CROSS-CULTURAL MANAGEMENT AS A TOOL FOR THE FORMATION AND DEVELOPMENT OF INTERNATIONAL RELATIONS ON THE EXAMPLE OF CHINA–REPUBLIC OF BELARUS

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Abstract. In this article, Cross-cultural management is considered as a tool for the formation and development of international relations using the example of the Republic of Belarus and China. The growing number of international organizations, the globalization of the economy and the expansion of international relations, and the clash of different cultures are becoming more common, affecting different spheres of life, which requires the expediency of taking into account cross-cultural aspects in business. In order to increase the effectiveness of the functioning of modern international organizations, the role of cross-cultural management is increasing in the formation of effective intercultural interaction, reducing intercultural conflicts.

Keywords: cross-cultural management, cross-cultural interactions, cross-cultural collectives, intercultural relations, economic globalization, international relations, international cooperation, instruments, competitiveness, international organizations.

КРОСС-КУЛЬТУРНЫЙ МЕНЕДЖМЕНТ КАК ИНСТРУМЕНТ ФОРМИРОВАНИЯ И РАЗВИТИЯ МЕЖДУНАРОДНЫХ ОТНОШЕНИЙ НА ПРИМЕРЕ КНР – РЕСПУБЛИКА БЕЛАРУСЬ

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Аннотация. В настоящей статье кросс-культурный менеджмент рассматривается как инструмент формирования и развития международных отношений на примере Республики Беларусь и КНР. Рост числа международных организаций, глобализации экономики и расширение международных связей, столкновение разных культур встречается все чаще, затрагивая разные сферы жизнедеятельности, что обуславливает целесообразность учета в бизнесе кросс-культурных аспектов. В целях повышения эффективности функционирования современных международных организаций возрастает роль кросс-культурного менеджмента в формировании эффективного межкультурного взаимодействия, снижении межкультурных конфликтов.

Ключевые слова: кросс-культурный менеджмент, кросс-культурные взаимодействия, кросс-культурные коллективы, межкультурные связи, глобализация экономики, международные отношения, международная кооперация, инструменты, конкурентоспособность, международные организации.

The growing number of international companies, the globalization of the economy

and the expansion of international relations, the clash of different cultures are becoming more common, affecting different spheres of life, the polyethnicity of societies makes it advisable to take into account cross-cultural aspects in business. In these conditions, the role of cross-cultural management in the formation of effective intercultural interaction, reducing intercultural conflicts in order to improve the efficiency of modern organizations is increasing.

Cross-cultural interactions are becoming an increasingly important problem in the modern world: business ties are expanding, multinational management teams are being formed, multinational companies are developing, international public associations are being organized, and intercultural ties are growing.

The expansion of international cooperation, the expansion of companies' activities beyond national borders, and their globalization have led to the need to study cultural differences between nations in the context of cross-cultural communications, their impact on the organizational and managerial environment, decision-making, motivation, and their effective use in company activities.

The history of Belarusian-Russian relations has passed a long period. Currently, cooperation is carried out in various areas. Over the past 10 years, foreign trade in goods has increased almost 4.7 times. China has become the second trading partner of the Republic of Belarus. In turn, the Republic of Belarus is one of the ten largest suppliers of high-quality meat, dairy and other food products to China. The product range of exports is constantly expanding.

In investment cooperation, Beijing today considers Minsk as a strategic partner within the framework of its "One Belt, One Road" initiative. China's investments in Belarus are growing, which contributes to the further development of infrastructure projects and the creation of new production facilities. If 68 residents were registered in the Park in 2020, today there are already 140 of them, with announced investments of 1.51 billion USD and plans to create more than 15.5 thousand new jobs. The vast majority of companies have Chinese capital.

In terms of scientific and technical cooperation, in August 2024, Belarus and China approved a Joint Action Plan, which includes 89 events, as well as a list of joint scientific and technical projects for 2024-2026.

Another qualitatively new stage of interuniversity cooperation has been launched in the field of education, which is connected with the launch of the Belarusian-Chinese Association of Universities, which includes 41 institutions of higher education in Belarus and 40 institutions of higher education in China.

In the field of medicine. An agreement on cooperation in the development of the Center of Traditional Chinese Medicine in Belarus has been signed. Such a Center is opening in the Great Stone Park. Work is underway to organize the supply of medical equipment and the creation of joint ventures for the production of pharmaceuticals [1].

Cross-cultural management is one of the components of the entire human resource management system, which ensures the formation of technologies for teaching competent and productive business management in conditions of different cultures in order to prevent intercultural conflicts.

Dealing with business processes in a rich variety of cultures and languages, in particular, developing and promoting large-scale projects, is not only time-consuming, but also quite difficult in the field of cross-cultural management.

So, using the example of cooperation with the PRC, it is clear that it is necessary not only to know the language well, but also the national customs and culture of the country of cooperation and residence.

Over time, the diversity of cultures and practices of conducting international projects is growing, which leads to an increasing need for cross-cultural management as one of the management tools for making effective decisions in situations of cultural and linguistic differences and peculiarities.

Modern cross-cultural management considers culture as an organizational resource, and cultural differences are forms of organizational knowledge that encourages solving international cultural problems.

Figure shows the most characteristic areas of socio-economic activity of international organizations, where there is an intersection, interaction, and confrontation of different cultures [2].

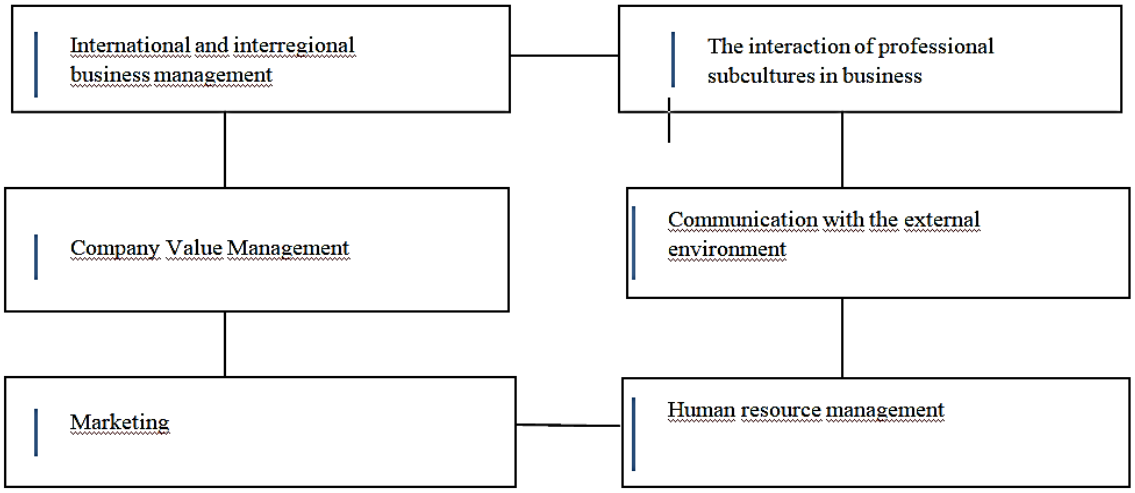


Figure – Areas of activity of international organizations related to the crossing of cultures

At large enterprises, international enterprises have various subcultures, the connection between the representatives of which require formation and management. As a result of the intersection of different cultures, negative aspects (conflict situations) are possible So are the positive aspects represented by mutual cultural enrichment and useful knowledge.

Cross-cultural teams are groups formed from representatives of different cultures in order to perform common tasks. Such teams are characterized by the predominance of different cultures, mixed languages of communication and styles of interpersonal interaction. Accordingly, in order to ensure the effectiveness of such a team, it is necessary to understand the degree of influence of the key distinguishing features of each unit of the group on the work of the team as a whole.

The leaders of cross-cultural collectives, as well as their members, can solve these problems in different ways based on their cultural affiliation, which determines the specifics of their approaches and team management strategies [3, p. 35].

In the management process, managers may encounter problems related to employees (language barriers, lack of understanding at the level of principles and standards of behavior, problems adapting to life in another country), as well as organizational strategies that do not take into account national characteristics, which

ultimately can lead to significant economic losses.

To solve existing problems at the macro and micro levels in the management of such organizations, it is necessary to apply cross-cultural management as an important tool for human resource management. One of the important areas of problem solving is the formation and development of intercultural competencies of managers. Let's present the stages of cross-cultural management training in Table [4, 5].

Table – Stages of cross-cultural management training

№ stage	Stage name	Characteristic
1	Education	Gaining knowledge through studying literature, watching films on the subject, listening to lecture material
2	Orientation	The use of prepared behavioral patterns, which consist of presenting situations in which characters from different cultures interact with each other. Interpretations have been added to each situation, from which it is necessary to choose the most appropriate and correct one
3	Training	A method of active developmental learning that is well adapted to business goals in the real world. It provides an opportunity to develop practical skills of intercultural interaction

Thus, in the current economic conditions, the role and importance of cross-cultural management is increasing as an important tool in the formation and development of international relations for effective intercultural cooperation between countries and improving the effectiveness of international organizations.

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LABOR PRODUCTIVITY AS THE MAIN INDICATOR OF ECONOMIC EFFICIENCY OF PRODUCTION

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Abstract. The article discusses the concept of "labor productivity" and methods for calculating labor productivity, including output per hour, output per worker, added value per employee, and multifactor productivity. Special attention is given to the labor productivity index, which allows tracking changes in productivity over time and conducting comparative analysis between industries and countries. It also discusses factors influencing productivity growth, such as the development of human capital, investments in capital, organizational practices, and the economic environment.

Keywords: labor productivity, economic efficiency, methods of calculation, labor productivity index, multifactor productivity.

ТРУДОВАЯ ПРОДУКТИВНОСТЬ КАК ОСНОВНОЙ ПОКАЗАТЕЛЬ ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ПРОИЗВОДСТВА

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Аннотация. В статье рассматривается понятие «трудовая продуктивность» и методы ее расчета, включая добавленную стоимость на сотрудника, многократную продуктивность и др. Особое внимание уделяется индексу трудовой продуктивности, который позволяет отслеживать изменения в продуктивности с течением времени и проводить сравнительный анализ между отраслями и по странам. Автор описывает факторы, влияющие на рост продуктивности, такие как развитие человеческого капитала, инвестиции в капитал, организационные практики и экономическая среда. В статье подчеркивается важность точного измерения трудовой продуктивности для обоснованного принятия политических решений и стимулирования устойчивого экономического роста.

Ключевые слова: трудовая продуктивность, экономическая эффективность, методы расчета, индекс трудовой продуктивности, многократная продуктивность.

Labor productivity is widely regarded as one of the most critical indicators of economic efficiency in production. It reflects how effectively labor inputs are transformed into outputs. By measuring the output generated per unit of labor, productivity provides insights into the efficiency of resource utilization, technological advancement, and organizational effectiveness. In essence, higher labor productivity signifies that an economy or business is producing more with less, which is a fundamental goal of economic efficiency.

Forms of measurement and performance indicators. Labor productivity may be expressed in various forms, depending on the context and the level of analysis [1, p. 164]. Common performance indicators are in the Table 1.

Table 1– Common performance indicators

Output per Hour Worked	**Output per Worker**	**Value-Added per Employee**	**Multifactor Productivity (MFP)**	**Sector-Specific Productivity**
This is the most widely used measure of labor productivity. It calculates the total output (e.g., GDP or gross value added) divided by the total number of hours worked.	This metric measures the total output divided by the number of workers. It is useful for comparing productivity across industries or countries with different working hours.	This indicator focuses on the value added by each worker, which is the difference between the value of output and the cost of inputs. economic It is particularly relevant in service-oriented sectors.	While labor productivity focuses on labor inputs, MFP considers the combined efficiency of labor, capital, and other inputs. It provides a broader perspective on economic efficiency.	In agriculture, productivity might be measured as crop yield per worker, calculation while in manufacturing, it could be units produced per shift. efficiency These sector-specific metrics help tailor productivity analysis to industry needs.

Factors affecting productivity gains. Improving labor productivity is a complex process influenced by a wide range of factors [2, p. 135]. These can be broadly categorized into economic, technological, organizational, and social determinants:

Technological Advancements:

1. Automation and Digitalization: The adoption of advanced technologies, such as robotics, artificial intelligence, and machine learning, can significantly enhance productivity by automating repetitive tasks and improving precision [3, p. 10].
2. Information and Communication Technology (ICT): Tools like cloud computing, data analytics, and collaborative platforms enable faster decision-making and streamline workflows.

Human Capital Development:

1. Education and Training: A skilled and educated workforce is more capable of leveraging new technologies and adapting to changing production processes.
2. Health and Well-being: Healthy workers are more productive, as they are less likely to miss work and can perform at their full potential [4, p. 87].

Capital Investment:

1. Machinery and Equipment: Access to modern tools and machinery allows workers to produce more efficiently [5, p. 193]. For example, a construction worker using advanced equipment can complete tasks faster than one relying on manual tools.
2. Infrastructure: Reliable transportation, energy, and communication systems reduce downtime and enable smoother operations.
3. Organizational and Managerial Practices:

Efficient Workflows: Lean management techniques and process optimization can eliminate waste and improve productivity [6, p. 173].

1. Employee Engagement: Motivated workers who feel valued and empowered are more likely to contribute to productivity gains [7, p. 25].
2. Economic and Regulatory Environment:

Market Competition: Competitive markets incentivize firms to innovate and improve efficiency to survive and thrive.

Government Policies: Supportive policies, such as tax incentives for R&D or investments in infrastructure, can boost productivity. Conversely, excessive regulation can hinder growth [9].

Social and Cultural Factors:

1. Work-Life Balance: Policies that promote flexibility, such as remote work options, can enhance employee satisfaction and productivity [8, p. 124].
2. Globalization and Trade:

Access to Global Markets: Export-oriented industries often achieve higher productivity due to economies of scale and exposure to best practices.

3. Chain Efficiency: Global supply chains can reduce costs and improve productivity, provided they are well-managed.

Labor productivity is calculated using the following formulas:

B = Q / T, Q – value, T – time for execution .

Tp = T / Q T – time Q – value.

Productivity index:

$$Iпр.т = \frac{I_{ВРП}}{I_{ЗТ}} *100\%$$

$I_{пр.т}$ – productivity index;

$I_{врп}$ – The index of the physical volume of the gross regional product at basic prices.

$I_{зт}$ –The index of total labor input for the region of the period [9, p. 110].

Table 2 presents data from Rosstat on labor productivity indices for 13 sectors of the economy of the Russian Federation over 11 years (from 2012 to 2023) [10].

Table 2 – Labor productivity index in the economy of the Russian Federation

	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
In the overall economy	103,8	102,1	100,8	98,7	100,1	102,1	103,1	102,4	99,6	103,9	97,2	101,9
Agriculture, forestry, hunting, fishing and fish farming	100,2	106,5	105,4	104,0	102,2	105,4	102,0	106,0	99,9	101,9	108,3	102,6
Mining industry	101,5	100,4	103,3	100,3	101,4	100,9	101,4	101,6	95,2	100,4	97,4	95,6
Processing industries	105,8	102,3	102,5	101,3	100,4	104,3	105,1	103,6	104,2	102,5	97,6	103,4
Provision of electricity, gas and steam; air conditioning	101,6	98,3	99,2	100,4	102,9	99,9	103,0	100,2	99,2	105,6	101,5	100,9
Water supply; drainage, collection and waste management, disposal activities contamination	103,8	99,6	97,9	89,0	108,7	98,8	102,6	105,8	103,4	106,3	95,3	98,3
Building	102,4	98,3	97,1	100,0	101,4	97,2	100,8	96,8	100,3	100,0	103,8	103,6
Repairing and trading	102,2	99,1	100,0	93,0	96,6	100,4	101,8	101,6	104,0	103,4	87,0	105,8

Transport and storing	102,0	100,0	99,6	100,6	102,4	100,1	101,5	101,0	89,8	103,1	97,9	101,0
Hotel and food services	102,6	101,5	98,7	97,6	94,2	103,0	104,4	100,6	78,7	119,8	102,5	102,9
Information and communication work	106,3	103,3	99,6	100,4	93,3	101,2	103,7	106,1	101,8	107,8	97,3	101,4
Work related to buying, selling, managing, or investing in real estate properties	101,7	105,3	100,4	98,9	97,4	103,7	105,7	102,6	95,7	102,8	102,7	99,9
Professional, scientific, and technical work	105,7	106,6	101,9	96,7	95,5	105,1	106,4	107,9	104,7	107,2	98,9	102,3
Administrative work and related supplementary services	103,1	113,6	99,2	111,6	102,4	103,5	96,8	96,3	94,3	103,8	96,8	100,3

For analysis, we have selected three sectors (mining industry, processing industries, repairing and trading) that are most important for the economy of Russia and demonstrate different trends during the specified period (Figures 1, 2).

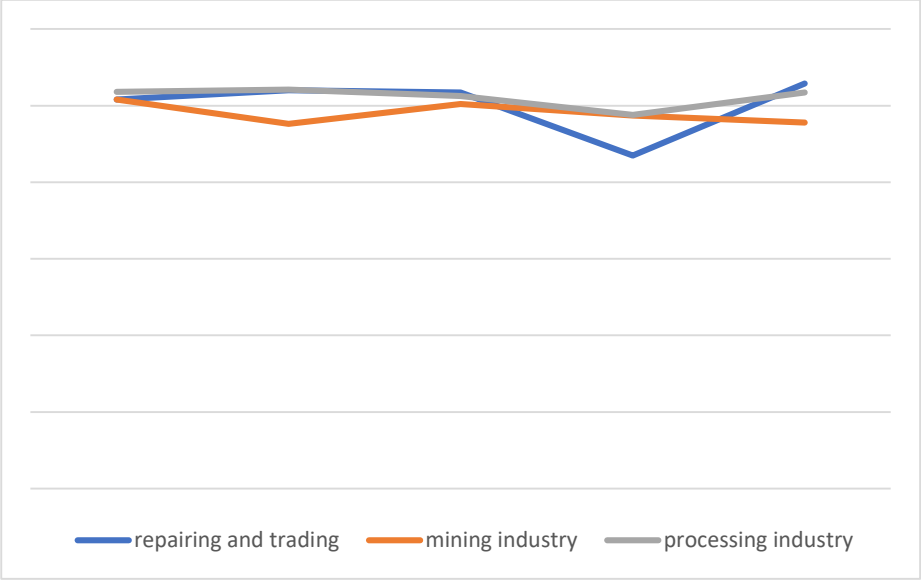


Figure 1 – Changing of labor productivity index in Russia in 2019-2023 in selected industries (% to previous year)

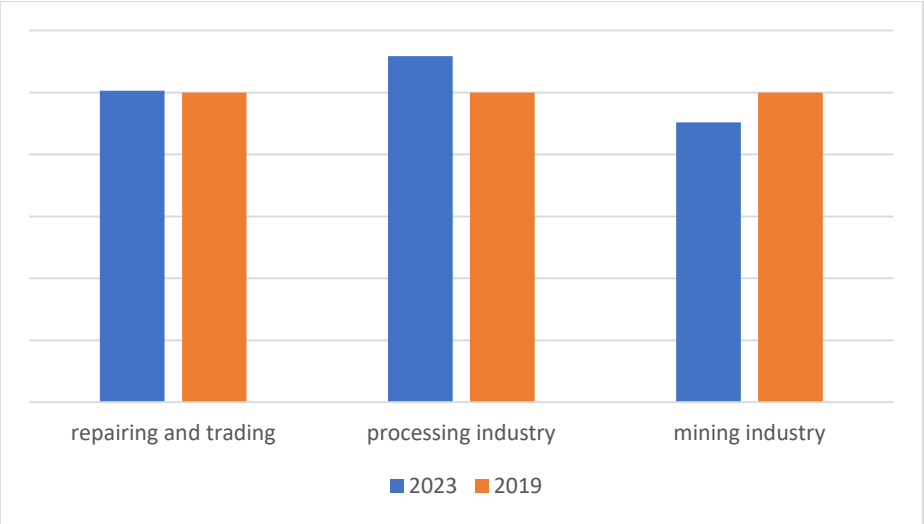


Figure 2 – Changing of labor productivity index in Russia in 2019-2023

The provided graphs illustrate the uneven development of various economic sectors. Some sectors have restructured in response to new economic realities and are showing growth in labor productivity, as measured by the labor productivity index. Meanwhile, other sectors have experienced a decline in investments.

Methods of calculating labor productivity. There are 5 methods of calculating labor productivity [11, p. 403] such as:

1. Output per Hour Worked

This is the most common and straightforward method of calculating labor productivity. It measures the amount of output produced per hour of labor input.

Total Output: This can be measured in physical units (e. g., number of products manufactured) or monetary terms (e. g., GDP or gross value added).

Total Hours Worked: This includes all hours contributed by employees during a specific period.

2. Output per Worker

This method calculates productivity based on the number of workers rather than hours worked. It is useful for comparing productivity across industries or countries with varying working hours.

3. Value-Added per Employee

This approach focuses on the value added by each worker, which is the difference between the value of output and the cost of inputs (e.g., raw materials, energy). It is particularly relevant in service-oriented sectors.

4. Multifactor Productivity (MFP)

While labor productivity focuses solely on labor inputs, multifactor productivity considers the combined efficiency of labor, capital, and other inputs. It provides a more comprehensive view of economic efficiency. The MFP can be calculated to assess overall efficiency.

5. Sector-Specific Productivity Measures

Different industries utilize specific productivity metrics to reflect their unique production processes. For example, in agriculture, metrics include crop yield per

worker or per hectare; in manufacturing, units produced per shift or per machine; and in services, revenue per employee or customer satisfaction scores.

The labor productivity index is a statistical tool used to track changes in productivity over time. It compares productivity levels in a given period to a base period, providing insights into growth or decline [12, p. 33]. The index is particularly useful for analyzing trends and benchmarking performance. There are *productivity in current period* (output per hour (or per worker) in the current period) and *productivity in base period* (output per hour (or per worker) in the base period, usually set to 100 for comparison).

Applications of the labor productivity index. The Labor Productivity Index is used for some purposes such as:

Trend Analysis: The index helps identify whether productivity is increasing, stagnating, or declining over time.

Benchmarking: It allows businesses and economies to compare their productivity performance against peers or industry standards.

Policy Evaluation: Governments can use the index to assess the effectiveness of policies aimed at improving productivity, such as investments in education or infrastructure.

Forecasting: By analyzing historical trends, the index can help predict future productivity growth and inform strategic planning [13, p. 150].

Labor productivity is a central measure of economic efficiency, reflecting how effectively labor inputs are converted into outputs. Its various forms of measurement, such as output per hour or value-added per employee, provide valuable insights into the performance of economies, industries, and businesses. However, achieving productivity gains is not a straightforward task – it requires addressing a multitude of factors, from technological innovation and human capital development to organizational practices and regulatory frameworks. By understanding and optimizing these factors, economies can unlock their full potential, driving sustainable growth and improving living standards for all. Labor productivity is a critical metric for assessing economic efficiency, and its calculation can vary depending on the context and the level of analysis. Accurate measurement is essential for identifying trends, making informed policy decisions, and improving operational efficiency.

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ROLE OF NEURAL NETWORK TECHNOLOGIES IN THE TRANSFORMATION ON PROFESSIONAL PRACTICES OF CREATIVE SPECIALISTS

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Abstract. The article examines the impact of artificial intelligence on modern creative industries. The key areas of application of neural networks in design, film production, music, advertising and the media sphere are analyzed. Special attention is paid to the transformation of professional activity in creative fields under the influence of AI technologies. Specific neural network tools (Midjourney, ChatGPT, Masterpiece, Gamma) and their practical application in the work of specialists are considered.

Keywords: artificial intelligence, neural networks, creative industries, digital art, generative design, deepfake, automation of creativity, ChatGPT, creative technologies.

РОЛЬ НЕЙРОСЕТЕВЫХ ТЕХНОЛОГИЙ В ТРАНСФОРМАЦИИ ПРОФЕССИОНАЛЬНЫХ ПРАКТИК СПЕЦИАЛИСТОВ КРЕАТИВНЫХ ИНДУСТРИЙ

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Аннотация. В статье исследуется влияние искусственного интеллекта на современные творческие индустрии. Анализируются ключевые направления применения нейросетей в дизайне, кинопроизводстве, музыке, рекламе и медиасфере. Особое внимание уделяется трансформации профессиональной деятельности в креативных областях под воздействием ИИ-технологий. Рассматриваются конкретные нейросетевые инструменты (Midjourney, ChatGPT, «Шедеврум», Gamma) и их практическое применение в работе.

Ключевые слова: искусственный интеллект, нейросети, творческие индустрии, генеративный дизайн, deepfake, ChatGPT.

Over the past 5 years, artificial intelligence has been actively implemented in everyday life. “Neural networks are software systems based on the principles of the

human brain. They are able to process huge amounts of information, identify patterns, and make predictions. One of the main reasons for the relevance of neural networks is their ability to analyze and process large amounts of data with high accuracy" [1]. Neural networks appeared in the 1950s, but became truly powerful only in the 2010s. "The popularity of this technology is undoubtedly growing, as is the number of various inventions utilizing it. The implementation of devices using neural networks across all spheres of human activity is one of the primary tasks for the coming few years" [2]. By 2023, they had transformed into an indispensable part of our reality. This rapid technological breakthrough has been particularly evident in the field of neural networks – computational systems whose architecture is inspired by the biological neural networks of living organisms. "In the past decade, neural networks have become widely used in practice, with an increasing number of tasks being solved with their help. One of the main trends of 2023 has been a sharp surge in attention toward generative neural network models" [3]. Initially, they could only solve simple problems. Now they outperform humans in image recognition, generate text, music and video, and even comprehend human speech.

Historically, the first theoretical developments in neural networks date back to the 1940s-50s, yet their practical applications remained severely limited for decades due to insufficient computing power and imperfect algorithms. The turning point came in the 2010s thanks to three key factors: the emergence of new deep learning architectures, the availability of big data for model training, and the revolution in GPU computing. "Generative neural networks are an integral part of the new reality. It should be understood that a neural network is a type of artificial intelligence, not AI itself in its direct sense. That is, it is merely a part of it" [4].

At first, they could solve simple problems. Now they recognize images better than people, generate text, music and video, and even understand human speech.

Today, neural networks are truly changing the world: they make creative work faster, reduce production costs, and create new opportunities for artists.

Artificial intelligence is applicable in many creative areas: In the field of design and digital art, neural networks have made a real revolution. They allow you to create unique images based on text descriptions, generate high-quality illustrations, concept art, and even photo-realistic pictures. Designers actively use these technologies to quickly create logos, brand style elements, and animated materials. The ability to instantly visualize ideas is especially valuable – now it is enough to describe the idea to get several options for further development;

In the film and video production industry, neural networks are used to create new-generation special effects. Modern algorithms can automatically remove unnecessary objects from the frame, improve the quality of the image and even generate completely synthetic scenes – this is video content where all elements are generated by artificial intelligence. Automatic editing technologies analyze the footage and offer optimal splicing options. Deepfake technologies attract special attention, allowing you to create very realistic digital faces and replace actors in the frame, which opens up new possibilities, but at the same time raises ethical questions;

The music industry is also actively implementing neural network solutions. Services can compose original musical compositions in various styles and genres, from

classical music to modern electronic tracks. Voice processing technologies allow you to change vocals, create unique timbres, and even create singing based on text;

In the advertising industry, neural networks provide personalization of content on a scale that is unachievable for humans. Algorithms analyze user data and create thousands of ad options optimized for a specific audience. Chatbots based on language models conduct meaningful dialogues with clients, they resolve up to 80% of issues without the participation of operators. This significantly increases the effectiveness of marketing campaigns and reduces costs; The media industry actively uses neural networks to automate routine tasks. Journalists use AI tools to write news notes, especially when it is necessary to quickly process large arrays of data. Algorithms help select the most suitable illustrations for articles, analyzing their content and emotional coloring. Some publications are experimenting with fully automated creation of materials based on press releases and open data. These examples show how neural network technologies penetrate all aspects of the creative industries, offer new tools for professionals and change traditional approaches to content creation. Neural networks create content so high-quality that sometimes it is impossible to understand whether it was done by a person or artificial intelligence.

Neural network technologies have a great impact on work in creative industries. Firstly, they automate routine tasks. Neural networks take on technical work (photo retouching, color correction, basic layout), allowing specialists to focus on the conceptual part of projects. For example, designers use AI tools for rapid prototyping, saving time on execution. Secondly, neural networks help with content generation. Modern AI systems are capable of: generating images based on text descriptions; creating music in a given style; writing scripts and advertising texts. This expands the capabilities of creatives, allowing them to experiment with ideas faster and cheaper. Thirdly, the emergence of neural networks creates collective creativity between humans and artificial intelligence. Neural networks become full-fledged co-authors, offering unexpected creative solutions and alternative options that humans can refine and improve. “However, there is no talk yet of fully replacing humans in these domains, although a number of IT companies have already conducted mass layoffs. Instead, a new highly paid profession has emerged – AI prompt engineer” [5].

Such symbiosis leads to the emergence of fundamentally new approaches – for example, a designer can generate dozens of logo concepts in Midjourney in a few minutes, and then select and refine the best ideas. This radically changes the dynamics of teamwork: designers, developers, and copywriters now jointly use AI tools as virtual colleagues, which speeds up the workflow by 3-5 times compared to traditional methods. This is especially noticeable in teams where neural networks take on the routine part of the work, allowing people to focus on strategic and creative tasks. This approach erases the boundaries between technology and creativity. And it is important to note that neural networks do not replace the author, but become a tool in his hands. Neural networks are now tools and are actively used by specialists in the creative industry. Now neural networks help to do work faster and save time. Artificial intelligence can: voice a video with any voice, generate any picture, generate a video with a person, write text for a website, find any information and structure it.

Let's consider examples of neural networks that are now actively used in their work by creative industry specialists:

Midjorney is a neural network capable of generating images, photos and video materials. Midjorney helps such creative industry specialists as: designers, SMM specialists, photographers and project managers. With its help, they can create realistic photo shoots and videos with brand products without inviting models, photographers and creative producers. Develop examples of future product packaging. Midjorney has many settings that should be studied before working with this neural network; it is suitable for more experienced creative industry specialists. Midjorney is a paid neural network and has a free trial period. Examples of content created in Midjorney (Figure 1).



Figure 1 – Picture created in neural network Midjorney

Chatgpt is a neural network capable of writing texts, transforming information and generating images. Chatgpt is an assistant for both beginners and more experienced creative industry specialists. The site and application have simple settings, which allows novice specialists to use them in their work. This neural network does not always issue the necessary requests, often requires a lot of comments and corrections to obtain the desired result. In the free version, Chatgpt has a limited number of generations. This drawback is still being eliminated and improved. Examples of created images in Chatgpt (Figure 2).



Figure 2 – Photo developed by Chatgpt

Shedevurm is a neural network from Yandex that can write short texts and generate images. This neural network is suitable for novice specialists who are just starting their acquaintance with neural networks. Shedevurm has its shortcomings, which are being improved by specialists, it often does not correctly create faces, ignoring the written information, rarely produces the necessary image the first time. Shedevurm has a limited number of generations on the site and an unlimited number in the application. Examples of developed images in Shedevurm (Figure 3).



Figure 3 – Image created in the Masterpiece neural network

Gamma is a neural network that creates interactive presentations, with the generation of images that advise the text. This neural network is suitable for both beginners and more experienced creative industry specialists. It allows you to quickly

create creative presentations with text generation, photos and the ability to export to other formats. Gamma has a free version limited by the number of slides generated. Examples of presentations created in gamma (Figure 4).



Figure 4 – The first slide of the presentation generated in the Gamma neural network

Neural network technologies are becoming an integral part of the modern creative economy, helping specialists in design, media, marketing, cinema, music and other fields. Their implementation contributes not only to the automation of routine tasks, but also to the expansion of creative opportunities, stimulating the emergence of new ideas for self-expression and interaction with the audience.

Creative industry specialists should not panic and worry about their place of work and the possibility of being replaced by neural networks. Neural networks are new technologies that will not be able to completely replace creative industry specialists. A modern creative specialist can no longer ignore AI – it is becoming not only a technological tool, but also a source of inspiration, a generator of ideas and a full-fledged participant in the creative process. inspiration, a generator of ideas and a fully-fledged participant in the creative process. When used correctly, neurotechnology can simplify and automate the process of creating content, generating ideas and implementing them.

Now neural network technologies are becoming an integral part of modern creators, helping specialists in design, media, marketing, cinema, music and other fields. Their implementation contributes not only to the automation of routine tasks, but also to the expansion of creative possibilities, stimulating the emergence of new forms of self-expression and interaction with the audience. Despite the many possibilities, neural networks require specialists to review their competencies, constantly learn and take a critical approach to the use of technologies. In the context of rapid technological changes, it is important to be able to combine creativity with a technological approach, understand how exactly to apply creativity and whether it will be appropriate in a given case.

Creative industry specialists should be flexible, master new technologies and apply them in their work if they want to be in demand in the market. Using neural

technologies will help them stand out in the market and offer something new and unique for brands and companies, without increasing the company's budget or attracting additional expenses, since the capabilities of neural networks allow developing realistic photo and video shooting without involving a team. Thus, neural networks not only open up new horizons, but also pose challenges for creative industries, the solution of which determines the future of professional practice.

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WHICH HR PROCESSES CAN BE HANDED OVER TO AI TODAY

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Abstract. Modern artificial intelligence (AI) technologies are actively transforming human resource management by automating routine tasks, enhancing decision-making processes, and improving overall efficiency. This article explores key HR functions where AI is currently being implemented, including recruitment, employee onboarding, training, performance management, and routine operations automation. The study highlights how machine learning algorithms and natural language processing (NLP) enable HR specialists to focus on strategic initiatives while AI handles data-intensive tasks. Examples of practical applications, such as AI-driven resume screening, chatbots for candidate communication, and predictive analytics for employee retention, demonstrate the technology's potential. The article also discusses the importance of maintaining a balance between automation and human oversight to ensure ethical and effective HR practices. As AI continues to evolve, its role in human resource management is expected to expand, making early adoption of these technologies crucial for organizational competitiveness.

Keywords: artificial intelligence, HR automation, recruitment, employee onboarding, performance management, predictive analytics, chatbots.

КАКИЕ HR-ПРОЦЕССЫ МОЖНО ПЕРЕДАТЬ ИСКУССТВЕННОМУ ИНТЕЛЛЕКТУ УЖЕ СЕГОДНЯ

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Аннотация. Современные технологии искусственного интеллекта (ИИ) активно трансформируют процессы управления персоналом, автоматизируя рутинные задачи, улучшая процессы принятия решений и повышая общую эффективность. В данной статье рассматриваются ключевые HR-функции, в которых уже применяется ИИ, включая рекрутинг, адаптацию сотрудников, обучение, управление эффективностью и автоматизацию рутинных операций.

Исследование демонстрирует, как алгоритмы машинного обучения и обработки естественного языка (NLP) позволяют HR-специалистам сосредоточиться на стратегических задачах, в то время как ИИ обрабатывает данные. Примеры практического применения, такие как автоматизированный анализ резюме, чат-боты для коммуникации с кандидатами и предиктивная аналитика для удержания сотрудников, подчеркивают потенциал технологии. Также обсуждается важность баланса между автоматизацией и человеческим контролем для обеспечения этичных и эффективных HR-практик. По мере развития ИИ его роль в управлении персоналом будет расти, что делает своевременное внедрение этих технологий критически важным для конкурентоспособности организаций.

Ключевые слова: искусственный интеллект, автоматизация HR, рекрутинг, адаптация сотрудников, управление эффективностью, предиктивная аналитика, чат-боты.

The incorporation of artificial intelligence (AI) into human resource management represents a paradigm shift in how organizations approach talent acquisition, workforce development, and operational optimization. This technological revolution is fundamentally altering traditional HR practices by introducing unprecedented levels of efficiency, objectivity, and personalization. As businesses navigate an increasingly competitive global marketplace, AI-powered solutions are emerging as critical differentiators in building and maintaining high-performing teams.

The recruitment process, historically one of the most labor-intensive HR functions, has undergone remarkable transformation through AI integration. Modern applicant tracking systems now employ sophisticated natural language processing (NLP) algorithms capable of parsing thousands of resumes with nuanced understanding that extends far beyond simple keyword matching. These systems analyze semantic patterns, contextual relationships between professional experiences, and even infer soft skills from linguistic cues. The depth of analysis enables identification of candidates whose potential might be overlooked by traditional screening methods [1].

Video interview platforms enhanced by AI represent another significant advancement in recruitment technology. Systems like HireVue utilize computer vision and voice analysis to evaluate candidates' communication skills, emotional intelligence, and cultural fit indicators. Pymetrics applies neuroscience principles through gamified assessments, measuring cognitive and emotional traits that correlate with job performance. These technologies demonstrate particular value in reducing unconscious bias, as they focus on measurable competencies rather than demographic characteristics. However, it's crucial to note that the effectiveness of such systems depends heavily on the quality and diversity of their training data to prevent algorithmic bias replication [2].

AI-powered chatbots have redefined candidate engagement by providing instantaneous, personalized communication throughout the hiring process. These virtual assistants handle inquiries, schedule interviews, and provide status updates around the clock, significantly enhancing the candidate experience while freeing HR professionals from administrative burdens. More advanced implementations can

conduct preliminary screening conversations, using sentiment analysis to gauge candidate enthusiasm and cultural alignment [3].

Beyond process automation, AI enables predictive hiring analytics that transform recruitment from reactive to proactive. By analyzing historical data on employee performance, retention, and career progression, machine learning models can identify patterns that predict candidate success with remarkable accuracy. These systems consider hundreds of variables including skill combinations, previous career trajectories, and even subtle indicators from interview responses. Organizations leveraging these capabilities report significant improvements in quality-of-hire metrics and reductions in early turnover rates [4].

The predictive capabilities extend to workforce planning, where AI models analyze market trends, internal mobility patterns, and skills gaps to forecast future talent needs. This allows organizations to develop strategic recruitment pipelines rather than scrambling to fill positions reactively. Some forward-thinking companies are even using AI to simulate how potential hires might perform in hypothetical future scenarios, enabling more informed decision-making about long-term talent investments.

The employee onboarding experience has evolved from standardized orientation programs to dynamic, personalized journeys powered by AI. Modern systems analyze multiple data points about each new hire – including their specific role, prior experience, learning style preferences, and even personality assessments – to create customized onboarding pathways. These intelligent platforms adjust content delivery in real-time based on the new employee's engagement levels and comprehension metrics, ensuring optimal knowledge transfer during the critical first months.

AI-driven recommendation engines suggest relevant learning resources, mentor pairings, and even social integration opportunities based on the individual's profile. Some organizations have implemented virtual onboarding assistants that provide just-in-time information and support, significantly reducing the time it takes for new hires to become fully productive. Research indicates that companies using these personalized approaches experience 50 % greater new hire retention after one year compared to traditional onboarding methods [5].

In the realm of corporate learning, AI enables truly personalized development at scale. Sophisticated learning platforms continuously assess employees' knowledge gaps by analyzing performance data, project outcomes, and even informal learning activities. These systems then curate individualized learning paths that adapt in real-time based on the learner's progress, preferences, and changing role requirements.

The most advanced implementations incorporate multiple content formats - from microlearning modules to immersive simulations – automatically selecting the most effective medium for each learning objective and individual. AI-powered coaching systems provide immediate feedback on skill application, while virtual reality environments create safe spaces for practicing complex interpersonal scenarios. Notably, these technologies have shown particular effectiveness in leadership development, where they can simulate challenging management situations with remarkable realism.

Perhaps most significantly, AI enables continuous, embedded learning that integrates seamlessly with workflow rather than disrupting it. Smart systems can

identify teachable moments during normal work activities and deliver contextually relevant knowledge at the point of need. This approach has demonstrated dramatic improvements in knowledge retention and application compared to traditional training methods [6].

AI is transforming performance management from an annual bureaucratic exercise to a continuous, insight-rich process. Modern platforms aggregate and analyze hundreds of performance indicators in real-time, including project outcomes, collaboration patterns, innovation contributions, and peer feedback sentiment. This multidimensional view enables more holistic and objective evaluations than traditional manager assessments alone.

Predictive analytics components can identify potential performance issues months before they would typically surface, allowing for proactive intervention. Similarly, AI can detect high-potential employees who might benefit from stretch assignments or accelerated development opportunities. Some organizations are using network analysis to understand informal leadership and knowledge flows within teams, providing insights that were previously invisible to management.

The most sophisticated systems incorporate natural language processing to analyze communication patterns in emails, meetings, and collaboration platforms. This can reveal valuable insights about team dynamics, employee engagement, and emerging leadership qualities. However, these applications raise important ethical considerations regarding privacy and data usage that organizations must carefully navigate [7].

AI has dramatically reduced the administrative burden on HR departments through automation of routine tasks. Intelligent chatbots now handle the majority of employee inquiries regarding benefits, policies, and procedures, with natural language capabilities that allow for increasingly complex question resolution. These virtual assistants are available 24/7, significantly improving employee service levels while reducing HR workload.

Document processing and compliance management have similarly benefited from AI implementation. Machine learning algorithms can review and extract relevant information from employment contracts, performance reviews, and other HR documents with accuracy surpassing human capabilities. This not only improves efficiency but also reduces compliance risks through more consistent application of policies and regulations.

Workforce scheduling and shift optimization represent another area where AI delivers substantial value. Advanced algorithms consider employee preferences, skills, labor regulations, and business needs to create optimal staffing plans. Some organizations are using AI to model various workforce scenarios, helping leaders make more informed decisions about hiring, restructuring, or flexible work arrangements [8].

While the benefits of AI in HR are substantial, responsible implementation requires careful attention to several critical issues. Algorithmic bias remains a persistent challenge, as AI systems can inadvertently perpetuate or amplify existing prejudices present in their training data. Organizations must implement robust testing and monitoring protocols to ensure fairness across demographic groups.

Transparency in AI decision-making is another crucial consideration, particularly when these systems influence hiring, promotion, or compensation decisions. Many jurisdictions are developing regulations requiring explainability in algorithmic HR processes, necessitating systems that can provide understandable rationales for their outputs.

Data privacy and security take on heightened importance when dealing with sensitive employee information. Organizations must establish clear protocols for data collection, usage, and retention that comply with evolving regulations while maintaining employee trust [9].

Perhaps most fundamentally, companies must strike the right balance between AI automation and human judgment. While AI excels at processing data and identifying patterns, human professionals bring essential contextual understanding, emotional intelligence, and ethical reasoning to HR decisions. The most effective implementations position AI as an augmentation tool rather than a replacement for human expertise.

As AI technologies continue to advance, several emerging trends promise to further transform HR practices. Emotion AI, which can detect and respond to human emotional states, may enable more empathetic employee interactions at scale. Blockchain technology could revolutionize credential verification and talent marketplaces. Advanced simulation environments may allow organizations to «test drive» potential organizational changes before implementation.

The growing field of people analytics is shifting from descriptive to prescriptive insights, offering not just information but actionable recommendations for improving workforce outcomes. Integration with other enterprise systems is creating more comprehensive views of how human capital factors influence overall business performance [10].

Organizations that successfully navigate these developments will gain significant competitive advantages in talent attraction, development, and retention. However, this requires more than just technological adoption – it demands thoughtful strategy, ethical frameworks, and ongoing investment in both systems and people. HR leaders must develop new competencies in data literacy and technology management while preserving the human-centric essence of their profession.

The future of HR lies in the synergistic combination of artificial and human intelligence – leveraging AI's analytical power while maintaining human judgment, creativity, and empathy. Organizations that master this balance will be best positioned to build workforces capable of thriving in an increasingly complex and dynamic business environment.

The integration of artificial intelligence into human resource management represents more than just technological advancement – it signifies a fundamental reimagining of how organizations attract, develop, and retain talent. From recruitment to retirement, AI-powered solutions are enhancing every phase of the employee lifecycle with unprecedented precision, efficiency, and personalization.

While the potential benefits are substantial, realizing them requires thoughtful implementation that addresses ethical considerations, maintains human oversight, and aligns with organizational values. The most successful organizations will be those that

view AI not as a replacement for human judgment, but as a powerful tool that amplifies HR professionals' ability to make data-informed, people-centric decisions [11].

As these technologies continue to evolve, ongoing research and dialogue will be essential to ensure their responsible development and application. Future advancements should focus on enhancing transparency, reducing bias, and creating more intuitive interfaces that bridge the gap between technical capabilities and user needs.

Ultimately, the organizations that will thrive in this new era will be those that harness AI's analytical power while preserving the human elements that lie at the heart of effective people management. The challenge – and opportunity – for HR leaders is to navigate this transformation in ways that create value for both businesses and employees alike.

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ENSURING RELIABILITY OF POWER SUPPLY TO CONSUMERS WITH CONTINUOUS TECHNOLOGICAL PROCESS

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Abstract. The article presents the actual aspects of ensuring the reliability of electricity supply to consumers, the work of which is characterized by the implementation of a continuous production process. The key factors directly affecting the reliability of power supply in general are considered. Special attention is paid to the main methods and means used in the electric power industry to assess this reliability.

Keywords: electric power industry, power supply, power lines, electrical equipment, production, power quality.

ОБЕСПЕЧЕНИЕ НАДЕЖНОСТИ ЭЛЕКТРОСНАБЖЕНИЯ ПОТРЕБИТЕЛЕЙ С НЕПРЕРЫВНЫМ ТЕХНОЛОГИЧЕСКИМ ПРОЦЕССОМ

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Аннотация. В статье излагаются актуальные аспекты обеспечения надежности электрического снабжения потребителей, работа которых характеризуется реализацией непрерывного производственного процесса. Рассматриваются ключевые факторы, непосредственно влияющие на надежность электроснабжения в целом. Особое внимание уделяется основным методам и средствам, применяющимся в электроэнергетике для оценки данной надежности.

Ключевые слова: электроэнергетика, электроснабжение, ЛЭП, электрооборудование, производство, качество электроэнергии.

Currently, the reliability of power supply is a critical aspect of the operation of all electrified industrial and residential facilities. Reliability of power supply is also defined as the ability of the electric power system to function in pre-set or specified conditions for a long time without any significant failures or interruptions in the process of supplying electricity to consumers for various purposes. In addition to the

uninterrupted supply of electricity, the main tasks of ensuring the reliability of power supply are also: maintaining voltage and frequency stability indicators at a high level; the ability of the electric power complex to quickly restore its normal operating mode after an emergency situation has arisen in the power system.

In the modern world, a significant number of enterprises, including the chemical, metallurgical and energy industries, operate in a continuous production (technological) process mode. Interruption or complete cessation of power supply in such conditions can lead to serious economic losses (of at least 20 % of country wide gross value) (Table), damage to electrical equipment and deterioration in the quality of products manufactured by industrial companies. In this regard, comprehensive provision of power supply reliability has always been one of the priority tasks for this type of electricity consumers [1].

Table – Production of GDP and gross value by economic sector [2]

	2023	
	Bn rubles	% total
GDP market value	**171041,0**	
Gross value added in basic prices	**155958,2**	**100**
Agriculture, forestry, hunting, fishing and fish farming	5742,4	3,7
Mining operation	19286,5	12,4
Manufacturing industries	21118,2	13,5
Provision of electric energy, gas and steam; air conditioning	3399,9	2,2
Water supply; sanitation; organization of waste collection and disposal, pollution elimination activities	687,7	0,4
Construction	7871,1	5,0
Wholesale and retail trade; repair of motor vehicles and motorcycles	20879,0	13,4
Transportation and storage	10749,0	6,9
Activities of hotels and enterprises of public catering	1453,6	0,9
Information and communication activities	4961,2	3,2
Financial and insurance activities	8090,8	5,2
Real estate activities	16398,3	10,5

	Bn rubles	% total
Scientific, technical and professional activities	7061,6	4,5
Administrative activity and additional related services	3606,7	2,3
Public administration and provision of military security; social security	12207,1	7,8
Education	4645,6	3,0
Healthcare and social services	6016,1	3,2
Cultural, sports and recreational activities	1556,5	1,0
Provision of other types of services	710,8	0,5
Self-employed household activities	516,0	0,5
Net taxes on products	15082,8	

The purpose of the article is to present current aspects of ensuring the reliability of electrical supply to consumers whose work is characterized by the implementation of a continuous technological process.

Let’s look at the key factors that directly affect the reliability of power supply in general:

1. The quality of electrical energy provided to consumers. It depends on the following parameters: voltage, frequency, harmonic distortion and duration of interruptions. Even a slight decrease in the quality of electricity, as a rule, has a negative impact on the operation of equipment and technological processes in general [3].

2. Technical condition of the parameters of the energy infrastructure: transmission lines, substations, transformers and other objects of the electric power sector. These parameters significantly affect the reliability of the power supply. Outdated and worn-out elements of the power grid, as well as an insufficient level of technological modernization of energy systems can lead to accidents and other critical situations in the energy sector.

3. Availability of backup power supply. Effective backup of power sources plays an important role in maintaining the reliability of power supply at a high level. The most common backup sources today are diesel generators, various types of batteries, as well as uninterruptible power supply systems that can activate their work in the event of power supply interruptions.

4. Application of innovative control, monitoring and monitoring systems. Experience shows that the operation of these systems can significantly help specialists of electric grid and energy supply organizations to identify problems with power supply at an early stage of their occurrence, as well as to warn responsible personnel about potential failures in the power system. The next advantage of using the designated

complexes of interconnected and interdependent equipment is the ability to implement a prompt response to critical changes in the state of parameters of electric grids and electric power systems.

5. Comprehensive forecasting and analysis of electric power data. Scientists note that the use of modern adaptive forecasting algorithms and big data analysis contributes to the improvement of energy load management indicators and the overall optimization of the functioning of electric networks, which has a positive effect on the level of reliability of power supply to industrial consumers with a continuous technological process.

6. Presence of written instructions and plans. These include the order of basic actions in various power interruption scenarios and key measures, the observance of which helps to minimize damage and restore the technological process [4].

An analysis of the literature showed that various methods and tools are used today to solve problems of assessing the reliability of electrical supply to consumers with a continuous technological process:

1. Primary analysis of power supply reliability. As a rule, specialized mathematical models are used here to assess the probability of failures in the operation of electrical power equipment.

2. Research and analysis of the following reliability factors of power supply of energy systems: availability, operation, time between failures.

3. Application of simulation modeling tools. Modeling a range of scenarios related to power outages enables energy company personnel to predict the behavior of the power system in various operating modes, as well as identify the risks of damage to electrical equipment and short circuits on power lines.

In the near future, in order to generally improve the reliability of power supply, the domestic fuel and energy sector sectors are expected to implement intelligent control systems, innovative ATS devices, and commission additional capacities from renewable energy sources [5].

Thus, ensuring the reliability of power supply to consumers with a continuous technological process is a critical aspect affecting the efficiency and sustainability of a large number of production systems. The work revealed that the use of modern technologies and methods for assessing reliability can help minimize the risks associated with power outages and ensure the stable operation of industrial enterprises.

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MINIMALISM IN LOGOS: THE INFLUENCE OF THE SIMPLICITY ON HUMAN PERCEPTION

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Abstract. The paper examines the history of the “minimalism” trend in graphic design, as well as the formation and evolution of logos in the brand market. As a result of the analysis, the causes and characteristic features of the gradual “simplification” of modern logos are identified, as well as their direct impact on the view of a potential consumer is considered.

Keywords: minimalism, graphic design, logo, brand, evolution, perception.

МИНИМАЛИЗМ В ЛОГОТИПАХ: ВЛИЯНИЕ ПРОСТОТЫ НА ЧЕЛОВЕЧЕСКОЕ ВОСПРИЯТИЕ

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Аннотация. В работе рассматривается история возникновения направления «минимализм» в графическом дизайне, а также становление и эволюция логотипов на брендовом рынке. В результате анализа выявляются причины и характерные черты постепенного «упрощения» современных логотипов, а также рассматривается их непосредственное влияние на взгляд потенциального потребителя.

Ключевые слова: минимализм, графический дизайн, логотип, бренд, эволюция, восприятие.

The term “minimalism“ was first introduced in 1965 in the work of the American theorist Charlie Wuheim "Minimal Art". Its predecessor was the term “minimum”, which at that time had a pejorative meaning. In a deeper sense, minimalism goes back to the concept proposed by the German architect Ludwig Mies van der Rohe, who formulated the principle of “less is more". This idea was widely recognized both in

Germany and abroad, having a significant impact not only on the subsequent development of architecture, but also on modern design around the world.

Minimalism is a design trend that was formed in the twentieth century and whose goal is to create “the simplest forms and structures.” The characteristic features of minimalism are the lack of decor, the search for new ideal proportions and color solutions. The style's motto: giving up the necessary in favor of the most necessary [1, p. 46]. For minimalism, the key aspects are the utmost conciseness of forms, clarity of perception, monochrome and simplicity, as well as comfort and purity of lines.

However, the modern interpretation of minimalism goes beyond simply rejecting ornament. Today, minimalism is becoming a response to information overload, environmental challenges, and the need for sustainability [2, p. 107].

In this context, minimalism acts as a response to the chaotic nature and abundance of information, offering clean lines and shapes that contribute to the creation of a harmonious space. Minimalism as a modern trend in design can be interpreted through the prism of the desire for simplification and functionality. Design opens up new horizons for the aesthetic expression of human beauty and greatness, providing opportunities for the realization of a variety of aesthetic concepts.

The era of simplicity as an aesthetic ideal is not something rare. People enjoy a high level of well-being, but at the same time experience significant pressure caused by the rapid pace of life in an urban environment. As a result, most people strive for a simple, dynamic, uncomplicated and measured life. Minimalism is exactly the kind of design style that resonates with a wide audience.

On the one hand, it meets modern design requirements by clearly articulating its goals, meeting functional needs and rejecting unnecessary complexity. On the other hand, minimalism focuses on the very essence of design, returning to its simplest forms. By eliminating unnecessary decorative elements and bright colors, it relieves potential consumers of visual stress and creates a harmonious space.

Minimalism, as a philosophy and style, includes many aspects of modern design, such as architecture, graphics, and even everyday objects. One of the most striking manifestations of minimalism is its application in logo design.

The word “logo” comes from the Greek language and translates as “sign word". It refers to both the full and abbreviated names of organizations, corporations, or products in their original form. Thus, the logo is a symbol that reflects the theoretical essence of the product.

With the beginning of the Industrial Revolution in the 19th century, logos began to take on a modern look. Companies began using logos to promote their products and services, creating unique and memorable images. This was due to the development of mass production and trade, requiring new methods of marketing and branding.

During this period, the first major brands such as Coca-Cola and Ford appeared. These companies began using logos to create recognition and establish trusting relationships with their consumers. Logos have become an important marketing and advertising tool, helping to stand out from competitors and attract the attention of customers.

Logos have also become an important element of corporate identity, creating and maintaining the company's image. They were used on products, packaging, advertising,

and other marketing materials, creating a unified and consistent brand image. This helped to build consumer trust and loyalty, which was especially important in an increasingly competitive environment.

With the development of printing technology and graphic design, logos have become more complex and diverse. Designers began experimenting with shapes, colors, and typography, creating unique and memorable logos. This allowed companies to create more expressive and effective visual images that better conveyed their values and mission.

Graphic design has also become an important element of corporate culture, helping to create and maintain a unique style and image of the company. Designers began to develop entire systems of visual identity, including logos, fonts, colors and other elements, while constantly simplifying and generalizing their projects, adapting to new technologies and market requirements. Logos, as visual identifiers of brands, should now be instantly recognizable and memorable. This helped to create a unified and consistent brand image that was recognizable, memorable, and easy to read.

The trend of minimalism in modern design is manifested through a number of key aspects, among them: the use of monochrome palettes, geometric precision of shapes, an emphasis on negative space and the rejection of excessive details [2, p. 107].

The main feature of minimalism in graphic design is to create a calm and free impression, while simplicity is achieved through careful work on reducing elements, focusing on basic geometric shapes and strict structure [3, p. 14].

Let's consider the evolution of the logos of the Coca-Cola company mentioned above (Figure 1). The first Coca-Cola logo was created in 1886 by Frank Mason Robinson, the company's accountant. He used the popular Spencerian Script font at the time, which was widely used in business correspondence. Later, a decorative frame was added, which gave the logo a more formal style, but was soon removed due to its excessive bulkiness. Over time, the logo turned red, symbolizing energy and passion. Later, a wavy line was added to the logo, emphasizing the movement and freshness of the brand, making it more dynamic and attractive. In the following years, the company returned to classic and more traditional design. The logo continued to undergo minor changes, such as the addition of shadows for volume and further simplification, while maintaining its relevance and traditional values in modern conditions.

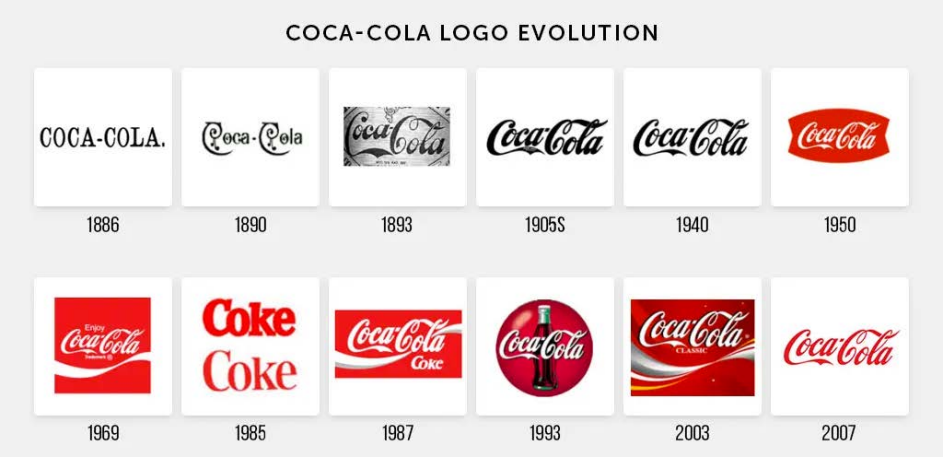


Figure 1 – The evolution of the Coca Cola logo

Attention should also be paid to the history of the Ford automobile company logo, which demonstrates an interesting approach to graphic design (Figure 2). Since its creation in the early 1900s, the logo has also undergone significant changes, starting with a calligraphic surname in a decorative frame and ending with experiments with various color solutions, while maintaining the overall concept. The logo design reflects the company's desire for unity and recognition in different markets. Blue is associated with strength, while white is associated with purity. Amendments to the logo, starting in 1909 and ending with updates in 2003, emphasize a minimalistic approach and stability, making it recognizable and attractive to consumers. Thus, the Ford logo is a prime example of how graphic design can evolve while remaining true to its fundamentals and adapting to modern requirements.

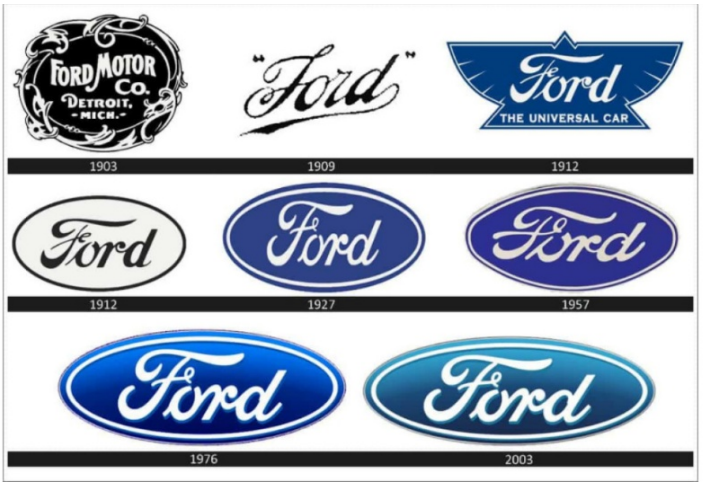


Figure 2 – The evolution of the Ford logo

The latest clear example of the gradual evolution of the logo is one of the largest Internet search engines, Google (Figure 3). Since its “official” creation in 1997, the logo has undergone significant changes, emphasizing the company's commitment to innovation and simplicity. The original logo, created by Larry Page and Sergey Brin, was simple and bright, with colors symbolizing diversity and creativity. Over time, the logo has become more minimalistic: in 2010, shadows and gradients were removed, making it more modern and easy to perceive. In 2015, the updated logo became friendlier thanks to the Sans-Serif font, which improved readability. The colors remained the same, but became brighter, adding freshness. Thus, the evolution of the Google logo demonstrates not only the visual changes in the company, but also its internal development. Like the Ford and Coca-Cola logos, it illustrates the importance of graphic design in shaping a corporate image.



Figure 3 – Evolution of the Google logo

After reviewing the presented examples of logo redesign, you can see that when creating the first logos, the companies set themselves the goal of emphasizing their individuality by any means, by adding a variety of decorative elements, effects and texts. The companies tried to stand out from the competition as much as possible, emphasizing the advantages of their products through oversaturated design.

Many well-known brands have updated their logos by choosing a simpler style. This simplification reflects the trend of flat design, which focuses on minimalism [4, p. 11].

In today's world, logo design is accessible to everyone, but creating the right logo requires special skills. A successful design must meet the goals outlined in the terms of reference, but a truly iconic logo must also be simple, relevant, durable, distinctive, memorable, and adaptable. Given the number of these requirements, the task may seem daunting, and it really is. A simple logo helps meet most other criteria for iconic design. Simplicity helps the design to be more versatile [5, p. 41]. The minimalistic approach makes it possible to use the logo on different formats, such as business cards, billboards and badges. The simplified design makes it more memorable, which increases the chances of becoming timeless and durable.

Thus, minimalism in logo design has a significant impact on human perception, providing high recognition due to the simplicity and purity of forms. Logos with a minimalist style are easy to remember and stand out from competitors, undoubtedly contributing to the success of the brand. The versatility of such logos allows them to be effectively used in various formats, which is important in a dynamic and modern market. In addition, minimalistic logos are less susceptible to fashion trends, which ensures their durability and stability in the brand's identity. As a result, minimalism in logo design not only improves visual perception, but also helps save redesign resources, making brands more resilient to change.

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COMPARATIVE ANALYSIS OF APPROACHES TO TRAINING LOGISTICS SPECIALISTS IN RUSSIA, EUROPE, AND THE USA

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Abstract. This article presents a comparative analysis of educational programs in logistics in Russia, Europe, and the USA. It examines the structural features of the programs, the competencies formed, teaching methods, and assessment approaches. The strengths and weaknesses of each approach are identified. The Russian program is characterized by a comprehensive professional orientation, the European program by an international focus and analytical approach, and the American program by flexibility and business orientation. Recommendations are proposed for improving programs and forming a comprehensive approach to training logistics specialists in the global economy.

Keywords: logistics education, competencies, comparative analysis, teaching methods, international logistics, supply chain management.

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ПОДХОДОВ К ПОДГОТОВКЕ СПЕЦИАЛИСТОВ ПО ЛОГИСТИКЕ В РОССИИ, ЕВРОПЕ И США

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Аннотация. В данной статье представлен сравнительный анализ образовательных программ в области логистики в России, Европе и США. Рассматриваются структурные особенности программ, формируемые компетенции, методы обучения и подходы к оценке. Выявлены сильные и слабые стороны каждого подхода. Российская программа характеризуется всесторонней профессиональной ориентацией, европейская программа – международной направленностью и аналитическим подходом, а американская программа – гибкостью и бизнес-ориентацией. Предложены рекомендации по совершенствованию программ и формированию комплексного подхода к подготовке специалистов в области логистики в условиях глобальной экономики.

Ключевые слова: логистическое образование, компетенции, сравнительный анализ, методы обучения, международная логистика, управление цепочками поставок.

Logistics as an educational program and field of knowledge plays an increasingly important role in the modern global economy. This requires educational institutions to constantly improve approaches to forming professional competencies in this area. A.A. Rabazanova emphasizes this in her research: «Researchers note that today there are such trends as: the internationalization of business and the globalization of supply chains, so it is important to train professional logisticians who possess modern tools» [1]. An analysis of logistics educational programs in various countries is interesting. The analysis will reveal differences, strong points, and shortcomings in the training of logistics specialists. This article presents a comparative analysis of the formation of competencies in the field of logistics using the example of three educational programs: a Russian university (SPbSUITD/HSE), a European consortium of the Autonomous University of Barcelona (UAB and partners), and an American university (Brenau University).

The study is based on a detailed analysis of the logistics educational programs of three educational institutions. The following were considered: the Bachelor's program «Logistics and Supply Chain Management» in the direction 38.03.02 «Management» at the Saint Petersburg State University of Industrial Technologies and Design (HSE), the «Logistics and Supply Chain Management» program at the Autonomous University of Barcelona (UAB), and the Bachelor's program at Brenau University (USA) with a focus on logistics and supply chain management.

The analysis included a comparison of:

- Program volume;
- Features of program implementation;
- Competencies;
- Teaching and assessment methods;
- Approaches to theoretical and practical training;
- Correspondence to student expectations.

The Russian program is a full Bachelor's program with a total volume of 240 credit units in the direction 38.03.02 «Management» with a profile «Logistics and Supply Chain Management» [2]. The European program is a full program with a volume of 120 credit hours (ECTS), implemented by a consortium of universities [3]. The American program is a Bachelor's program with a total volume of 120 ECTS with the possibility of specialization in the field of logistics and supply chain management [4].

The European program demonstrates the most pronounced international character, being implemented by a consortium of universities from Spain, Latvia, and Germany. This allows students to gain learning experience in various European countries and form a global vision of logistics systems. The American program also emphasizes international orientation, but to a lesser extent. The Russian program is implemented at the Department of Marketing and Logistics of the Institute of Management and Economics of the HSE SPbSUITD, although it includes elements of

international logistics.

The Russian program offers a comprehensive set of competencies, including universal (UC-1 – UC-11), general professional (GPC-1 – GPC-6), and professional (PC-1 – PC-8) competencies [2]. Universal competencies include the ability to search for and critically analyze information, define a range of tasks, carry out social interaction, communication in the state and foreign languages, and others [2]. General professional competencies cover the ability to solve professional problems based on economic, organizational, and managerial theories, collect and analyze data, and develop organizational and managerial solutions. Professional competencies are divided by task types: information and analytical (PC-1 – PC-4), organizational and managerial (PC-5, PC-6), and research (PC-7, PC-8) [2].

The European program offers a more differentiated competency model, including:

- Analysis competencies (CA01, CA13, CA14) – the ability to apply analytical methodologies, develop arguments based on quantitative models;
- Knowledge competencies (KA01, KA02, KA03, KA18 – KA20) – identification of LSCM terminology and strategies, understanding the general framework of logistics;
- Skill competencies (SA01 – SA04, SA20 – SA22) - analysis of problems and challenges in the field of logistics, assessment of the impact of logistics actions [5, 6].

The American program, despite its orientation towards practical application, presents the least detailed competency model in its documents, focusing on a set of business competencies with elements of logistics. A significant difference is observed in the balance between professional and managerial competencies. The European program emphasizes analytical and quantitative methods in logistics, including modeling logistics networks, data analysis, and the use of specialized software (MS Excel, Open Solver, R, Python) [5]. The Russian program is balanced between managerial and professional competencies. It includes both the principles of building logistics systems, and tools for managing material, information, and financial flows. The American program forms operational and managerial competencies with less focus on quantitative analysis methods, but with greater attention to business communications and general management principles.

All three programs emphasize practical training, but implement it differently. In the Russian program, the practical component includes solving problems, conducting ABC/XYZ analysis, calculating optimal order sizes, and developing reports using MS Excel and MS Word [2]. The European program offers the most comprehensive approach to practical training, including computer labs, simulation games (The Fresh Connection), teamwork, and virtual enterprise management. Special attention is paid to modeling logistics networks and processes. The American program stands out with mandatory internships or practicums, providing practical experience in a real business environment, which is an important advantage for students. The assessment system of the Russian program includes traditional forms of control, highlighted in E.A. Khapalazheva's research: credit, term paper, final qualifying work, etc. [7]. The European program applies more diverse methods: final exams, reports on practical

assignments, team presentations, laboratory work, and simulation results.

An important component of the analysis of educational programs in logistics is taking into account the opinions and expectations of the students themselves. Let's evaluate this component based on the analysis of expectations highlighted by Pawlak and Kudelska. The main expectations of students from education in the field of logistics are:

- Prospect of obtaining an attractive and high-paying job (26.2 % of respondents);
- Development of interest in logistics as a field of knowledge (15.4 %);
- Acquisition of new specialized knowledge (13.9 %);
- Mastering a promising and in-demand profession (8.5 %);
- Correspondence to market demand for logisticians (5 %);
- Development of creative thinking (5 %) [8, p. 37-44].

Let's analyze how these expectations are realized in different programs. It can be noted that all three programs considered (Russian, European, and American) strive to satisfy these expectations, but with different emphases:

- The Russian program focuses on the comprehensive formation of professional competencies, taking into account the requirements of professional standards, traditions, and scientific and pedagogical achievements of the university, which corresponds to students' expectations regarding employment.
- The European program emphasizes analytical methods and international orientation, which meets the demands for specialized knowledge and compliance with global trends.
- The American program offers flexibility and integration with business education, which can be attractive in terms of employment prospects.

It is interesting to note that in all programs there is a problem of balance between theoretical and practical training. As A.A. Rabazanova notes, digitalization is becoming a necessary condition for the competency development of future logisticians, which requires appropriate adaptation of educational programs and teaching methods [1].

Table – Comparison of Educational Programs by Key Factors

Factor	**SPbSUITD**	**UAB**	**Brenau University**
Program Volume	240 credit units	120 credit hours (ECTS)	120 credit hours (ECTS)
Features of Program Implementation	In one university	In network form (consortium of universities from Spain, Latvia, and Germany)	In business form
Program Level	Bachelor's	Master's	Bachelor's
Competencies	Comprehensive set of competencies (universal, general	Differentiated competency model	Wide range of business

	professional, professional)	(analysis, knowledge, skills)	competencies with logistics elements
Balance of Competencies	Balanced between managerial and technical competencies	Emphasis on analytical and quantitative methods	Emphasis on operational and managerial competencies
Teaching Methods	Problem solving, ABC/XYZ analysis, optimal order size calculation	Computer labs, simulation games, teamwork, virtual enterprise management	Mandatory internship or practicum in a real business environment
Assessment Methods	Traditional forms: credit, term paper, final qualifying work, etc.	Diverse methods: final exams, reports, team presentations, laboratory work	No data
Correspondence to Student Expectations	Yes	Yes	No
International Orientation	Limited, includes elements of international logistics	Pronounced international character	Emphasizes international orientation, but to a lesser extent
Strengths	Comprehensive approach, integration of professional standard requirements, balanced competency development	International orientation, integration of theory and practice, use of modern modeling methods	Learning flexibility, credit transfer possibility, integration with business education
Weaknesses	Insufficient focus on international aspects, limited use of modern technologies	Tough training, university coordination	Less detailed model of logistics competencies, insufficient attention to analytical methods

The conducted comparative analysis in Table demonstrates significant differences in approaches to the formation of logistics competencies in different educational systems. The Russian program focuses on the comprehensive formation of competencies, taking into account the requirements of professional standards; the European program offers a comprehensive international education with an emphasis on analytical methods; and the American program provides flexible business education with elements of specialization in logistics.

An ideal logistics program should combine the strengths of all three approaches: the comprehensive professional orientation of the Russian program, the international and analytical focus of the European program, and the flexibility and business orientation of the American model. This will allow for the training of specialists capable of effectively solving logistics problems in the global economy, based on both a deep theoretical understanding and practical skills.

In a rapidly changing world and transforming supply chains, logistics educational programs must constantly evolve, taking into account both local specifics and global trends, as well as developing critical thinking and adaptability of future specialists to new challenges.

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MODELING AND APPROXIMATION OF OPERATING CHARACTERISTICS OF CENTRIFUGAL PUMPS

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Abstract. The paper presents a method for modeling mathematical modeling of a pump. The main stages of modeling are described, starting with the formulation of the problem and the choice of mathematical apparatus to the interpretation of the results obtained. The method is primarily focused on the use of computing technology for polynomial approximation of the pump operating characteristics specified by the manufacturer, and can be used as a basis for developing the corresponding software. The use of the method in the process of technical and economic justification for the introduction of an adjustable electric drive at a pumping station will allow justifying the feasibility of the planned activities.

Keywords: pump, main line, efficiency, hydraulic characteristics, mathematical modeling, approximation.

МОДЕЛИРОВАНИЕ И АППРОКСИМАЦИЯ РАБОЧИХ ХАРАКТЕРИСТИК ЦЕНТРОБЕЖНЫХ НАСОСОВ

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Аннотация. В статье приведена методика математического моделирования насоса. Описаны основные этапы моделирования, начиная с постановки задачи и выбора математического аппарата до интерпретации полученных результатов. Методика ориентирована, в первую очередь, на использование вычислительной техники для полиномиальной аппроксимации рабочих характеристик насоса, указанных производителем, и может быть использована в основе разработки соответствующего программного обеспечения. Применение методики в процессе технико-экономического

обоснования внедрения регулируемого электропривода на насосной станции позволит обосновывать целесообразность запланированных мероприятий.

Ключевые слова: насос, магистраль, коэффициент полезного действия, гидравлическая характеристика, математическое моделирование, аппроксимация.

Introduction

Traditionally, pump design has been based on empirical relationships and laboratory tests, as in [1], but such methods have their limitations, especially when dealing with complex geometries and non-standard operating conditions. In the last decade, there has been a growing interest in numerical modeling methods.

In modern practice of designing and operating pumping units, the use of mathematical models presented in works [2, 3, 4] is widespread. These models demonstrate high efficiency in the development and control of pumping equipment in critical and expensive systems. Centrifugal pumps are the largest consumers of electric power, but there is a category of pumping units that require the ability to control in the absence of expensive frequency converters and complex control controllers, which makes the implementation of complex mathematical models technically unrealistic. And since most hydraulic characteristics of pumps have the form of a parabola, one formula can be used to construct their simplified models. In connection with the above, the purpose of this work is to develop a mathematical model of a pumping unit that is distinguished by its simplicity of implementation and interpretability.

Building a model

The pump chosen for the study is the Grundfos CRN 15-14 [5], which is used in the food and pharmaceutical industries. For modeling, I use the approximation method of the hydraulic characteristic shown in Figure 1, which is the dependence of the pressure at the pump outlet on the flow rate, at a constant shaft speed. The following parameters are indicated on the graph: the upper blue line is the hydraulic characteristic, and the upper black lines on the graph display the efficiency at P1 and P2 values.

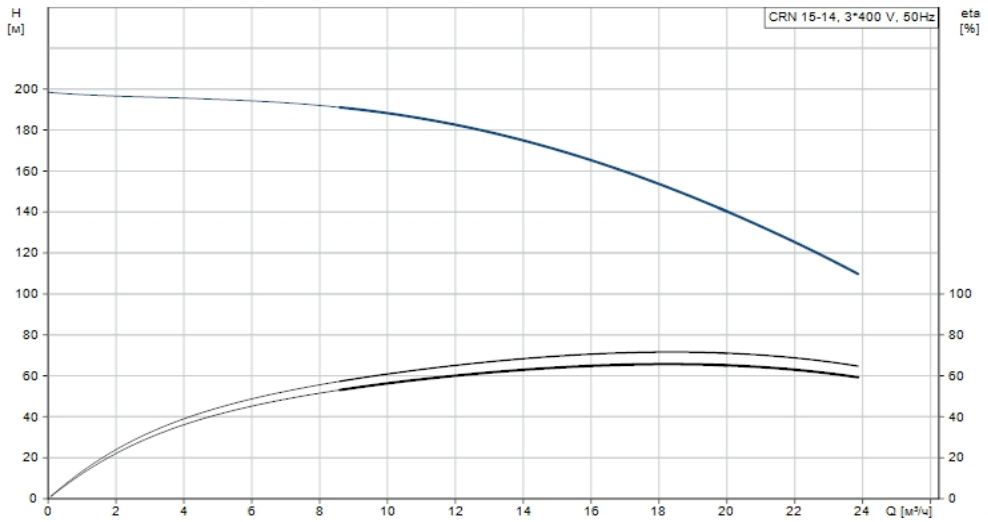


Figure 1 – Pump pressure characteristic

Since the graph has a parabolic form, the function that best describes it is a quadratic equation with three coefficients. To calculate the coefficients, were used the flow and pressure values corresponding to the following points: the nominal value and the extreme values that are visible on the graph.

$$A \cdot 17^2 + B \cdot 17 + C = 156.9, \quad (1.1)$$

$$A \cdot 0^2 + B \cdot 0 + C = 197, \quad (1.2)$$

$$A \cdot 20^2 + B \cdot 20 + C = 140, \quad (1.3)$$

By solving the system of equations (1.1), (1.2) and (1.3), the following coefficients were obtained: $A = -0.1637, B = 0.4245, C = 197,$. Substituting the coefficients into the original equation (1.1) made it possible to obtain equation (1.4), which is a mathematical model of the pump under study, graphically presented in Figure 2.

$$H = -0{,}1637 \cdot Q\text{^}2 + 0{,}4245 \cdot Q + 197, \quad (1.4)$$

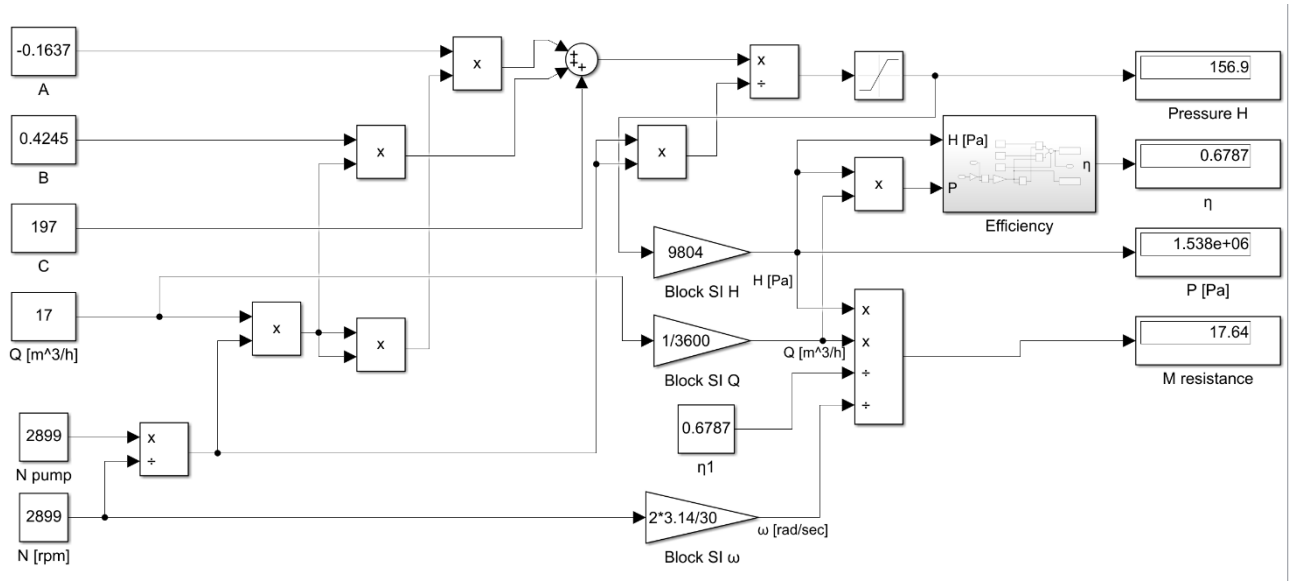


Figure 2 – Mathematical model of the pump

Calculating the time-varying efficiency of a pump is important for improving the control accuracy and reducing errors. This is because the efficiency of a pump can vary depending on various factors, such as load, rotation speed, and impeller condition. Using a function that reflects the changing efficiency allows us to take these changes into account and provide more accurate control of the pump. For more accurate modeling of the pump, a model was created in which the efficiency was calculated from the difference between the nominal speed, the actual rotation speed, and the flow rate of the main line. In the efficiency graph shown in Figure 1, the graph has the shape of a parabola, so a quadratic equation is used to synthesize the efficiency function, the model will have the same form as the pump model (1.5).

$$\eta = A * Q\text{^}2 + B * Q + C, \quad (1.5)$$

The pump efficiency model is calculated by solving the system of equations (1.6), (1.7), and (1.8). The efficiency and flow values from the graph in Figure 1 were

used for the calculation.

$$A * 17^2 + B * 17 + C = 0.66, \quad (1.6)$$

$$A * 18^2 + B * 18 + C = 0.68, \quad (1.7)$$

$$A * 12^2 + B * 12 + C = 0.60, \quad (1.8)$$

By solving the system of equations (1.6), (1.7) and (1.8), the following coefficients were obtained: A = 0.0014, B = -0.0267, C = 0.728. Substituting the coefficients into equation (1.5), equation (1.9) was obtained, which is a mathematical model of the efficiency shown in Figure 3.

$$\eta = 0{,}0014 * Q\text{^}2 + -0{,}0267 * Q + C = 0{,}728, \quad (1.9)$$

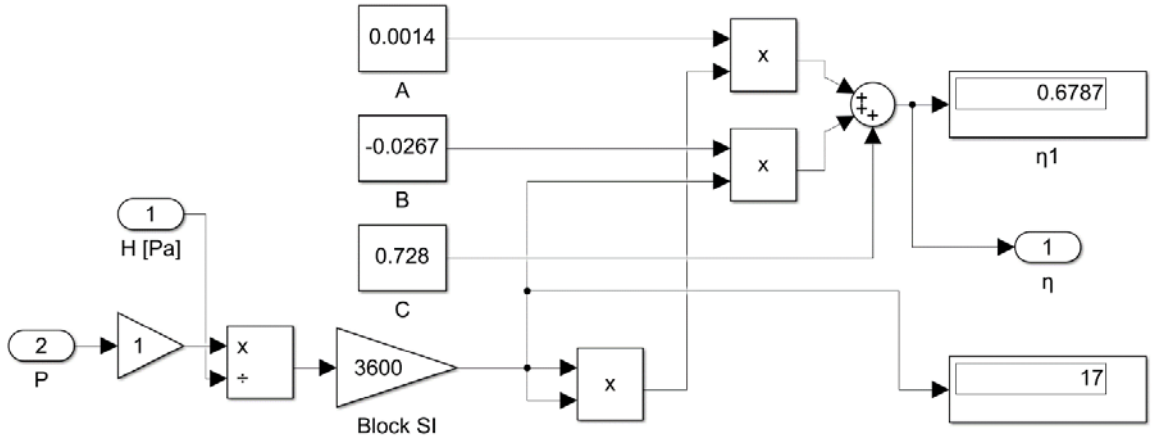


Figure 3 – Mathematical model of efficiency

Results and discussion

To check the correctness of the coefficient calculation and the model's performance, we use the flow rate value Q = 17 m^3/h, at which the pressure will be equal to H = 156.9 m, which can be seen in Figure 2 and coincides with the value on the graph shown in Figure 1.

For verification, by substituting the flow rate Q = 17 m^3/h into equation (1.9), the efficiency was equal to η = 0.6787, calculated in Figure 3, which corresponds to the efficiency in Figure 1.

Conclusion

As a result of the calculations and modeling, a mathematical model of the pump was created, including a model of the pump itself and an efficiency model obtained by approximating the passport characteristics of the pump unit. This model has sufficient accuracy for simple equipment and is characterized by ease of calculation and implementation.

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THE IMPACT OF INTEGRATING WIND ENERGY INSTALLATIONS INTO INDUSTRIAL ENERGY ON THE RATIONAL USE OF NATURAL RESOURCES

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Abstract. This article explores the integration of wind energy installations (WEI) into industrial energy systems, focusing on their role in rational resource use and reducing environmental impact. It evaluates the benefits of WEI in decreasing reliance on fossil fuels, reducing carbon footprint, and minimizing water and land resource needs. Special attention is given to innovations in WEI component recycling, including 3D printing technologies for turbine and blade production and methods for recycling old turbines.

Keywords: wind energy installations, integration, land resources, water resources, carbon footprint, recycling.

ВЛИЯНИЕ ИНТЕГРАЦИИ ВЕТРОЭНЕРГЕТИЧЕСКИХ УСТАНОВОК В ПРОМЫШЛЕННУЮ ЭНЕРГЕТИКУ НА РАЦИОНАЛЬНОЕ ИСПОЛЬЗОВАНИЕ ПРИРОДНЫХ РЕСУРСОВ

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Аннотация. В статье рассматриваются вопросы интеграции ветроэнергетических установок (ВЭУ) в промышленную энергетику, особое внимание уделяется их роли в рациональном использовании природных ресурсов и снижении экологического воздействия. Оценены преимущества ВЭУ в контексте сокращения зависимости от ископаемых источников энергии, уменьшения углеродного следа, а также минимизации потребности в водных и земельных ресурсах. Особое внимание уделено инновациям в переработке и утилизации компонентов ВЭУ, включая использование технологий 3D-печати для производства турбин и лопастей, а также разработке методов переработки старых турбин.

Ключевые слова: ветроэнергетические установки, интеграция, земельные ресурсы, водные ресурсы, углеродный след, утилизация.

In the context of the global environmental agenda and the growing attention to sustainable development, the problem of rational use of natural resources is becoming increasingly relevant for many sectors of the economy. One of the most effective ways to solve this problem is to integrate renewable energy sources (RES), such as wind, into industrial energy. This approach not only addresses the issues of environmental protection but also enhances the long-term economic resilience of industries by reducing their dependence on volatile fossil fuel markets. Wind power plants represent a promising and environmentally friendly energy source that has the potential to significantly reduce industry's dependence on traditional fossil resources such as coal, oil, and gas.

Despite the wide potential of wind power, the introduction of wind turbines into the industrial sector requires an analysis of their impact on the rational use of natural resources. In particular, it is necessary to take into account not only the energy efficiency of wind turbines, but also their impact on reducing greenhouse gas emissions, water and land consumption, as well as on creating sustainable and energy-efficient production processes. Additionally, lifecycle assessments should be conducted to evaluate the environmental impact of wind turbine manufacturing, installation, operation, and decommissioning, ensuring that their integration genuinely contributes to overall resource sustainability.

With proper wind turbine integration, significant reduction of the carbon footprint and efficient use of land and water resources are possible. This can be achieved through careful site selection, taking into account ecological sensitivity, existing infrastructure, and optimal wind conditions to maximize energy output while minimizing environmental disturbance. However, there are still a number of issues related to optimizing the processes of using wind turbines in an industrial context, increasing their economic and energy efficiency, as well as minimizing possible negative consequences for the ecosystem. Ongoing technological innovations, such as the development of more efficient turbine designs, smarter grid integration systems, and hybrid renewable energy complexes, play a crucial role in addressing these challenges.

The integration of wind turbines into industrial energy is an important step in ensuring sustainable and environmentally sound energy supply. For industrial applications, wind power is an alternative or supplement to traditional energy sources such as coal-fired or gas-fired power plants. In addition to reducing harmful emissions, the use of wind energy can also contribute to corporate social responsibility goals, enhancing the reputation of enterprises among consumers, investors, and regulatory bodies. Next, the features of wind turbine integration into industry are considered.

1. Integration into existing energy systems. In some cases, wind turbines can be installed as autonomous energy sources, especially for remote or hard-to-reach areas, for example, in the northern regions of Russia or on islands where traditional energy sources are difficult to access. In other cases, they are integrated into the overall energy system of the enterprise, reducing the need for electricity generated from hydrocarbon sources, as is the case in some large industrial enterprises in Germany that use wind turbines to cover up to 40 % of energy needs [1]. It is important to take into account that for the effective integration of wind turbines into the industrial energy

sector, it is necessary to have a reliable energy storage system, for example, rechargeable batteries or pumped storage plants, which ensure the stability of the energy supply when the wind speed changes.

2. Hybrid systems. Wind turbines are often combined with other energy sources, such as solar panels or diesel generators, to increase the reliability and sustainability of power supply. This makes it possible to compensate for the disadvantages of wind turbines in a variable climate and ensure uninterrupted power supply. Hybrid systems can effectively take advantage of different energy sources, increasing the overall energy security of an industrial enterprise. An example of successful application of hybrid systems is a project on the Shetland Islands in the UK, where wind turbines in combination with solar panels and diesel generators provide stable energy supply in a changeable climate and limited local resources [2].

3. Economic benefits. In the long term, the use of wind turbines can significantly reduce energy costs and reduce dependence on fossil resources. Investments in wind power plants, although they require significant installation and maintenance costs, can pay off by reducing operating costs and improving energy efficiency. Research conducted by GE Renewable Energy shows that initial investments in wind turbines are 30 % lower compared to traditional gas-fired power plants, and the payback period of such installations is on average 45 years, depending on location and operating conditions [3].

Now let's take a closer look at how the integration of wind turbines into industrial energy contributes to the rational use of natural resources in terms of the use of land and water resources, reducing the carbon footprint and optimizing production processes. In this context, several key factors can be identified that affect the sustainability and effectiveness of this integration.

The use of wind turbines for electricity generation significantly reduces the need for fossil energy sources. This helps to reduce the negative impact on natural ecosystems associated with the extraction and processing of fossil resources. Examples of wind turbine integration into industrial power systems show that even partial use of wind energy as a supplement to traditional sources can significantly reduce the consumption of hydrocarbons. For example, in South Dakota, USA, the introduction of wind turbines has reduced the consumption of hydrocarbon resources by 15 %, as well as significantly reduced CO_2 emissions, which was confirmed by data obtained during monitoring of the state of ecosystems in the region [4]. The introduction of wind turbines into industry not only reduces greenhouse gas emissions, but also improves air quality, which is an important aspect of sustainable development.

Wind turbines require a significant area of land to be located, but compared to other types of power plants, such as nuclear or thermal power plants, wind turbines have much lower land resource requirements. Unlike nuclear power plants, which require huge territories to accommodate facilities and ensure safety, wind turbines occupy a much smaller area. For example, to place wind turbines with a capacity of 100 MW, about 200-300 hectares of land are required, while for a similar nuclear power plant the area may exceed 1000 hectares [5]. Moreover, in the case of hybrid systems using solar panels in combination with wind energy, additional use of land for agriculture, pastures or other needs is possible, which minimizes the impact on the

ecosystem. Projects are underway in Germany where wind turbines are used as an additional source of energy for farms, which allows land to be used for agricultural production [6].

One of the key advantages of wind turbines over traditional power plants is that wind power plants do not require a large volume of water for cooling, which significantly reduces the burden on water resources. Water is used only at the production stage and during the maintenance process, unlike thermal power plants, where water is needed to cool steam, which can create additional stress on the ecosystems of reservoirs. This is especially important for regions where water resources are limited. For example, in arid regions of Europe, where water resources are scarce, the use of wind turbines helps to avoid competition for water with other consumers, such as agriculture or the population [7]. This not only reduces the need for water resources, but also helps to prevent pollution of water bodies, which often occurs during the operation of traditional power plants.

Wind turbines are manufactured using materials such as steel, concrete, and rare earth metals such as neodymium and dysprosium, which are necessary to create powerful generators. In recent years, technologies aimed at reducing the use of rare earth metals in wind turbine generators have been actively developing. For example, in some new turbine models, the amount of neodymium used in DC magnets is significantly reduced. In particular, innovative developments such as reducing the neodymium content in magnetic resonance generators and replacing it with more affordable materials can reduce the use of these materials by 20-30 %. According to research by Siemens Gamesa, their new models of SG 14-222 DD series wind turbines have managed to reduce the content of rare earth metals by 20 % compared to previous models, which reduces the need for complex and expensive mining processes [8].

In addition, active work is underway to recycle materials used in wind turbines, which helps to reduce the burden on ecosystems. In Germany, recycling projects for old turbines are actively being developed, where components from rare earth metals are extracted and reused using hydro- and thermal processing technologies to create new turbines [9]. Research has shown that recycling old turbines and using recycled materials can reduce the total carbon footprint by 10-15 %. An example of successful recycling is the Nordex project, which in 2021 launched a recycling program for its old turbines, including rare earth metals, which reduced the need for primary extraction of materials by 12 % [10].

In the future, the integration of wind turbines into industrial energy will only expand, which, in turn, will increase the importance of sustainable use of natural resources and reduce the impact on ecosystems. New developments and improvements in wind turbine production and operation are expected to significantly reduce the need for rare earth metals, improve their energy efficiency, and reduce installation and maintenance costs.

One of the important prospects is the development of large offshore wind turbines, which can significantly increase the efficiency of wind use in remote coastal areas. These installations are usually more powerful and can provide a more stable and high-quality energy supply. They can also help reduce competition for land resources and reduce the burden on ecosystems on land, as their placement does not affect

cultivated agricultural or other valuable territories. According to research, offshore wind turbine projects can reduce the cost of electricity by 20-30 % over the next decade [11].

In addition, innovations in the processing and disposal of wind turbine components are an important area. The development of technologies such as 3D printing for creating blades and other parts of turbines allows not only to significantly reduce waste, but also to increase the accuracy and efficiency of production, which helps reduce the need for materials with high environmental costs. By enabling more lightweight and aerodynamic designs, 3D printing also enhances the overall energy efficiency of wind turbines, further optimizing their performance over the lifecycle. 3D printing technology also opens up new possibilities for manufacturing parts directly on site, which reduces transportation costs and reduces the carbon footprint associated with logistics. In addition, approaches such as the use of recycled materials and biocompatible polymers in structures help reduce the need for rare earth metals and other rare resources, whose extraction has a significant impact on ecosystems. The ongoing research into biodegradable composites for turbine blades offers additional promise in minimizing the environmental burden of decommissioned equipment in the future.

The development of new methods for processing wind turbine components, including turbine blades, requires the introduction of technologies that make it possible to efficiently extract and reuse not only metals, but also other materials such as carbon fibers, which were previously difficult to recycle. The use of methods such as pyrolysis and thermochemical processing will help significantly increase the recycling rate of old components. Recent advancements in low-temperature pyrolysis and solvent-based recovery methods show particular promise, allowing for more efficient preservation of valuable materials' structural properties during recycling. In turn, this contributes to the creation of closed production cycles, minimizing waste and re-involving resources in production processes. Such closed-loop models are crucial for reducing industry's overall environmental impact and are increasingly supported by both regulatory frameworks and industry standards focused on circular economy principles. The use of such approaches not only reduces the environmental footprint, but also ensures more efficient use of natural resources, which is becoming an important part of the sustainable development strategy in the wind energy industry.

The integration of wind power plants into industrial energy has a significant impact on the rational use of natural resources, helps reduce the carbon footprint, reduce the need for water and land resources, and helps reduce dependence on fossil energy sources. The development of technologies such as the improvement of wind turbine design, the use of 3D technologies, as well as the introduction of recycling of old turbines, will further reduce the impact of wind energy on ecosystems. Moreover, digitalization and the use of artificial intelligence in turbine monitoring and maintenance allow for predictive diagnostics, extending the operational life of turbines and reducing the frequency of repairs and replacements, which in turn contributes to more sustainable resource management.

The use of wind turbines, including in hybrid systems and on large areas, opens up new opportunities for industry, which will ensure a sustainable and environmentally

safe energy supply. For instance, hybrid renewable energy systems that combine wind with solar, biomass, or energy storage technologies allow for more stable and efficient energy delivery, especially in remote or off-grid industrial zones. In the long term, such measures contribute not only to the rational use of natural resources, but also to strengthening sustainable development, reducing environmental pollution and ensuring energy efficiency.

For the successful implementation of these initiatives, it is necessary to continue to support innovations in the field of renewable energy, as well as to improve legislative and financial support for such projects. This includes the creation of incentive mechanisms such as tax breaks, green bonds, and preferential financing programs that encourage investments in wind energy and related sustainable technologies. With this in mind, wind energy is becoming an integral part of the strategy for the transition to more sustainable and environmentally friendly energy production at the global level.

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PROSPECTS FOR THE USE OF ROBOTS IN OPTIMIZING THE TECHNOLOGY OF HANDLING A BLOCK CONTAINER TRAIN

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Abstract. The article examines the history of the development of robots and their applications. The factors of the introduction of robots into production and transport logistics are analyzed. The demographic situation in the Russian Federation and its impact on the country's economy have been studied. Measures are proposed and economic calculations are given for optimizing the technology of handling a block container train.

Keywords: collaborative robots, unmanned technologies, routing, optimization, economics, robotization.

ПЕРСПЕКТИВЫ ПРИМЕНЕНИЯ РОБОТОВ В ОПТИМИЗАЦИИ ТЕХНОЛОГИИ ОБРАЩЕНИЯ МАРШРУТНОГО КОНТЕЙНЕРНОГО ПОЕЗДА

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Аннотация. В статье рассматривается история развития роботов, области их применения. Проанализированы факторы внедрения роботов в производство и транспортную логистику. Изучена демографическая ситуация в Российской Федерации и ее влияние на экономику страны. Предложены меры и приведены экономические расчеты по оптимизации технологии обращения маршрутного контейнерного поезда.

Ключевые слова: коллаборативные роботы, безлюдные технологии, маршрутизация, оптимизация, экономика, роботизация.

The development of robotics began in 1928 by the American engineer J. Wensley, who designed the first robot, Mr. Telecox. The robot looked like a human, was voice-controlled, and could carry out simple commands. Then robots appeared in the USSR, Great Britain, and Japan, but society was skeptical about such developments due to a lack of understanding of the scope of these inventions [1, p. 13].

The first use of robots in industry began in 1959 in the USA, where scientists came to the conclusion that the processes of loading and unloading and transportation can be performed by a computer. Such ideas became the impetus for the development of robots for casting, forging, machining, welding and coating in the 1960s.

Today, robotics is developing rapidly, which is associated with the need for fast cargo delivery.

Today, South Korea is the leader in the number of robots employed in the industry. The effectiveness of implementing robots depends on several factors. Firstly, robots are effective in production, where operations are constantly repeated. Secondly, the cost of robots should not be too high, otherwise it will affect production. Thirdly, the availability of specialists who can effectively manage and operate robots. [2, p. 21].

With the development of technology in robotics, cobots have appeared. Cobots are autonomous devices capable of establishing virtual communication with humans, with the help of which interaction between a robot and a human is possible, whereas previously there was a clear division of their labor.

According to official statistics from Rosstat, the population of the Russian Federation decreased by 1.8 million people from 2020 to 2024 [3], which tells us that in 4 years the number of working people in the economy, including in railway transport, has decreased, only by the end of 2022 in Siberia and the Far East recorded a significant negative balance of the population – 86,997 people (Fig. 1), which led to a shortage of personnel, therefore, it is most promising to use cobots in production. The most effective are flexible grippers that work with fragile, perishable products and do not harm humans, as well as cobots used in the field of logistics related to the transportation of goods [4, p. 286].



Figure 1 – Demographic situation in the subjects of the Siberian and Far Eastern Federal Districts (2022)

The article discusses the logistics scheme for the export of export cargo from Biryulinskaya station in the direction of China. The type of rolling stock is open-top

containers. The next link in the chain is the delivery of imported goods through the Kleshchikha station, where this cargo will be unloaded. For the purpose of additional technological effect, it is proposed to inspect the fitting stops on platforms with removed containers at Kleshchikha station, and then a container train with empty containers departs according to the local schedule to load coal at Biryulinskaya station [5, p. 20]. Taking into account the economic effect, as well as technological advantages, it is proposed to make changes to the current technology by eliminating the inspection of fitting stops with the removal of containers and providing visual monitoring of their condition to robotic equipment such as cobots.

The main advantages are: reduction of idle time of wagons at the loading station due to the fact that inspection by teams of inspectors and repairmen will be eliminated, as well as removal of empty containers from platforms; safety of fitting stops of wagons; reduction of wagon turnover at the station; increase in revenues of Russian Railways.

To date, cargo transportation is carried out along the closed ring route B – K (exp.) – B. Inspection of the fitting stops of the platform wagons is carried out within the framework of the technology of JSC Russian Railways No. 911-2020 PKB CV dated 02/01/2021. The workers of the technical inspection department who performed the maintenance of the car during preparation for loading with the painting in the book of VU-14 MVTS are responsible for the serviceability of the fitting stop before the car is returned to the initial station of loading the container onto the car [6, p. 8]. As part of the proposals for changes to the current technology, it is proposed to exclude the inspection of the fitting stops of specialized platforms at Biryulinskaya station, and to introduce the possibility of organizing only the loading of export cargo for the departure of a new container train. A schematic diagram of the technological sequence of following a looped route when changing the inspection technology of the fitting stops of platform wagons is shown in Figure 2.

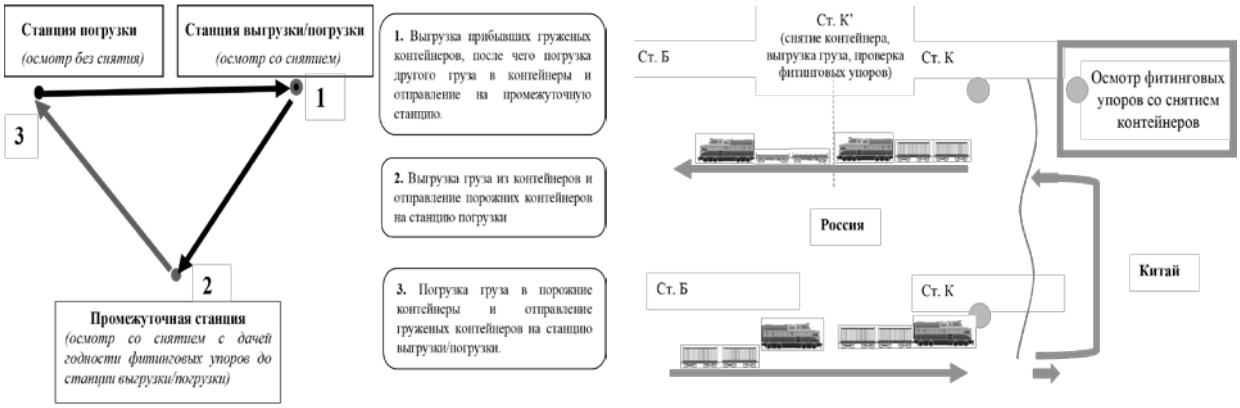


Figure 2 – Diagram of the sequence of inspection of the fitting stops of platform wagons at intermediate stations following the established looped routes on the infrastructure of Russian Railways using three stations

The main changes in technology are the following: the control of plates with stops for fixing ODS containers is performed visually. When the container(s) are

mounted on the wagon, the inspection is performed from the side of the side beams in the visible area for the inspector. The base of the stop is controlled through the gap between the side beam and the container, as well as the stops through the holes in the container fittings. Thanks to the development of modern systems, it is proposed to transfer all the listed actions for the inspection of rolling stock to robotic equipment with photo-video monitoring of fitting stops. The implementation of these systems will make it possible not to call an ODS employee to intermediate stations for container trains, which will have a positive impact on the transportation process.

The current technology of organizing the inspection of wagons leads to long downtime of wagons at loading stations. According to the technology of forming a container train, the standard for inspection of one container is 3.47 minutes, then the inspection of a train consisting of 67 platform wagons with 134 containers will be 464.98 minutes. Considering that a total of 4 container trains are formed in this direction every month, and in the future it is possible to send 10 such routes per month, the saving of people per hour in annual terms will be determined by:

$$Эк = 12 \cdot \frac{N_п \cdot m_{конт} \cdot t_{од.конт.}^{осм}}{60},$$

where, $N_п$ – number of container trains per month, train/month;
$m_{конт}$ – number of containers in one container train, cont.;
$t_{од.конт.}^{осм}$ – time to inspect one container, min.

$$Эк = 12 \cdot \frac{4 \cdot 134 \cdot 3{,}47}{60} = 371{,}984 \frac{\text{person} - \text{hour}}{\text{yea}} \text{by } 4 \frac{\text{march}}{\text{month}},$$

$$Эк = 12 \cdot \frac{10 \cdot 134 \cdot 3{,}47}{60} = 929{,}96 \frac{\text{person} - \text{hour}}{\text{yea}} \text{by } 10 \frac{\text{march}}{\text{month}}.$$

When taking into account the hourly tariff rate (HTS) of the inspector-repairman at 180.66 rubles/hour, the annual savings will amount to 746,745.2 rubles/year. If we take into account the list of employees at the railway station, then there should be at least 2 such inspectors and repairmen, and therefore the costs are proportionally higher. But this is provided that these workers will not be called to the place of inspection of the rolling stock and the condition of the fitting stops, and control over the performance of the functions of the robot will be included in the current regulations and job descriptions of maintenance inspectors as an element of remote technology of work at railway stations. A detailed calculation of the salary of the inspector-repairman is given in Table.

Table – Calculation of the salary of an inspection repairman

№ п/п	The name of the expense item when calculating wages	Calculation formula and explanations to it	Salary amount, thousand rubles/year
1	The tariff part of the monthly salary	$Z_1 = \text{ЧТС} \cdot \Phi_{\text{мес}}$ where ЧТС is the hourly tariff rate of an inspector-repairman of wagons of the 8th category of the 2nd level of remuneration 2,69·67,16 = 180,66 rub; $\Phi_{\text{мес}}$ – The average monthly working time is 164.4 hours in 2024.	$Z_1 = 180{,}66 \cdot 164{,}4 = 29\,700{,}504$ rub;.
2	Additional payment for harsh and harmful working conditions	$Z_2 = \frac{Z_1 d_{\text{т}}}{100}$ where $d_{\text{т}}$ – the percentage of additional payment for work with harmful and harsh working conditions is equal to 4%	$Z_2 = \frac{29\,700{,}504 \cdot 4}{100} = 1\,188{,}02$ rub.
3	Additional payment for night work	$Z_3 = \frac{Z_1 d_{\text{н.в}}}{100}$ where Z_1 – salary, rub.; $d_{\text{н.в}}$ – the average percentage of additional payment for night work. $d_{\text{н.в}} = t_{\text{н}} \cdot \frac{40}{t_{\text{р}}}$ where $t_{\text{н}}$ – the number of hours of work at this worker at night per day; $t_{\text{р}}$ – total working time at this workplace per day; 40 – the amount of additional payment established by the collective agreement for each hour of work at night (40%).	With round-the-clock operation ($t_{\text{н}}$ = 8 h., $t_{\text{р}}$ = 24 h.) the average value of the surcharge for night work as a percentage of the tariff earnings will be: $d_{\text{н.в}} = 8 \cdot \frac{40}{24} = 13{,}33\%,$ $Z_3 = \frac{29\,700{,}504 \cdot 13{,}33}{100} = 3959{,}07$ rub,
4	Additional payment for work on public holidays	$Z_4 = \frac{Z_1 d_{\text{п.д}}}{100}$ where $d_{\text{п.д}}$ – the average percentage of additional payment for work on public holidays.	$d_{\text{п.д}} = \frac{14 \cdot 100}{365} = 3{,}84\%,$ $Z_4 = \frac{29\,700{,}504 \cdot 3{,}84}{100} = 1140{,}49$ rub.

		$d_{\text{п.д}} = \frac{Д_{\text{п.д}} \cdot 100}{Д_{\text{р}}}$ where $Д_{\text{п.д}}$ – number of holidays in the planned period (14 days); $Д_{\text{р}}$ – the number of business days in the planned period (365 days).	
5	Bonuses	The bonus of the car inspector-repairman is set at 40% of the salary. $Z_5 = \frac{Z_1 d_{\text{пр}}}{100}$ where $d_{\text{пр}}$ – percentage of bonus by staff category	$Z_5 = \frac{29\,700{,}504 \cdot 40}{100} = 11\,880{,}20$ rub.
6	Additional payment based on the district coefficient	The district coefficient $d_{\text{рк}}$ s set in the territory of the region "K" at 30%. $Z_6 = \frac{(Z_1 + Z_2 + Z_3 + Z_4 + Z_5) \cdot d_{\text{рк}}}{100}$	$Z_6 = \frac{\begin{pmatrix}29700{,}504 + \\ 1188{,}02 + \\ 3959{,}07 + \\ 1140{,}49 + \\ 11880{,}20\end{pmatrix} \cdot 30}{100} = 14360{,}48$ rub.

Investing in domestic automation and robotics projects brings significant dividends in the long term. Russian Railways is taking the necessary steps in the digitalization of the transportation industry, as well as the introduction of robots, manipulators, cobots and drones. According to a rough estimate, the cost of a mobile robot is from 1.5 million rubles [7], which is comparable to the annual salary of an on-site inspection and repair team. Of course, one should also take into account the serious risks of equipment malfunction, software availability and updates, the influence of climatic conditions, etc. However, for economic justification, this study provides the use of robotic technology for simple operations only for video recording and eliminating the need to call workers to the inspection site and remote data transmission. The introduction of new technologies will improve the existing logistics of container trains, reduce their downtime at intermediate stations, increase the rhythm of transportation and reduce the costs of Russian Railways.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN PROTECTING DIGITAL IDENTITY AND CYBERSECURITY IN THE CONTEXT OF DIGITALIZATION OF SOCIETY

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Abstract. This article explores the key areas of artificial intelligence application in ensuring cyber security and protecting digital identity in the context of rapid digitalization of society. Special attention is given to the use of machine learning algorithms for detecting and preventing cyber threats, as well as analyzing user behavior and network traffic to identify anomalies at an early stage. The article presents examples of successful implementation of AI technologies across various sectors, including energy, transportation, and healthcare.

Keywords: artificial intelligence, digital identity, cyber security, data protection, digitalization.

РОЛЬ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ЗАЩИТЕ ЦИФРОВОЙ ИДЕНТИЧНОСТИ И КИБЕРБЕЗОПАСНОСТИ В УСЛОВИЯХ ЦИФРОВИЗАЦИИ ОБЩЕСТВА

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Аннотация. В статье рассматриваются ключевые направления применения искусственного интеллекта в обеспечении кибербезопасности и защите цифровой идентичности в условиях стремительной цифровизации общества. Особое внимание уделяется использованию алгоритмов машинного обучения для выявления и предотвращения киберугроз, а также анализу поведения пользователей и сетевого трафика с целью раннего обнаружения аномалий. Приводятся примеры успешного внедрения ИИ-технологий в различных отраслях, включая энергетику, транспорт и здравоохранение.

Ключевые слова: искусственный интеллект, цифровая идентичность, кибербезопасность, защита данных, цифровизация.

In the era of digitalization, more and more aspects of our lives are moving online. Banking operations, medical records, government services, and social interactions are now conducted through digital platforms. This highlights the importance of protecting our digital identity – a set of data that defines us on the internet. A leak or theft of this data can have serious consequences, including financial loss, fraud, and threats to personal safety.

The rise of cybercrime, including phishing, malware, and authentication attacks, challenges the effectiveness of traditional security systems. Static rules and signature-based methods are no longer sufficient to provide reliable protection against modern, rapidly evolving threats. Artificial intelligence (AI) offers a solution capable of dynamically adapting to new challenges, analyzing user behavior, detecting anomalies, and preventing attacks in real time.

The purpose of this article is to examine the role of AI in protecting digital identity and cyber security, analyze its capabilities and advantages, and present examples of successful applications of machine learning technologies for data security.

Digital identity security is of paramount importance, as its compromise can lead to serious consequences, including unauthorized access to personal information, fraudulent financial transactions, and identity theft. With the exponential growth of online services and the volume of personal data stored in cloud environments, traditional password-based authentication methods are proving increasingly ineffective. This is further exacerbated by the widespread practice of reusing passwords across multiple platforms, significantly increasing the risk of compromise.

One of the promising directions in ensuring digital security is the use of artificial intelligence (AI) for protecting digital identity through dynamic analysis of user behavior. Unlike traditional authentication methods based on static data such as passwords or PIN codes, behavioral biometrics involves continuous monitoring of unique characteristics of user interaction with a device. These characteristics include typing rhythm, mouse movements, touchscreen gesture speed and trajectory, as well as how a mobile device is held. These parameters are difficult to replicate, making them a reliable tool for identification.

AI systems trained on large volumes of behavioral data are capable of creating individual user profiles and comparing current activity with a reference model in real time. When deviations are detected – such as logging in from an unusual location, changes in typing speed, or atypical navigation patterns – the system can initiate additional verification or block access. This approach significantly reduces the risk of account compromise, even in cases where authentication data has been leaked [1].

A practical example of this technology is demonstrated by the company “BioCatch”, which specializes in behavioral biometrics. Its solutions are used by leading financial institutions around the world. The “BioCatch” platform analyzes over 2000 behavioral parameters during a user session, including micro-delays in data entry, action sequences, and interaction patterns with the interface. If an attacker gains access to a client’s credentials, the system can detect behavioral inconsistencies and prevent fraudulent actions before they occur. According to the company, the implementation of such solutions has enabled banks to reduce fraud-related losses by millions of dollars annually.

In addition, AI is actively used to combat fraud in the financial sector. Banks and payment systems employ machine learning algorithms to detect suspicious transactions in real time. These systems analyze numerous factors, including transaction amount, recipient, transaction history, and even user behavior during the payment process. If the algorithm detects signs of fraud, the transaction may be blocked for further verification. Such technologies have already proven effective, reducing the number of successful attacks on bank accounts by dozens of percent [2]. For example, “Mastercard” uses its proprietary AI-based platform “Decision Intelligence” to assess the risk of each transaction in real time. “Sberbank” has also implemented AI solutions for transaction monitoring, significantly reducing financial losses from fraudulent activities.

The impact of AI on cyber security extends beyond digital identity protection. AI technologies are also used to detect and prevent complex cyber attacks, such as targeted phishing campaigns or malware-based attacks. Traditional antivirus solutions operate on signature-based detection, comparing files to a database of known threats. However, modern malware often changes its code to evade detection. AI, on the other hand, can analyze program behavior and identify suspicious actions, even if the code has not previously been encountered in databases. For instance, machine learning algorithms can track indicators such as unauthorized access attempts to system files or hidden network connections, enabling the detection of even the most sophisticated types of malware [3].

Another important area is the use of AI for network traffic analysis to detect anomalies. Cybercriminals often use covert communication channels to transmit data or control infected systems. Machine learning algorithms can identify unusual patterns in network activity that may indicate a breach or data leak. For example, a sudden increase in data transmission volume during non-working hours may signal that attackers are exfiltrating confidential files. Such systems help prevent data leaks before they lead to serious consequences. Additionally, AI is used to protect against distributed denial-of-service (DDoS) attacks by analyzing traffic and automatically redirecting or blocking suspicious requests [4]. “Cloudflare”, for instance, uses AI to analyze traffic and automatically respond to DDoS attacks, protecting millions of websites worldwide. Cisco integrates AI into its Secure Network Analytics solutions, enabling real-time detection of anomalies in network behavior. In 2025, top AI-powered network monitoring tools included platforms like “Darktrace” and “Juniper Mist AI”, which use behavioral analysis and machine learning to detect threats before they cause damage.

Examples of the successful use of AI for data protection can already be observed across various industries. Major technology companies such as “Google” and “Microsoft” are implementing machine learning-based systems to protect users from phishing and fraud. For instance, Gmail algorithms analyze millions of emails daily, identifying suspicious messages and blocking them before they reach users' inboxes. Social media platforms also use AI to combat fake accounts and the spread of disinformation. Facebook employs neural networks to detect bots and automated systems attempting to manipulate public opinion. In recent years, the issue of deepfakes – realistic fake images and videos generated using AI – has become particularly

pressing. To counter this threat, specialized algorithms are being developed to analyze subtle details such as facial expressions, eye movements, and video compression artifacts to distinguish genuine content from fake [5].

In the context of rapid digitalization of key sectors of the economy and social infrastructure – such as energy, transportation, healthcare, and communications – the importance of artificial intelligence in ensuring national cyber security is growing. AI technologies enable comprehensive analysis of network traffic, user behavior, and the operation of automated process control systems. These systems can detect anomalies that may indicate unauthorized interference. For example, a sudden change in parameters in a power plant control system may signal an external intrusion attempt. In Russia, such solutions are being implemented in the energy sector: companies like “Rosseti” and “Gazprom Energoholding” use AI to monitor telemetry and network events, allowing timely detection and prevention of interference in power grid management.

In the transportation sector, AI is also widely applied. For example, the Moscow Metro uses intelligent systems to analyze video streams and network activity. Since 2020, the Moscow Metro has been operating the “Sfera” video analytics system, which is based on artificial intelligence and biometric identification technologies. The system converts facial images into unique biometric keys and compares them with law enforcement databases. If a match is found, the system notifies the appropriate authorities within 3 to 5 seconds. During its operation, “Sfera” has helped detain over 1,500 wanted criminals and locate more than 1,000 missing persons, including minors. This not only ensures passenger safety but also protects against cyber attacks targeting train control systems, which are critical to the functioning of urban infrastructure.

Healthcare is becoming one of the most vulnerable sectors in terms of cyber security threats, as medical institutions process vast amounts of confidential information – from patients personal data to test results and medical histories. A data breach can lead not only to financial losses but also to serious consequences for patients’ health and safety. Moreover, cyber attacks targeting medical information systems can disrupt the operation of critical equipment, including life-support systems. Artificial intelligence plays a key role in protecting medical systems, providing both preventive monitoring and rapid incident response. Modern AI solutions are capable of analyzing network traffic, user behavior, and interactions with medical systems to detect anomalies that may indicate an attempted breach or the introduction of malicious software. For example, if the system detects unusual activity during nighttime hours or an attempt to access a database from an atypical location, it can automatically block the session and alert the security team. For instance, in 2023, an intelligent system in a European clinic detected an attempted attack on a Picture Archiving and Communication System (PACS), allowing the threat to be blocked in time and the integrity of the information to be preserved.

The digitalization of society inevitably leads to an increase in the volume of personal data online, making the protection of digital identity and cyber security more relevant than ever. Traditional protection methods are no longer sufficient to counter modern threats, opening new opportunities for the application of artificial intelligence.

AI enables real-time analysis of vast amounts of data, detection of anomalies, and prevention of cyber attacks before they cause damage.

Machine learning technologies have already proven effective in various fields, from financial monitoring to the protection of critical infrastructure. However, it is important to understand that AI is not a panacea but a tool that requires continuous improvement and adaptation to new threats. In the future, the development of artificial intelligence is likely to lead to the creation of even more reliable security systems capable of predicting and preventing cyber attacks before they occur.

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SURVEY AND ANALYSIS OF MODERN METHODS OF OVERHEAD CRANE HOISTING DRIVE PERFORMANCE IMPROVEMENT

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Abstract. The paper discusses ways to increase the productivity of overhead crane by means of hoisting speed control. Several methods of load measurement are compared. Particular attention is paid to the indirect load sensing method. The paper concludes by outlining the effectiveness of using algorithms integrated in variable frequency drives.

Keywords: field weakening, hoisting speed, load detection, variable frequency drive, overhead crane.

ОБЗОР И АНАЛИЗ СОВРЕМЕННЫХ СПОСОБОВ ПОВЫШЕНИЯ ПРОИЗВОДИТЕЛЬНОСТИ ПРИВОДА ПОДЪЕМА МОСТОВОГО КРАНА

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Аннотация. В работе рассматриваются способы повышения производительности мостового крана с помощью регулирования скорости подъема. Сравниваются несколько методов определения нагрузки. Особое внимание уделено методу косвенного измерения нагрузки. В заключении статьи подчеркивается эффективность использования алгоритмов, встроенных в преобразователи частоты.

Ключевые слова: ослабление поля, скорость подъема, определение нагрузки, крановый частотный преобразователь, мостовой кран.

Lifting mechanisms are used in many enterprises, from warehouses to metallurgical plants. This makes the idea of increasing their productivity an urgent task.

Since the crane's function is to move cargo, increasing its productivity is an increase in the speed of movement of mechanisms. The load lifting mechanism is the most loaded and, often, the slowest. This article discusses ways to increase crane performance by increasing the speed of the lifting mechanism.

The static power of the lifting mechanism will be defined as [1, p. 414]:

$$P = \frac{(Q + q) * v}{10^3 * m * \eta},$$

where Q – weight of the lifted load,

q – weight of the hook suspension,

v – nominal lifting speed of the load,

η – efficiency of the rope system and mechanism when lifting the nominal load,

m – number of mechanisms that lift the load.

Formula shows that increasing the speed will require more power with a constant weight of the load. The most obvious way is to replace the crane's equipment, such as the motor and gearbox.

However, replacing these drive elements may lead to the need to modernize other crane components, such as the braking system, ropes, and a more powerful motor will naturally require an equally powerful frequency converter. Based on the above, the question arises about the economic feasibility of this method.

A significant part of the working cycle of an overhead crane is occupied by lifting/lowering the hook without a load, while lifting /lowering occurs at the same speed, that is, at the nominal rate as the same process, but with a load.

If you make the engine run at a speed higher than the rated speed, you can optimize the process – reduce the time spent on work. With a microprocessor-based crane control system, it is possible to increase productivity without replacing equipment.

On cranes without a microprocessor control system, the engine and mechanical transmission may not need to be replaced, limiting yourself to installing a frequency converter and PLC.

Instead of replacing the motor, you can do without shorting the rotor winding of the phase motor, after which you can install a frequency converter [2, p. 5].

Since the rated ascent/descent speed is only slightly lower than the rated engine speed, it is necessary to accelerate the engine above the rated speed.

If necessary, accelerate the engine to a speed higher than the rated speed, you can resort to the method of weakening the magnetic field.

In the rated mode, the motor operates at the maximum allowable values, which means that the voltage cannot be increased, while if the frequency is increased at constant voltage, the magnetic flux will decrease, which will lead to a decrease in torque. That is why it is necessary to use field attenuation rather than increase voltage and frequency.

As the magnetic field of the motor weakens, its torque begins to decrease and its speed increases, as can be seen in Figure 1.

There are several ways to weaken the motor field [3, p. 15]:

1. Tabular
2. Voltage feedback method (automatic adjustment)
3. The direct and feedback method
4. Control of current amplitude and voltage angle.

All of these methods, with the exception of the feedback method, do not require equipment replacement, so they will be discussed below.

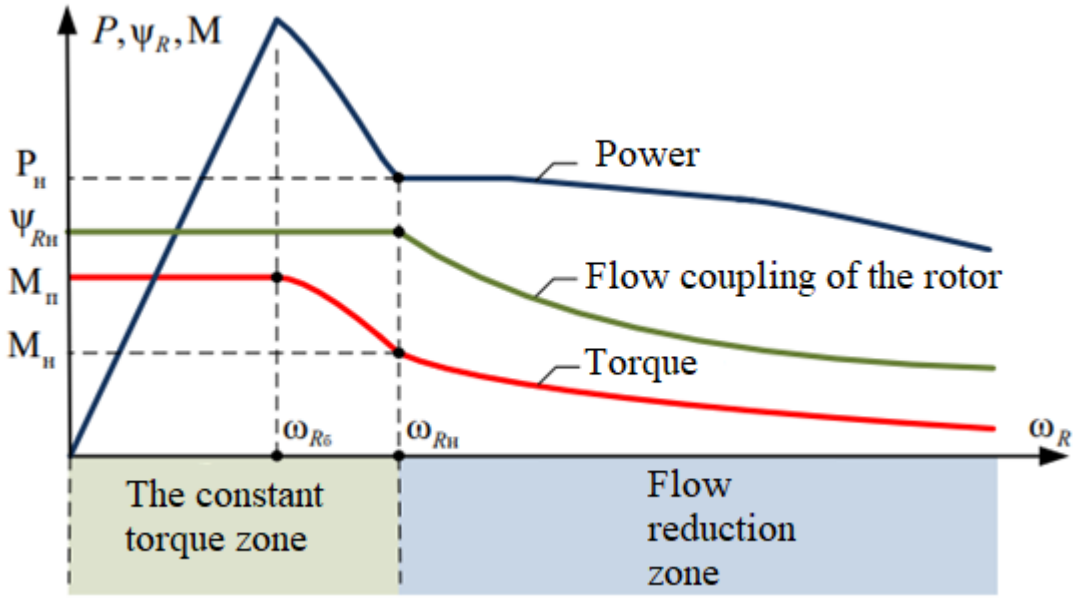


Figure 1 – Field Weakness

The tabular method.

Its essence lies in the fact that the dependence of the stator current component Isd on the motor speed is entered in the table. The system then selects the desired current based on this table.

This method is simple in comparison with the others, but it does not take into account load changes, therefore adaptation is not provided. Suitable for systems with constant operating conditions.

Note: Isd, Isq are the components of the stator current vector in the d-q system.

D – axis (direct) – coincides with the flow direction of the rotor

The Q – axis (quadrante) is perpendicular to the d – axis.

Isd is responsible for creating the magnetic flux, Isq is responsible for the torque.

The voltage feedback method.

In this case, the inverter monitors the output voltage, preventing it from reaching a value above the set limit. When a value close to the limit is reached, the Isd is reduced by the regulator, the flow is weakened and the voltage drops.

This method is universal and suitable for solving most tasks, it provides adaptation to changes in speed and load, but with sudden changes, delays are possible [4, p. 223].

Control of current amplitude and voltage angle.

Isq and Isd are calculated from the total stator current, which is set by the regulator. In turn, another regulator "monitors" the voltage value (it should not exceed 90-95 % of the maximum), and adjusts the angle of the voltage vector.

Since the torque value will be low at speeds above the nominal value, it is important to correctly determine the load, and it is the methods of determining the load that will be discussed later.

The considered methods are valid for both synchronous and asynchronous motors.

If the speed of the hook is increased, attention should also be paid to determining the load on the crane. The process of lifting the hook at an increased speed when a load is attached to it can lead to an emergency situation, which makes it necessary to

determine the load.

The load cell is well suited for this task and is most often used. The load cell can be mounted on: hook suspension, crane support units, lifting mechanisms. In this case, the sensor is mounted on a hook suspension. Due to the load, deformation occurs, the resistance on the resistors changes proportionally to the deformation. The value of the load can be determined from the received signal.

However, there are few other ways.

This method provides good accuracy in conditions where the speed is constant, but gives errors when it changes, due to the difficulty of accurately differentiating the speed signal to estimate acceleration. Figure 2 shows a diagram of this system [5, p. 2].

A method for measuring the load by torque and speed.

As the name suggests, this method is based on determining the load by torque and drive speed through feedback. The velocity signal is differentiated and multiplied by inertia to estimate the accelerating moment. The loss profile is programmed to approximate the calculation of friction as a function of velocity. These losses are subtracted from the torque feedback signal to obtain a load torque indicator, which is then filtered and scaled to determine the load.

This method provides good accuracy in conditions where the speed is constant, but gives errors when it changes, due to the difficulty of accurately differentiating the speed signal to estimate acceleration. Figure 2 shows a diagram of this system.

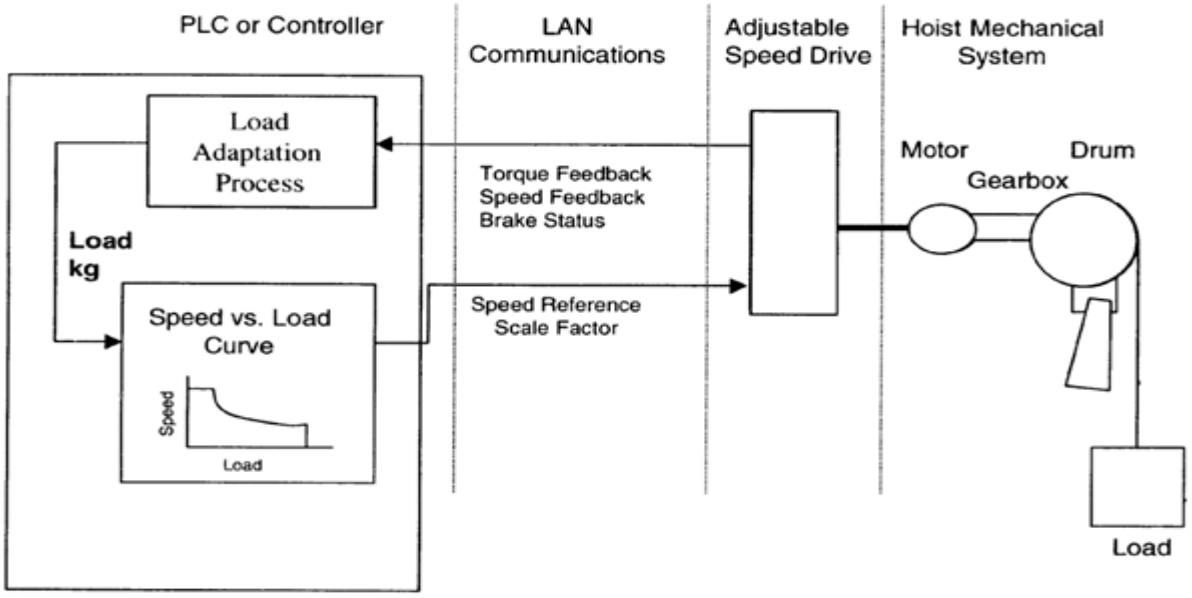


Figure 2 – System of measuring the load by torque and speed

The controller consists of a load measurement unit and a speed-load unit, which adjusts the speed depending on the weight.

The frequency drive controls the mechanical part of the winch and is connected to the controller via LAN or other interface. The drive transmits data about the torque, speed, and brake condition to the controller.

Similar algorithms are implemented on frequency converters of a specialized crane series: INVT GD350-19, VEDA VF-302C Crane Drive and so on.

For example, the frequency converter mentioned above has a function for controlling the lifting speed of an empty hook.

If the current frequency reaches or exceeds the threshold frequency, the frequency converter measures the current for a time equal to the value of the timer parameter. When the current value is below the threshold current, the converter increases the frequency to the maximum. If the current exceeds the threshold, the converter does not change the frequency.

For this mode to work, it is necessary to adjust some parameters of the converter: [6, p. 324]

1) P91.09 – the maximum frequency to which the converter can accelerate the motor (0-100 Hz)

2) P91.10 – threshold frequency (50-100% of the rated motor frequency)

3) P91.11 – timer parameter (0 – 10 s)

4) P91.12 – threshold current (0-150% of nominal)

5) P91.13 – threshold current at reverse (0-150% of nominal)

In this regard, the need for a PLC is completely eliminated, which significantly reduces the cost of modernization.

After installing the crane series frequency converter, it is possible to increase production productivity, while costs will be lower than in the case of PLC installation. Thus, the modernization task will be performed optimally, as much as possible.

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PPORTUNITIES FOR THE DEVELOPMENT OF SMALL POWER REACTORS

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Abstract. The article presents the prospects of small power reactors (SPR) as the main source of energy for remote areas and decarbonization of power engineering. The advantages of SMRs are analyzed: modularity, low capital costs, short construction periods and passive safety systems. Various projects and their role in providing Arctic, industrial and hybrid systems are reviewed. Environmental advantages – use of depleted uranium and closed cycles – are highlighted. Challenges are emphasized: competition with renewable energy sources, licensing difficulties and the need for public trust. The decisive role of state support for the introduction of RMM technology is emphasized.

Keywords: small power reactors, modular nuclear reactors, remote areas, floating NPPs, closed fuel cycle, passive safety systems, hybrid energy systems, decarbonization of energy, environmental safety.

ВОЗМОЖНОСТИ РАЗВИТИЯ РЕАКТОРОВ МАЛОЙ МОЩНОСТИ

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Аннотация. В статье представлены перспективы реакторов малой мощности (РММ) как основного источника энергии для удаленных территорий и декарбонизации энергетики. Анализируются преимущества РММ: модульность, низкие капитальные затраты, короткие сроки строительства и пассивные системы безопасности. Рассмотрены различные проекты и их роль в обеспечении Арктики, промышленности и гибридных систем. Отмечены экологические преимущества – использование обедненного урана и замкнутые циклы. Особое внимание уделено следующим проблемам: конкуренция с ВИЭ, сложности лицензирования и необходимость общественного доверия. Подчеркивается решающая роль государственной поддержки для внедрения технологии РММ.

Ключевые слова: реакторы малой мощности, модульные ядерные реакторы, удаленные территории, плавучие АЭС, замкнутый топливный цикл, пассивные системы безопасности, гибридные энергосистемы, декарбонизация энергетики, экологическая безопасность.

The topic of development of power generation by small power reactors is becoming more and more topical. The reason for this is the growing interest in the development of remote areas that cannot always be connected to a single state power grid. In the Russian Federation, vivid examples of such territories include hard-to-reach territories of the North, Siberia and the Far East, which do not have permanent logistic and energy connections with the developed territories, but at the same time are places of natural resources extraction, in particular, oil, natural gas, as well as non-ferrous and rare metals [1, 2].

The objects of energy consumption in them can be mining enterprises, settlements of small indigenous peoples, seaports, pumping stations of main gas and oil pipelines, defense facilities, etc. This is the cardinal difference in the functions of small reactors and traditional large power plants. If traditional power plants work in the general network and provide only the main, basic part of the total load, small power reactors have the task to provide all the needs of a small, localized network of consumers. Also, small power plants can be used as backup sources in areas with unstable power supply; it is worth noting that abroad, as one of the goals of the development of small power plants, the creation of a distributed generation system is considered [3].

Modern power generation must simultaneously solve two problems: to reduce carbon dioxide production and to meet the ever-increasing demand for energy. Traditional large nuclear power plants, although emission-free, have several problems – high cost, large expenditures of money and time for construction, and difficulty of use in remote regions. Small power reactors (SPRs), up to 300 MW according to the IAEA classification, unlike large nuclear power plants, combine flexibility, safety, and versatility. Their development opens up opportunities for supplying power to isolated areas, generating heat, and supporting the development of renewable energy sources. This type of small reactors attracts attention due to their short construction periods and relatively low investments (as all small reactors do). Another advantage of small power plants is the lower risk in financial investments, due to the relative low costs and relatively short time to build small power plants.

The key difference between RMMs and large analogs, and one of the main advantages of RMMs is their modularity. Also, the structures are designed for mass production, which reduces the commissioning time from 10-15 years to 3-5 years. For example, Russia's SVBR-100 demonstrates the possibility of using closed fuel cycles, which reduces dependence on enriched uranium. This reactor developed on the basis of nuclear submarine engines, which ensures natural circulation of the coolant, thus eliminating the need for pumps. Another example is high-temperature gas-cooled reactors (HTGRs), such as China's HTR-PM, which generate heat up to 750 °C for industrial processes such as hydrogen production.

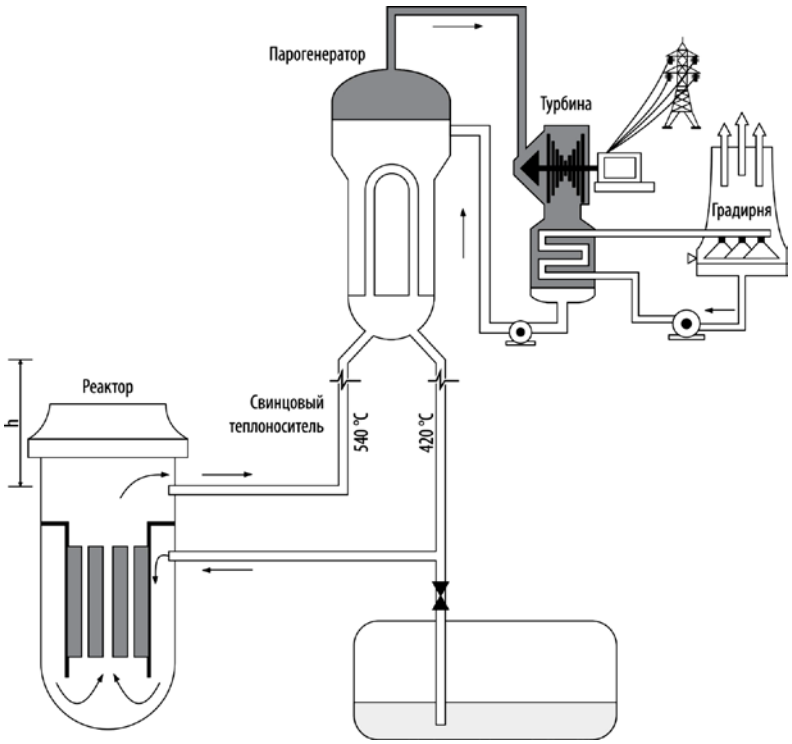


Figure – Simplified schematic diagram of low-power lead-cooled fast reactor (LCFR)

Floating NPPs, such as Russia's Akademik Lomonosov, which already supplies heat and electricity to the Chukotka Peninsula, in addition to producing up to 240000 m³ of fresh water per day. Such solutions are particularly relevant in the Arctic region, where the logistics of traditional fuels are extremely difficult and the requirements for environmental safety are strict. Similar projects to the Russian one are being developed in other countries: Canada is researching mobile reactors for mines in the far North, and Indonesia is developing models of floating NPPs to power islands.

The problem of ensuring the safety of PWMs is solved by technological innovations that make PWMs competitive. For example, passive systems, such as the aforementioned natural circulation of the coolant, eliminate the risks, in this example, associated with pump failure. Another example is the Shelf project, in which the reactor is placed underground, minimizing the effects of external influences such as earthquakes. The modular design of the reactor allows the core to be isolated at the plant, reducing on-site handling of nuclear fuel and thereby lowering radiation levels.

An environmental benefit may be the use of depleted uranium and fast neutrons in reactors like the Russian BREST-300 project not only reduces the volume of radioactive waste, but also makes it possible to reprocess spent fuel from other plants. This brings the nuclear power industry closer to realizing the concept of a closed cycle, where the waste from one plant can be used as a resource for another.

Capital costs for RMM are estimated at 3-5 thousand$ /kW, which is lower than for large NPPs (6-8 thousands /kW). Mass production, as in the case of the American NuScale (60 MW modules), can reduce the cost by 20-30 % by 2030. However, competition with renewables and gas-fired generation requires optimization.

Table 1 – Promising foreign projects of small modular reactors [4]

Project	Power capacity, MW	Type	Developer	Country	Status
ACP100	100	PWR	CNNC	China	Baseline project
DHR400	400 (heating supply)	Basin-type LWR	CNNC	China	Baseline project
SMART	100	PWR	KAERI	South Korea	Certified project
mPower	195*2	PWR	BWX Technologies	USA	In development
NuScale	50*12	PWR	NuScale Power	USA	In development
SMR-160	160	PWR	Holtec International	USA	Preliminary project
ACPR50S	60	PWR	CGNPC	China	Preliminary project
CTHTR300	300	HTGR	JAEA	Japan	Baseline project
A-HTR-100	50	HTGR	Eskom Holdings SOC Ltd.	South Africa	Conceptual project

Government support plays a key role in the development of small power reactors. For example, in the United States, the government's Advanced Reactor Demonstration program allocated 3.2 billions of dollars for the development of SMRs (Small Modular Reactors). In the Russian Federation, Rosatom is integrating SMRs into its Arctic development strategy, combining them with traditional pulverized coal and gas-fired CHP plants, as well as renewable electricity sources. For example, hybrid systems in Yakutia include SVBR-100 reactors and solar panels, providing stable power supply at temperatures below -50 °C [5].

Licensing of new technologies remains difficult due to high safety requirements. The NuScale project in the US has been delayed due to stringent requirements for seismic risk analysis. International IAEA standards, such as SSR-2/1, tighten regulations for protection and waste management, which increases the time taken for certification. Public fear of radiation, fueled by accidents like Fukushima and Chernobyl, requires education. However, statistics show that severe accidents at RRMs are 1,000 times less likely than at conventional nuclear power plants due to their compactness and passive safety. In Norway, where RRMs are planned to power oil platforms, open dialogues with the public are being held to dispel myths about nuclear power.

Pilot projects illustrate both the potential and the challenges. In China, a 210 MW HTGR is being completed to supply heat to the chemical industry. In Canada, ARC Clean Energy is developing a fast molten salt reactor capable of running on waste from conventional nuclear power plants. In Europe, the UK is investing $300 million

in the Rolls-Royce SMR, focused on replacing coal-fired power plants [6].

Russia's experience with the Akademik Lomonosov PWPP revealed the need to adapt the electrical infrastructure: to connect to onshore grids it was necessary to modernize substations. Another lesson is the importance of personnel training. A training center for operators has been opened in Chukotka, where VR simulators are used to practice emergency scenarios at the plant. But the main technical problems are related to materials. High temperatures during HTGR operation accelerate corrosion of steel, which requires the development of new alloys and materials. Waste disposal is still a challenge: even with closed nuclear cycles, some waste and materials require long-term storage under special conditions [7].

Economic competition with cheapening RES and conventional energy sources also remains a threat. However, by 2050, according to IAEA forecasts, RMMs may occupy 5-10 % of the global energy market, reducing carbon dioxide emissions by 1-2 billion tons per year. In the Arctic, their role will be the main one: by 2035, Russia plans to deploy 15 PATPPs to power the Northern Sea Route.

Table 2 – Implemented low power nuclear reactors.

Title	Reactor	Application	Electric capacity, MW	Heat generation, MW	Assignment
TPP-3 (Russia)	BWR	Electricity generation	1,5	—	Experiment
Beloyarskaya ATEC (Russia)	Water-graphite	Electricity and heat generation	48	78	Commercial
"Gamma" (Russia)	BWR	Electricity generation	0,0066	—	Experiment
AVR-15 (Germany)	HTGR with ball fuel elements	Same	15	—	Commercial
NHR-5 (China)	LWR	Heat generation	—	5	Experiment
Slowpoke-2 (Canada)	Same	Same	—	0,02	Same

Thus, small power reactors are not just an addition to the existing power system, but a tool for its large-scale transformation. Their introduction requires international cooperation, investment in R&D, and adaptation in regulation. For Russia in particular, with its inaccessible Arctic territories and experience in ship-based nuclear power, this represents a chance to strengthen its leadership in low-carbon technologies. Success in this will depend on the ability to combine innovation with safety, economics and public trust.

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IT TECHNOLOGIES FOR RESUME ANALYSIS

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Abstract. This article presents an overview and brief analysis of the classification of IT resources for processing candidates' resumes and managing human resources, solving key tasks and expanding the boundaries of existing HR methodologies.

Keywords: IT Technologies, recruitment process, resume screening, HR management, candidate evaluation.

ПРИМЕНЕНИЕ IT-ТЕХНОЛОГИЙ ДЛЯ АНАЛИЗА РЕЗЮМЕ КАНДИДАТОВ

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Аннотация. В статье представлен обзор и краткий анализ классификации IT-ресурсов для обработки резюме кандидатов и управления человеческими ресурсами, решения ключевых задач и расширения границ существующих методологий в области HR.

Ключевые слова: IT-технологии, подбор персонала, проверка резюме, оценка кандидата, управление персоналом.

In today’s fast-paced business environment, where the rate of development is accelerating and labor market competition is increasing, recruitment has become one of the key functions in HR management. The increasing reliance on online recruitment platforms coupled with the adoption of AI technologies has highlighted the critical need for efficient resume classification methods. Traditional hiring methods – including manual resume screening – are no longer efficient when a single job posting can attract hundreds or even thousands of applicants. In this context, the use of IT technologies for resume analysis becomes a necessity [1, 2]. This report explores the main technologies, their benefits, and their impact on the recruitment process.

Resume screening is a crucial stage of recruitment, but it takes HR professionals a lot of time and effort. In recruitment scenarios, person–job fit serves as a fundamental criterion for evaluating candidate suitability but in large companies, a single vacancy may be received by hundreds of applications that need to be reviewed and filtered. A recruiter might accidentally overlook a strong candidate – or, conversely, move forward with someone who clearly does not meet the requirements [3].

To avoid misleading and reduce time spent on initial screening, modern tools based on AI can be used.

A resume is a concise document in which a job candidate outlines his professional experience, skills, achievements, and qualifications. Its purpose is to present the applicant in a favorable light and demonstrate his suitability for a specific role.

For employers, a resume is the first tool for evaluating a candidate, helping them decide whether to invite the person for an interview [1].

Resume screening refers to the initial filtering of applicants for a vacancy. Recruiters check if candidates meet the key requirements of the job and eliminate those who clearly do not fit. A specific algorithm and criteria guide this process.

Candidates who pass the initial resume screening move on to the next stage. Sometimes this ends the screening phase, but some companies include an additional step: the screening interview. This is usually a phone call where recruiters ask clarifying questions not covered in the resume – for example, willingness to travel or experience with specific software versions [5].

Resume evaluation criteria include work experience, the relevance of past roles, employment duration at each position, such hard skills as knowledge of specific software, foreign languages, or equipment handling, soft skills comprising communication, teamwork, and leadership. Soft skills are harder to assess on paper and are usually evaluated during live interviews. As regards education, recruiters generally check whether the candidate's education aligns with job requirements. Resume formatting is also a crucial thing as a well-structured and grammatically correct resume shows the candidate's attention to detail. Valued qualities include:

- Clarity and logic: clearly separated sections without unnecessary information.
- Neatness: no spelling or grammar errors.
- Professional appearance: appropriate fonts and formatting.

A cover letter is a document that complements the resume and demonstrates the candidate's interest in the position but nowadays it is considered to be outdated [6]. Previously a cover letter contained a quick description of the work, or background and motivation, but the primary purpose was to provide info/metadata, as well as the paperwork to track enclosed documents/materials (perhaps there was supplementary information included with the manuscripts, or film negatives, or physical floppy disks). It could be considered almost like a receipt. Today, all of this information (metadata, supporting materials) is required to be input and uploaded into an online submission system [6].

Manual resume checking is time consuming and not productive. That's why HR professionals are increasingly turning to AI-powered resume screening tools [4, 6].

We have prepared a list of IT tools for CV screening.

1. *Applicant Tracking Systems (ATS)* imply software solutions designed to automate the candidate management process. Their main task is to collect resumes, sort them based on specified criteria, and provide recruiters with a list of the most suitable candidates [4].

2. *Artificial Intelligence (AI) and Machine Learning (ML)* are becoming essential tools in resume analysis and candidate selection. These technologies help process and analyze large volumes of data, identify patterns, and predict a candidate's potential for success based on historical data [6].

3. AI can analyze historical candidate data and identify characteristics that correlate with successful employment. Based on data analysis, AI can suggest the most suitable candidates for a specific job opening.

4. *Semantic analysis* is a technology that allows the evaluation of resumes not only at the level of keywords but also in the context in which they are used. This in-depth text analysis helps uncover a candidate's true skills and experience.

5. *Online Tests and Surveys*. IT technologies enable the creation of online tests and surveys that help assess a candidate's skills and qualifications even before a personal interview. This is particularly useful for roles that require specialized expertise.

6. *Social Media Analysis.* Today, social media plays a significant role in recruitment. Candidate profiles on professional platforms like LinkedIn can be used for additional analysis and verification of information.

7. *Video Interviews.* Video communication technologies allow recruiters to conduct remote interviews – something that became especially relevant during global disruptions such as the COVID-19 pandemic. Some platforms also offer features for analyzing a candidate's nonverbal behavior.

8. *Data Storage and Analytics.* Modern cloud technologies enable companies to efficiently store candidate data and perform analytics. This allows them to track candidate success within the company and make informed decisions about the recruitment process.

Despite the numerous benefits of using IT technologies in resume analysis, there are several challenges and ethical concerns that need to be addressed. One of the main concerns is algorithmic bias. If AI systems are trained on biased data – for example, favoring candidates from specific backgrounds or educational institutions – they may unintentionally perpetuate discrimination. Ensuring fairness and inclusivity requires transparency in algorithm design and regular audits of AI systems that specifically focus on resume categorization into distinct classes. The proposed methodology utilizes Convolutional Neural Networks (CNN) with Glove-Word Embedding for resume classification. Resumes undergo hierarchical segmentation, and a CNN model with word embedding is employed at each level for classification. The outputs from individual classifiers are amalgamated to define the overarching resume category hierarchy [7].

Data privacy is another critical issue. Handling large volumes of personal data entails strict compliance with data protection laws such as the General Data Protection Regulation (GDPR) in the European Union. Recruiters and HR departments must

implement secure systems to safeguard candidate information and maintain confidentiality throughout the recruitment process.

Another challenge lies in the accuracy of AI interpretations. While machine learning models are capable of analyzing resumes, they may sometimes misinterpret context or overlook nuanced information that a human recruiter would catch. Therefore, a hybrid approach – combining AI automation with human judgment – is often recommended to ensure balanced decision-making.

We have also analyzed a number of trends in resume analysis technologies. As technology continues to evolve, several issues are likely to shape the future of resume analysis:

1. Natural Language Processing (NLP) Advancements: Enhanced NLP models will improve machines 'ability to understand human language in greater depth, allowing for more nuanced resume evaluations that take tone, context, and subtle cues into account.
2. Integration with Predictive Analytics: Resume analysis tools may begin to incorporate predictive models that estimate not just the likelihood of hiring success, but also the candidate's potential for long-term retention and career progression within the company.
3. AI-powered Chatbots: Intelligent chatbots can conduct initial candidate screenings by asking dynamic questions based on the resume and job description. This helps further automate early-stage filtering.
4. Personalized Candidate Experience: AI systems will increasingly be used to tailor the recruitment experience for each applicant, offering customized communication, interview preparation resources, and status updates throughout the hiring process.
5. Cross-platform Integration: Future systems will likely offer seamless integration across job boards, social networks, corporate websites, and internal HR databases – enabling centralized and more efficient data handling.

Summing up all the points mentioned above, the integration of IT technologies into resume analysis has transformed the traditional recruitment methods into faster, more data-driven, and strategic processes. While challenges remain – particularly around bias, privacy, and ethical use – the benefits of increased efficiency, accuracy, and scalability are undeniable. Artificial intelligence combined with human resources has great possibilities to improve operational effectiveness and change HR processes. Adopting artificial intelligence in human resources requires careful consideration of ethics as well as efficiency. Efficiency-driven criteria center on how artificial intelligence may automate jobs, use data analysis to improve decision-making, and finally save time and money by streamlining HR procedures. However, ethical issues are important as they address the need to guarantee justice, preserve privacy, and uphold openness in choices made in artificial intelligence-driven companies. Managing these factors calls for a deliberate approach, the need to maintain ethical standards and the possibility for operational improvements must be carefully balanced. As technology continues to advance, organizations that embrace innovations will be better equipped to attract, evaluate, and retain top talent in an increasingly competitive job market.

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IMPACT OF AUTOMATION ON THE ENVIRONMENTAL PERFORMANCE OF INDUSTRIAL ENTERPRISES

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Abstract. The article presents an analytical review on the influence of automation on the environmental efficiency of industrial enterprises, and the effect of automation on environmental indicators of industrial enterprises is considered. Particular attention is paid to such modern technologies as artificial intelligence, the Internet of things and robotic systems that reduce greenhouse gas emissions, optimize energy consumption, reduce waste formation and increase water use efficiency. An example of the successful introduction of an automated system of disposal of waste heat at a cement plant is given.

Keywords: automation, energy efficiency, ecology, artificial intelligence, Internet of Things, robotics, heat utilisation.

ВЛИЯНИЕ АВТОМАТИЗАЦИИ НА ЭКОЛОГИЧЕСКИЕ ПОКАЗАТЕЛИ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ

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Аннотация. В статье представлен аналитический обзор о влиянии автоматизации на экологическую эффективность промышленных предприятий. Рассматривается влияние автоматизации на экологические показатели промышленных предприятий. Особое внимание уделено таким современным технологиям, как искусственный интеллект, Интернет вещей и роботизированные системы, которые позволяют снизить выбросы парниковых газов, оптимизировать энергопотребление, уменьшить образование отходов и повысить эффективность водопользования. Приведен пример успешного внедрения автоматизированной системы утилизации отработанного тепла на цементном заводе.

Ключевые слова: автоматизация, энергоэффективность, экология, искусственный интеллект, Интернет вещей, робототехника, утилизация тепла.

Automation of production processes has a significant impact on environmental indicators of industrial enterprises. It allows us to optimize the use of natural resources, minimize emissions of harmful substances and waste, as well as reduce energy consumption. Industrial enterprises are traditionally the main sources of environmental pollution. However, the introduction of modern automation technologies opens up new opportunities to increase the environmental efficiency of production.

One of the key areas of automation is to reduce greenhouse gas emissions. Modern monitoring systems [1] allow you to track the level of carbon dioxide emissions (CO_2) and other pollutants in real time. For example, the use of predictive analysis technologies helps optimize fuel combustion processes in metallurgical enterprises. This not only reduces the amount of harmful substances secreted, but also minimizes fuel costs. At one of the metallurgical plants, the introduction of such a system made it possible to reduce Co_2 emissions by 25 % [2], which became a significant step towards the implementation of international environmental standards.

Energy efficiency is another important aspect of automation. Modern technological process management systems provide accurate control of the parameters of the equipment: temperature, pressure and flows. For example, the use of intellectual algorithms for managing electric motors allows you to reduce energy consumption by 10-15 % [3]. In conditions of rising energy prices, such technologies become especially relevant.

Automation also plays an important role in optimizing water use. Water quality monitoring systems allow you to quickly identify pollution and prevent them from getting into the environment. In addition, technology for cleaning and re -use of water helps reduce the consumption of fresh water resources.

Particular attention is paid to reducing waste formation. The technologies of automatic product quality control can minimize the amount of marriage in production. Robotized waste sorting systems contribute to more efficient processing of secondary materials [4].

To illustrate the capabilities of automation, we will simulate an example of the disposal of the spent heat (from) using the Renkin organic cycle (ORC)-the technology for the disposal of low-potential heat in the industrial and energy sectors for generating conditionally paid and environmentally friendly electricity (Organic Rankine Cycle-Renkin's organic cycle, organic cycle, OTCR). At the cement plant, an ORC system was installed for converting the heat of exhaust gases into electricity. This made it possible not only to reduce thermal pollution of the environment, but also to provide the enterprise with additional electricity. The annual electricity production amounted to 40 million kilowat-hours (KWh), which brought the plant an income of 3.2 million rubles with the payback period of less than four years.

In the context of sustainable development, the disposal of the spent heat is especially important, which is a by product of many industrial processes. This heat can be effectively used for heating, electricity production or other needs, which not only reduces greenhouse gas emissions, but also increases the economic efficiency of

production [5]. To understand the influence of various automation technologies on the environment, it is necessary to consider their application and the effect that they have on the environment. Table presents the main technologies and their contribution to a decrease in the negative impact on environmental indicators.

Table – Examples of automation technologies and their impact on ecology

Technology	Application	Environmental effect
Artificial Intelligence	Process Optimization	Emission Reduction
Internet of Things (IoT)	Equipment Condition Monitoring	Efficient Resource Use
Robotic Systems	Waste Sorting	Waste Reduction

The technologies considered can significantly improve the environmental indicators of industrial enterprises. Figure presents a fundamental diagram of the heat utilization system from the internal combustion engine (ICE), demonstrating the possibilities of using waste gas and coolant heat. The heat from the internal combustion engine can be aimed at various needs, such as heating or electricity production.

The diagram shows that the exhaust gases from an engine with a temperature of 460 °C enter the recycled gases (UG) heat utilizer, where they are heat the heat carrier, for example, antifreeze. After UTG, the gas temperature decreases to 120 °C. The heat of the coolant (antifreeze) is also disposed of in the heat utilizer of antifreeze (dot). Further, heat can be used to heat the consumer, for example, for heating premises. The radiator serves to cool antifreeze if there is no need to use heat. The scheme allows the use of heat from the ICE for various needs, which increases the overall energy efficiency of the system and reduces the negative impact on the environment [6].

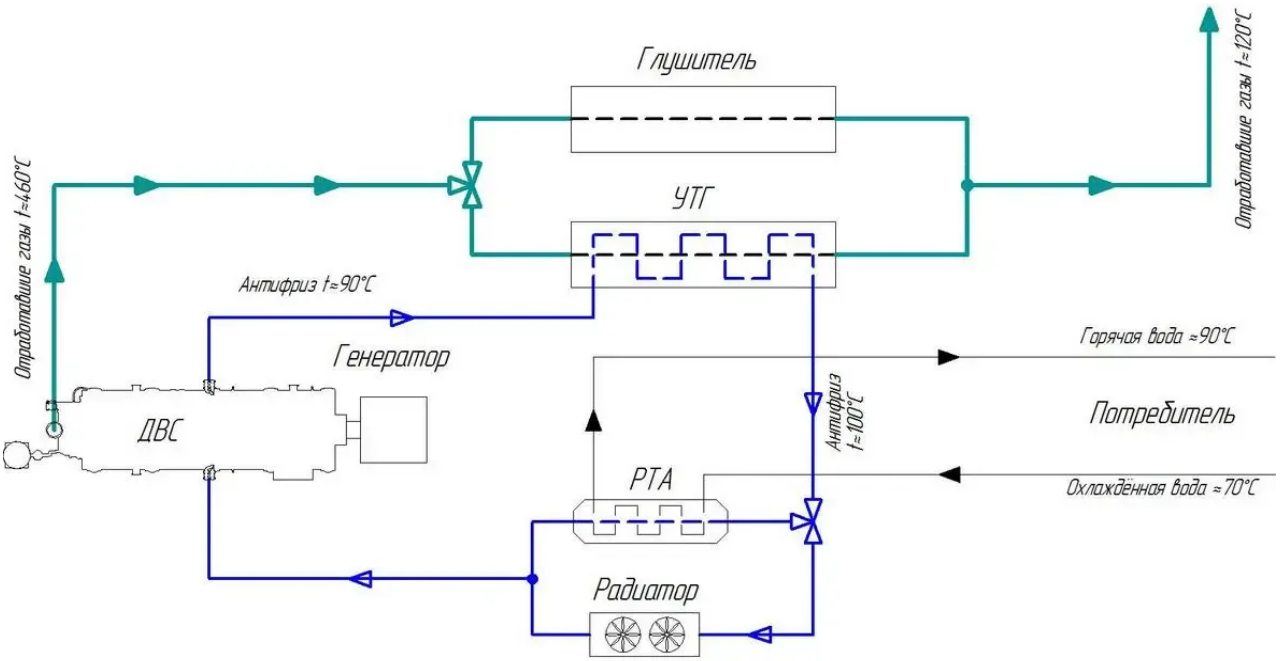


Figure – The principal scheme of the heat recycling system from the internal combustion engine

Automation of technological processes allows enterprises not only to improve their environmental indicators, but also to increase the economic efficiency of production. Despite the high initial investments in equipment and infrastructure, long-term benefits include reducing energy and resources costs, reducing fines for violation of environmental norms and increasing competitiveness by improving the image of the enterprise. The economic effect can also be achieved by increasing productivity and reducing operating costs [7].

One of the factors affecting the economic feasibility of introducing automation technologies is the price of energy. At high prices for electricity and fuel, projects for the disposal of waste heat become more attractive. In addition, state support in the form of tax benefits, subsidies and incentive programs also plays an important role in stimulating the introduction of environmentally friendly technologies.

Another important factor is the cost of equipment and its maintenance. A decrease in the cost of automation and disposal technologies makes them more affordable for a wide range of enterprises. In addition, it is important to take into account the costs of staff training and the adaptation of existing production processes to new technologies [8].

For a more detailed assessment of the economic efficiency of recycling heating, we will consider an example of the introduction of an ORC system at a cement plant. Suppose that the factory has a source of waste heat with a temperature of 300 °C and a heat capacity of 10 MW. To convert this heat into electricity, an ORC system with a capacity of 5 MW is installed.

Suppose that the capital costs of installing an ORC system amount to 10 million rubles. The annual electricity production is 40 million kWh, and the price of electricity is 8 rubles per kWh. Under such conditions, the annual income from the sale of electricity will be 3.2 million rubles. If we assume that annual operating expenses amount to 150 thousand rubles, then net annual profit will be 3.05 million rubles. The payback period of the project will be about 3.3 years, which makes this project very attractive from an economic point of view. In addition, ecological benefits should be taken into account, such as a reduction in Co_2 emissions, which can lead to additional economic advantages in the form of tax benefits and improve the image of the company.

Thus, the integration of artificial intelligence, the Internet of things and robotics into production processes opens the way to create stable production systems of the future. Automation becomes not just an tool for increasing efficiency, but also an important element of the global strategy for protecting the environment.

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FIFTH-GENERATION MOBILE NETWORKS: OPPORTUNITIES, APPLICATIONS, AND SAFETY

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Abstract. This article is dedicated to the technology of fifth-generation mobile communication (5G). It examines the main principles of operation, distinctive features, and applications of the technology across various sectors. Particular focus is given to safety issues and the potential impact of electromagnetic fields on human health. The article presents research findings that confirm the safety of 5G, along with future prospects for its implementation.

Keywords: 5G mobile networks, mobile communication technology, digital information transmission, safety issues, electromagnetic field.

МОБИЛЬНАЯ СВЯЗЬ ПЯТОГО ПОКОЛЕНИЯ: ВОЗМОЖНОСТИ, ПРИМЕНЕНИЕ И БЕЗОПАСНОСТЬ

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Аннотация. Статья посвящена технологии мобильной связи пятого поколения (5G). Рассматриваются основные принципы работы и особенности технологии, ее применение в различных сферах. Особое внимание уделяется вопросам безопасности и потенциальному воздействию электромагнитных полей на здоровье человека. В статье представлены результаты исследований, подтверждающие безопасность 5G, а также перспективы внедрения данной технологии.

Ключевые слова: мобильные сети 5G, технология мобильной связи, передача цифровой информации, вопросы безопасности, электромагнитное поле.

The development and implementation of fifth-generation (5G) mobile communication technologies represent a crucial milestone in the evolution of modern information society. By providing significantly higher data transmission speeds, lower

latency, and expanding the capabilities of the Internet of Things (IoT), 5G opens new horizons for diverse applications affecting various aspects of human life. However, the widespread adoption of this technology raises concerns related to safety and potential adverse health effects. This paper analyzes the key technical specifications, application domains, and scientific research that supports the safety of 5G technology.

Principles of Operation of 5G Networks. The core principle of 5G networks involves the use of radio waves for the transmission of digital information over large distances [1, p. 317]. The fifth-generation mobile communication system is based on compact antenna stations, typically installed on towers (Figure 1). Depending on their height and the terrain features, these stations can transmit signals over distances ranging from 1 to 500 kilometers. Each antenna serves between 10 and 1000 users. Under maximum load conditions, signals from different devices are separated using time division, frequency division, and even power control techniques.



Figure 1 – Cell towers equipped with 5G antennas

Features of 5G Technology. *New Frequency Ranges.* The radio interface specified by 3rd Generation Partnership Project for 5G is known as New Radio (NR). It operates within two frequency (FR) bands: FR1 (600–6000 MHz) and FR2 (24–100 GHz), each with unique capabilities.

Coverage of FR2 and High Frequencies. In the 5G standard, operation at frequencies of 24 GHz and above is supported. Signals in these high-frequency ranges are characterized by limited effective range, typically only a few hundred meters, in contrast to 4G or 5G signals at lower frequencies (up to 6 GHz). Consequently, 5G base stations must be deployed at intervals of a few hundred meters to ensure seamless coverage. Due to high attenuation, these signals poorly penetrate solid objects such as vehicles, trees, and walls. Therefore, small cell stations can be installed indoors or in locations where visual and physical accessibility permits, such as restaurants and shopping centers, allowing flexible deployment and unobtrusive installation.

Beamforming Technology. An essential feature of 5G antennas is beamforming, where a focused signal beam is directed precisely toward a device, ensuring a stable high data transfer rate [1, p. 320]. This is achieved by combining antenna array elements to create constructive interference in the signal's direction, while destructive

interference diminishes the signal elsewhere. Phased array antennas facilitate this process by phasing signals across different elements, enhancing signal quality and strength. More efficiently, digital array antennas can perform beamforming without phase shifters, by digitally controlling the antenna elements to form narrow, directed beams. This technology improves communication quality and increases data transfer speeds through enhanced signal-to-noise ratios, which scale with the number of antenna elements.

Multi-Element Digital Antenna Array Systems is one of the key technologies for implementing 5G cellular networks (Figure 2). It involves the deployment of multi-element digital antenna arrays at base stations, with the number of antenna elements reaching 128, 256, or more.

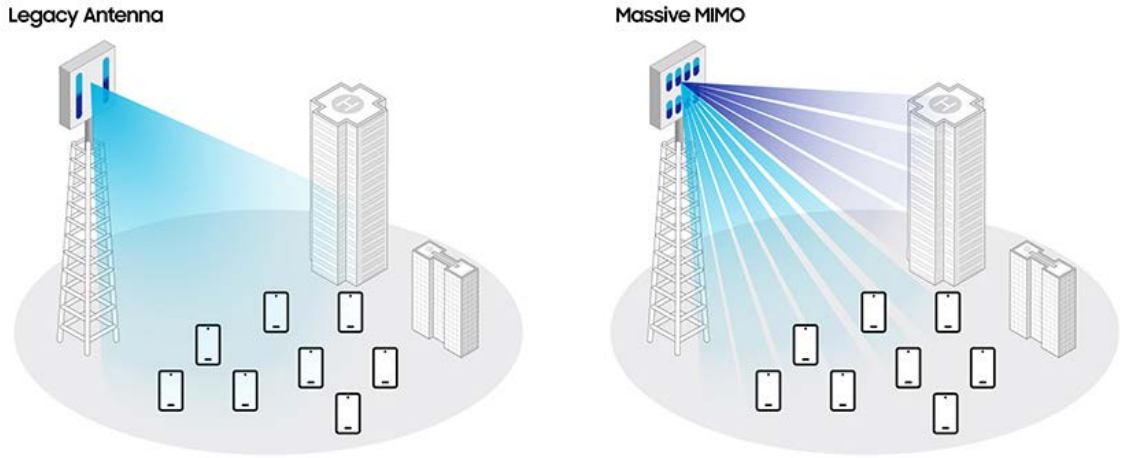


Figure 2 – Implementation options for cellular networks

To enhance spectral efficiency, alongside spatial multiplexing, 5G can utilize variants of non-orthogonal multiple access (NOMA) technologies and non-orthogonal frequency division multiplexing (N-OFDM) signals.

Small cells are low-power radio access nodes operating within licensed and unlicensed spectra over ranges from 10 meters to several kilometers. Small cells are critical for 5G networks because high-frequency 5G signals cannot propagate over long distances due to increased attenuation at higher frequencies. Practical deployment involves placing transmitters at street level or above five meters, typically on lamp posts, to ensure coverage and signal quality.

Hardware. At the end of 2018, Intel introduced the XMM 8160 modem (Figure 3) supporting fifth-generation mobile networks, alongside Qualcomm’s X50, Huawei’s Balong 5000, and MediaTek’s Helio M70 modems.

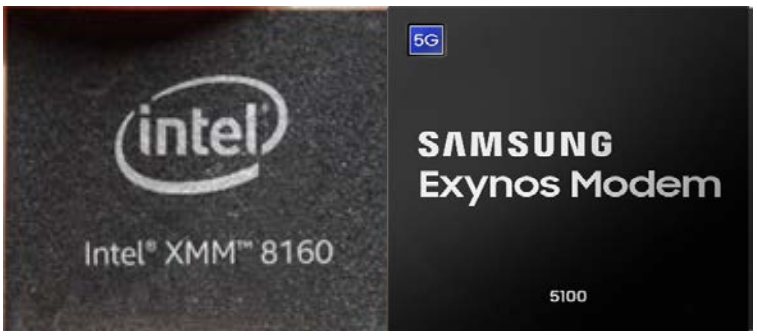


Figure 3 – 5G modems: Intel XMM 8160 and Samsung Exynos Modem 5100

Further, at the Mobile World Congress (MWC) 2022, Qualcomm Technologies announced the Snapdragon X70 5G modem (Figure 4), capable of supporting all commercial 5G frequency bands from 600 MHz up to 41 GHz [2, p. 249].

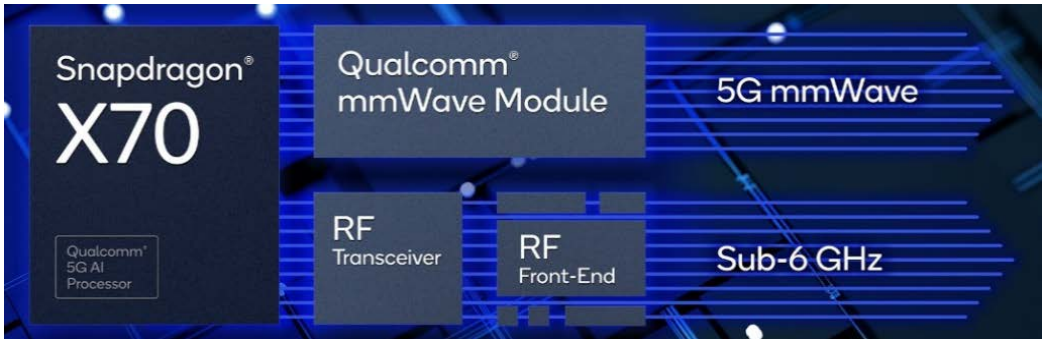


Figure 4 – Snapdragon X70 5G modem

Applications of 5G Technology in Various Sectors. The applications of 5G technology are diverse (Figure 5). Let us consider some of them.

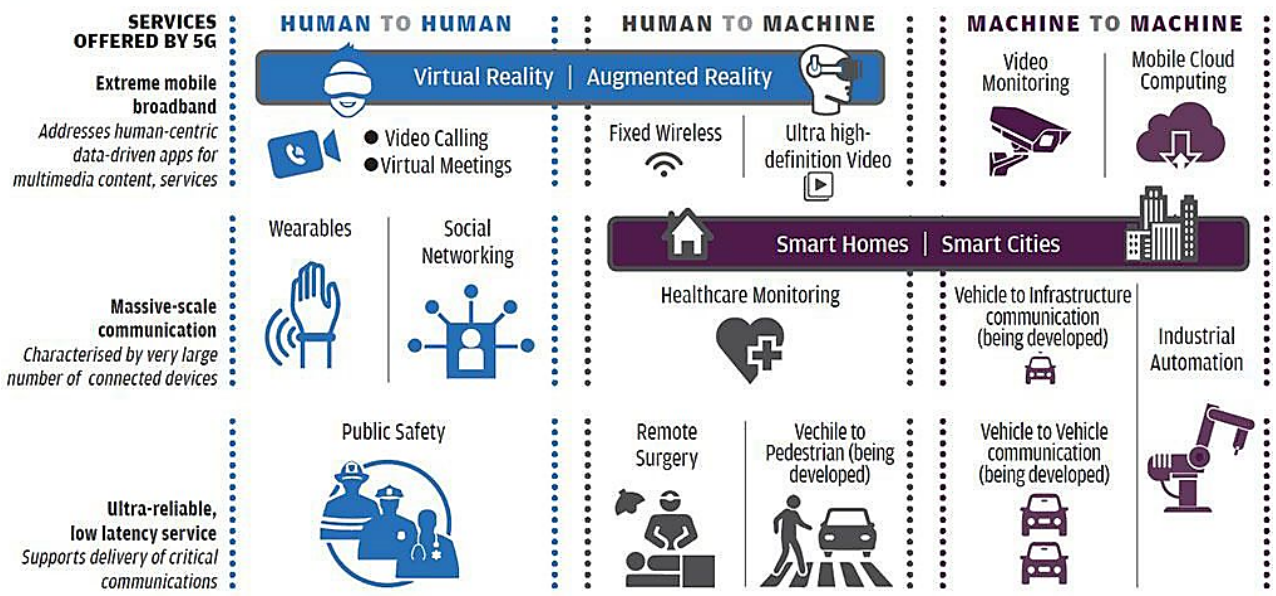


Figure 5 – Applications of 5G technology

Medicine. Thanks to 5G technology, patients requiring emergency assistance will no longer need to travel to clinics or hospitals. New technologies enable the transmission of vast amounts of data without delay and are in demand in pediatrics, psychotherapy, dermatology, neurology, and even intensive care. If a patient cannot be transferred to another hospital, a critical video consultation with a more specialized expert can save lives. A highly qualified surgeon can remotely observe the ongoing operation via a 5G video feed and provide guidance to colleagues or control auxiliary devices during the procedure [3, p. 399].

Transport. Thanks to high data transmission speeds, next-generation wireless networks will facilitate the development of autonomous vehicles. According to PwC forecasts, fully autonomous transport will appear in major cities worldwide by 2040. 5G will enable autonomous cars to interact with roads, traffic lights, street signs, and parking facilities. Data from connected vehicles and IoT sensors will be transmitted to cloud storage and processed in real time. Based on this, traffic flow can be monitored, urban transport routes optimized, priority given to emergency vehicles (ambulances, fire services, police, etc.), and violations recorded. 5G will play a critical role in ensuring the safety of autonomous vehicles due to low latency; in emergencies, traffic controllers can take immediate control of vehicles if needed.

Smart Homes. When discussing everyday life, 5G is primarily associated with the Internet of Things and smart homes [3, p. 400]. The number of connected devices constantly grows: smart bulbs, sockets, speakers, cameras, locks, and more. To ensure that a large number of devices communicate with each other swiftly and reliably, a high-speed connection is necessary. 5G technology can address these challenges while simultaneously increasing home security and reducing energy consumption. For example, surveillance systems transmitting signals with delays of only a few milliseconds exist today. IoT-based systems may include smart meters that autonomously transmit readings to utility companies, thermostats that regulate energy consumption, and gas sensors capable of detecting leaks.

Entertainment. It is expected that, thanks to 5G, the global entertainment industry will increase revenue by over $1 trillion [3, p. 397]. High data transfer rates and minimal latency will lead to breakthroughs in cloud gaming. For instance, as early as August 2019, MegaFon demonstrated the first example of cloud-based 5G gaming. The processing of complex 3D graphics is handled by a dedicated server, and the resulting images are transmitted over the 5G network with minimal delays to a regular laptop. As a result, gameplay matches that of a high-performance gaming PC, eliminating the need to purchase expensive hardware. Furthermore, games can be launched from anywhere covered by 5G, even if the user is sitting on a park bench. 5G will also allow users to download full-length movies within seconds, rather than minutes, and access streaming multimedia content almost instantaneously.

Impact of the Technology on Humans. The deployment of fifth-generation mobile networks raises public concerns regarding potential negative effects on human health [4, p. 110]. There are opinions that electromagnetic fields increase the risk of cancer, induce cellular stress, elevate harmful free radicals, cause genetic damage, lead to structural and functional changes in the reproductive system, impair learning ability and memory, induce neurological disorders, and exert overall negative effects on well-

being. There have also been claims of harmful impacts on other animals and plants. A group of 240 scientists signed an open letter titled “International EMF Scientist Appeal”, addressed to the United Nations, World Health Organization (WHO) and United Nations Environment Programme (UNEP). Based on this, some individuals argue that the effects of 5G equipment radiation have not been sufficiently studied and that this radiation could be hazardous to human health. Let us examine this issue in more detail.

Some people refer to their so-called “electromagnetic hypersensitivity”, but controlled experiments conducted in 2019 and 2021 found that these individuals did not perceive the presence of electromagnetic fields or radiofrequency radiation on their bodies [5, p. 198]. Additionally, research has not revealed any evidence of harm from high-frequency electromagnetic radiation at low power, which is used in 5G devices. Moreover, radiation at frequencies of 6 GHz and above is unable to penetrate deeply into the body; the only observed effect is mild skin heating. Researchers have tested hypotheses concerning the genotoxicity of the radiation, its influence on cell proliferation, gene expression, nerve impulse transmission, effects on cell membrane permeability, and other factors. Epidemiological studies have also been conducted to identify possible correlations between 5G radiation and public health. All high-validity studies have found no evidence of any impact of 5G radiation on the human body or health.

In conclusion, it can be noted that 5G technology offers broad prospects for the development of modern society, contributing to improving quality of life and progress across various sectors. At the same time, it is necessary to continue active scientific research to evaluate potential risks and ensure user safety. A systemic approach and strict adherence to international standards will be key to the harmonious implementation of 5G and to achieving maximum societal benefits while minimizing potential negative consequences.

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COMMUNICATION WITH SPACE AND MODERN DATA TRANSMISSION TECHNOLOGIES

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Abstract. This article examines the history of communication systems in space, from the earliest radio signals and technologies employed during the launch of the first satellites to modern methods of optical and radio communications. The key stages of the evolution of space-based telecommunications are analyzed, highlighting their technical features, advantages, and limitations. Special attention is given to the rospects for the further advancement of communication systems in space.

Keywords: space communication systems, radio communication, optical communication, satellite technologies, International Space Station.

СВЯЗЬ С КОСМОСОМ И СОВРЕМЕННЫЕ ТЕХНОЛОГИИ ПЕРЕДАЧИ ДАННЫХ

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Аннотация. Данная статья посвящена истории развития систем связи в космосе, начиная с первых радиосигналов и технологий, используемых при запуске первых спутников, и заканчивая современными методами оптической и радиосвязи. Рассматриваются основные этапы эволюции космических коммуникаций, их технические особенности, достоинства и недостатки. Особое внимание уделяется перспективам дальнейшего развития систем связи в космосе.

Ключевые слова: космические системы связи, радиосвязь, оптическая связь, спутниковые технологии, Международная космическая станция.

The exploration of space represents one of humanity’s most significant technological achievements of the 20th century. The launch of the first artificial Earth satellite, Sputnik-1, in 1957 marked the beginning of a new era in scientific and

technological progress. Since then, maintaining reliable communication channels between astronauts and ground control has become a crucial aspect of space exploration. The dependability and efficiency of these communication systems are vital for ensuring the safety of crew members, the successful execution of missions, and the acquisition of valuable scientific data.

Challenges of the Space Environment. The unique conditions of space, including the absence of an atmosphere, vast distances, and the deep vacuum, impose stringent requirements on communication tools. To establish dependable data links between astronauts and ground stations, extensive scientific research and innovative technological solutions have been developed. Over several decades, various methods and devices for space communication have been designed and improved, and these will be discussed in this paper.

Early Radio Communications. The primary means of communication in the initial stages was radio, which was used for long-distance signal transmission (Figure 1). Experiments with radio wave propagation began as early as the late 19th century; however, it was only in the mid-20th century that radio communication gained practical application in space research.



Figure 1 – Evolution of radio communication



Figure 2 – The first artificial satellites: Sputnik-1 and Sputnik-2

The earliest spacecraft employed basic radio stations for transmitting telemetry data and control commands [1, p. 116]. One of the first successful attempts to establish radio communication with a space object was the launch of the Soviet satellite *Sputnik-1* in 1957 (Figure 2). Communication was achieved through the satellite's onboard radio transmitter device, the *D-200*, which was mounted inside the artificial satellite. It emitted radio waves at two frequencies: 20.005 MHz and 40.002 MHz, alternately. The satellite signals consisted of telegraph-like packets – short radio pulses lasting approximately 0.3–0.4 seconds, followed by pauses of similar duration. Signal reception was carried out using conventional amateur radio equipment at distances of up to 2000–3000 kilometers.

Development of Radio Frequency Communication Systems: Over time, radio communication systems evolved and advanced. Initially, shortwave radio systems were used for communication with the first spacecraft. These systems enabled long-distance signal transmission but were vulnerable to atmospheric interference and depended heavily on the state of the ionosphere (Table 1). This made shortwave systems unreliable for long-term use. In the 1960s, spacecraft began to be equipped with ultra shortwave radio systems. These provided higher accuracy and reliability since they were less affected by atmospheric conditions. Ultra shortwave ystems have since become the backbone of most modern space communication radio systems. Their advantages include multiple reflections from Earth's surface and the ionosphere, allowing signals to propagate over very large distances. The optimal frequency range for such communication lies between 1.5 and 30 GHz. At shorter wavelengths, energy losses increase due to absorption by water molecules and oxygen in the troposphere, while longer wavelengths face propagation disruptions caused by the ionosphere.

Table 1 – Radio communication in space

Functions of Radio Communication	Telemetry Data Transmission: Spacecraft transmitted to Earth information about their status, such as temperature, pressure, battery charge levels, and other parameters.	Control Commands: Commands were sent from Earth to control various spacecraft systems, such as course adjustments, activation of scientific instruments, and other operations.
Use of Radio Stations	The earliest spacecraft employed simple radio stations for signal transmission, operating on fixed frequencies and transmitting basic signals.	Signals were conveyed as "beep" or "pulses" and could be easily detected by amateur radio operators and scientific institutions.
Impact on Future Research	Achievements in radio communication served as the foundation for the development of more complex communication systems used in modern satellites and interplanetary missions.	Radio communication remains critically important for mission management, including crewed spaceflight, lunar exploration, Mars missions, and other objects within the Solar System.

The development of satellite communication systems was closely linked to the creation and launch of the first artificial Earth satellites. For instance, the Soviet satellite *Sputnik-1* enabled scientists to study the upper layers of the ionosphere and gather crucial data for subsequent launches. The primary goal of *Sputnik-2*, launched on November 3, 1957, was the experimental investigation of the potential existence of life beyond Earth. The capsule carried the first space- faring dog, Laika, who lived in space for 4–5 hours but died due to overheating. Early spacecraft used the *Tral* radio telemetry system for communication with Earth, which included onboard devices and ground stations for receiving and recording information.

Subsequently, during the onset of the space race, the American satellite *Explorer 1* was launched on February 1, 1958. It experimentally confirmed the existence of cosmic radiation. The spacecraft was equipped with two radio transmitters operating on two frequencies: 108.03 MHz and 108.00 MHz.

Development of Global Communication Networks. Over time, the number of artificial Earth satellites increased, and they began forming global communication networks. These networks enabled communication between spacecraft and different regions of the world [2, p. 301]. Using the first Soviet geostationary satellite, *Molniya-1C*, launched on July 29, 1974, a new communication technology called signal retransmission was tested – i. e., the process of receiving, amplifying, and re-transmitting signals. This innovation opened new possibilities for communications, especially in remote and hard-to-reach areas where laying ground-based communication lines was difficult or impossible.

In subsequent years, new generations of communication satellites with improved characteristics and longer operational lifespans were developed and launched. The number of geostationary satellites increased, providing continuous coverage over large territories. Simultaneously, low Earth orbit satellite systems with reduced signal delay and higher bandwidth were also developed. These advancements led to the emergence of various types of satellite networks designed to fulfill different tasks: from global telephony and data transmission to broadband Internet access and television broadcasting. Satellites have become an integral part of the global telecommunications infrastructure, enabling intercontinental communication and fostering globalization.

Table 2 illustrates the issues related to communication in space and potential solutions.

Table 2 – Problems in space communication and potential solutions

Problems	Solutions
Data Transmission Delays: The large distance to satellites causes delays, which are critical for real-time applications.	**Use of Low-Latency Protocols:** Development and implementation of protocols that minimize delays during data transmission.
Interference and Disruptions: Atmospheric phenomena and other sources can cause interference in signals.	**Error Correction Technologies:** Application of error correction methods to reduce the impact of interference.

Data Security: Protecting data from unauthorized access and cyberattacks.	**Data Encryption:** Use of modern encryption techniques to secure transmitted information.
Limited Bandwidth: Insufficient channel capacity can restrict the volume of transmitted information.	**Increasing Bandwidth:** Utilization of new frequency ranges and modulation technologies to enhance channel capacity.

Communication with the International Space Station (ISS). The International Space Station is considered as a key element in the exploration of outer space and in studying the effects of microgravity on phenomena familiar to humans [3]. As a “flying laboratory”, it holds significant scientific value for all of humanity. It is a modular structure capable of supporting human habitation for extended periods. For coordinating scientific experiments and astronauts in outer space, a dedicated radio communication system has been deployed on the ISS. A frequency of 145.990 MHz is used for transmission, while 145.800 MHz is used for reception. The station's radio equipment provides a high level of communication quality, allowing not only voice communication but also the exchange of photos and videos, which enhances the living conditions onboard the spacecraft. For example, astronaut engineer Oleg Germanovich posts video blogs directly from the ISS, regularly conducts live broadcasts, and manages social media accounts (Figure 3).

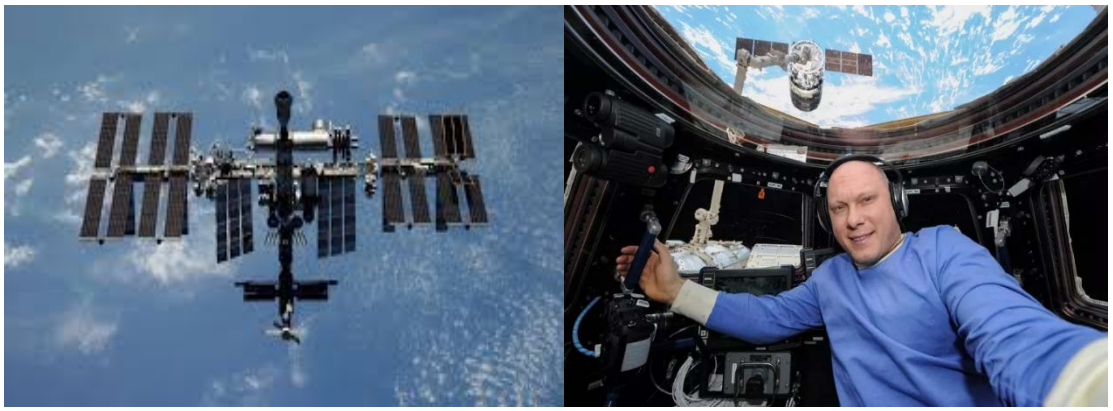


Figure 3 – Astronaut Oleg Germanovich on the ISS

Optical Communication. Another method of data transmission and communication is optical communication. Developments in this area began in the 1960s; however, due to the novelty of the technology, practical implementation was challenging [4, p. 658]. Optical systems transmit information via light waves, utilizing various wavelengths within the visible and infrared spectra. The main components of such a system include a light source (laser diode), a modulation unit, the transmission channel (typically vacuum or atmosphere), and a receiver. Light modulation is achieved by changing the intensity, phase, or frequency of the light beam, depending on the transmitted signal. This modulated light propagates to the receiver, which reconstructs the original signal. Key characteristics of optical communication systems include source power, beam divergence angle, wavelength, and receiver sensitivity [5, p. 155]. For space communication, minimizing signal loss during transmission and

ensuring high resistance to various types of interference are critically important.

Optical communication relies on laser technology, as lasers are used as light sources [6, p. 143]. Lasers generate coherent, monochromatic radiation that is highly directional and stable, enabling data transmission over long distances with minimal energy dispersion. Successful experiments of laser-based satellite-to-satellite links were conducted by the European Space Agency (ESA) as part of the SILEX (Semiconductor Laser Intersatellite Link Experiment) in 1992 [7, p. 235].

Tables 3 and 4 present the advantages and disadvantages of optical communication systems, along with a comparative analysis of radio and optical communication characteristics.

Table 3 – Advantages and disadvantages of optical communication systems

Advantages of optical communication systems	**Disadvantages of optical communication systems**
High data transfer speed	Dependence on atmospheric conditions
High reliability	Requirement for high pointing accuracy
Compactness and energy efficiency	High cost
Resistance to electromagnetic interference	Limited transmission distance

Table 4 – Comparison of radio communication and optical communication characteristics

Feature	**Radio Communication**	**Optical Communication**
Data transfer speed	Limited bandwidth, constrained within 1–2 Gbit/s	Higher transfer rates up to 100 Gbps and above
Transmission distance	Effective over long distances, including interplanetary missions	Ineffective over large distances due to the need for precise pointing
Pointing accuracy	Not required	Requires high pointing accuracy
Power consumption	Higher power requirements at high frequencies	More energy-efficient due to beam focusing
Equipment size and weight	Bulky equipment, problematic for small satellites	Compact and lightweight equipment
Interference resistance	Sensitive to solar radiation and other electromagnetic fields	Less affected by electromagnetic interference but can be disrupted by space dust or micrometeoroids
Security	Susceptible to interception due to broad transmission area	Harder to intercept due to narrow beam direction

Thus, laser communication is one of the main methods for transmitting information for artificial satellites of Earth. However, radio communication remains the priority in today's technologies. It is more flexible in tuning and can transmit over vast distances without data loss. It is used for communication with interplanetary probes, coordination of planetary spacecraft (e. g., on Mars), and communication with the International Space Station.

In conclusion, the history of space communication development exemplifies how technology can help humans overcome vast distances and provide reliable communication between astronauts and Earth. The advancement of space technologies has been a rapid and continuous process. Modern space communication systems support not only voice messaging but also the exchange of large data volumes, including video footage and telemetry information. These systems enable monitoring of spacecraft status, conducting scientific experiments, and maintaining contact with crew members onboard the ISS. Future development of space communication technologies will focus on increasing data transfer speeds, enhancing reliability and resistance to interference, and expanding capabilities for interacting with remote objects throughout the Solar System. It is significant to note that achievements in astronautics are crucial for not only exploring space but also for solving Earth-bound challenges such as global navigation, environmental monitoring, and ensuring national security.

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ADVANCEMENTS IN TECHNOLOGY CAN CHANGE THE SOCIETY

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Abstract. The article is devoted to the study of the impact of technology on modern society and communication processes. The advantages of technological progress are considered. It analyzes the emerging problems and offers practical recommendations for responsible use of technology and maintaining a healthy balance between virtual and physical space.

Keywords: technology, society, communications, automation, social media, information, privacy, artificial intelligence.

РАЗВИТИЕ ТЕХНОЛОГИЙ МОЖЕТ ИЗМЕНИТЬ ОБЩЕСТВО

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Аннотация. Статья посвящена исследованию влияния технологий на современное общество и процессы коммуникации. Рассматриваются преимущества технологического прогресса. Анализируются возникающие проблемы, а также предлагаются практические рекомендации по ответственному использованию технологий и сохранению здорового баланса между виртуальным и физическим пространством.

Ключевые слова: технологии, общество, коммуникации, автоматизация, социальные медиа, информация, конфиденциальность, искусственный интеллект.

In the modern world, technology has become an integral part of everyone's daily life. Its rapid development over the past few decades has fundamentally transformed the ways people interact, form opinions, and organize social structures.

The influence of technology extends far beyond mere convenience – it reshapes interpersonal relationships, redefines communication, and alters socio-political dynamics on a global scale. The impact of these advancements is both profound and

multifaceted, affecting nearly every aspect of human existence. From education and healthcare to business and entertainment, technology has revolutionized traditional systems, offering unprecedented opportunities while also presenting new challenges. [1, p. 32-38].

One of the most significant advantages of technological progress is the democratization of knowledge. Digital technologies have made information more accessible than ever before, breaking down geographical and socio-economic barriers. Online libraries, educational platforms, and open-access resources allow individuals from remote regions to acquire knowledge that was once restricted to elite institutions. This shift has not only expanded educational opportunities but also fostered a more informed and intellectually engaged global population. Moreover, the development of digital means of communication such as video calls, instant messaging, and social media has allowed people to keep in touch over vast distances, strengthening personal and professional relationships in ways that were unthinkable just a few decades ago.

The proliferation of mobile technologies has fundamentally altered the way people access information, communicate, and conduct daily activities. Smartphones and tablets have become ubiquitous, serving as gateways to the digital world for billions of users. Mobile apps provide instant access to a wide range of services, from banking and shopping to entertainment and social networking. This level of connectivity has created unprecedented opportunities for businesses to engage with customers, for individuals to stay informed, and for communities to organize and collaborate. However, the constant stream of notifications and digital stimulation can also lead to information overload, distractions, and a sense of being perpetually "switched on". Striking a balance between the benefits of mobile technology and the need for digital downtime is essential for maintaining mental well-being and productivity. We will consider this important point in more detail later.

Another critical area where technology has made a transformative impact is healthcare. Advances in medical diagnostics, such as AI-powered imaging and genetic testing, have improved early disease detection, significantly increasing treatment success rates. Telemedicine has emerged as a vital tool, particularly in underserved areas, allowing patients to consult specialists without the need for travel. Additionally, breakthroughs in pharmaceuticals, including personalized medicine and biotechnology, have provided solutions for previously untreatable conditions, extending life expectancy and enhancing quality of life for millions. The integration of wearable health devices has further empowered individuals to monitor their well-being in real time, promoting preventive care and healthier lifestyles.

The automation of industrial and business processes represents yet another milestone in technological advancement. Robotics and artificial intelligence have revolutionized manufacturing, logistics, and service industries by increasing efficiency, reducing human error, and lowering operational costs. Automated systems handle repetitive tasks with precision, freeing employees to focus on creative and strategic endeavors. This shift has not only boosted productivity but also redefined the nature of work, emphasizing skills such as problem-solving, innovation, and adaptability. Companies that embrace these technologies gain a competitive edge, while workers benefit from opportunities for professional growth and skill

diversification.

Technology is also transforming the labor market, creating new professions and making some traditional professions obsolete. For example, the demand for specialists in data analysis, cybersecurity, and artificial intelligence development is growing, while routine administrative and production roles are gradually being automated. This requires a review of the vocational education system and staff retraining so that employees can adapt to changing conditions. In addition, the geek economy (freelancing, remote work) is becoming more widespread, changing perceptions of stable employment and social guarantees.

Beyond individual sectors, technology has played a crucial role in enhancing urban infrastructure and sustainability. Smart city initiatives leverage data analytics, the Internet of Things (IoT), and renewable energy solutions to optimize resource management, reduce environmental impact, and improve residents' quality of life. Intelligent transportation systems minimize traffic congestion and accidents, while energy-efficient buildings and smart grids contribute to reduced carbon footprints. Smart homes, equipped with automated lighting, heating, and security systems, offer convenience while promoting energy conservation. These innovations collectively pave the way for more sustainable and resilient communities [2, p. 81-83].

Education has also undergone a radical transformation due to technological integration. Traditional classroom learning environments are increasingly being complemented and, in some cases, replaced by digital learning environments. Online courses, virtual classrooms, and interactive educational software provide flexible and personalized learning experiences, catering to diverse student needs. Platforms like Coursera, Khan Academy, and edX have made high-quality education accessible to millions worldwide, bridging gaps caused by economic or geographical constraints. Furthermore, gamification and augmented reality (AR) tools enhance engagement, making learning more dynamic and immersive. As the demand for digital literacy grows, educational institutions are adapting their curricula to prepare students for careers in an increasingly technology-driven economy.

Another important aspect of the impact of technology on society is its role in shaping culture and art. Digital platforms such as YouTube, Netflix, and TikTok have transformed the way content is consumed, making it more personalized and accessible. Virtual reality (VR) and augmented reality (AR) open up new possibilities for creativity, allowing artists and musicians to experiment with interactive formats. However, it also raises questions about copyright preservation, the monetization of digital art, and the impact of algorithms on cultural preferences.

However, despite these remarkable benefits, the rapid proliferation of technology has introduced significant challenges. One of the most pressing issues is the erosion of personal privacy. With the vast amounts of data generated through online activities, individuals are vulnerable to breaches, identity theft, and unauthorized surveillance. High-profile cases of data leaks by major corporations have heightened public awareness and concern over digital security. The commodification of personal information by tech giants for targeted advertising further complicates the ethical landscape, raising questions about consent and user autonomy in the digital age.

Another major concern is the prevalence of misinformation and its societal

repercussions. The internet, while a powerful tool for knowledge dissemination, also serves as a breeding ground for fake news, propaganda, and manipulated content. Social media algorithms often prioritize sensationalism over accuracy, amplifying divisive narratives and fostering polarization. The spread of false information can have dire consequences, from influencing elections to inciting public panic during crises. Combating this issue requires a concerted effort from tech companies, governments, and users to promote media literacy and fact-checking mechanisms [3, p. 223].

The pervasive use of digital devices has also given rise to concerns about psychological and physical health. Excessive screen time, particularly among younger generations, has been linked to sleep disturbances, eye strain, and reduced attention spans. The addictive nature of social media and online entertainment platforms can lead to decreased real-world social interactions, contributing to feelings of isolation and anxiety. Studies have shown a correlation between heavy technology use and mental health issues such as depression and low self-esteem, underscoring the need for balanced and mindful consumption.

Interpersonal relationships have likewise been affected by the digital revolution. While technology facilitates communication, it can also create a sense of detachment when virtual interactions replace face-to-face connections. The convenience of texting and social media often comes at the expense of deeper, more meaningful conversations. Many people report feeling lonelier despite being more "connected" than ever, highlighting the paradox of digital socialization. Maintaining authentic relationships in an increasingly virtual world requires intentional effort to prioritize in-person interactions and emotional presence [4, p. 16-18].

The impact of automation on the labor market deserves special attention. McKinsey estimates that up to 30 % of jobs could be automated by 2030. This will lead not only to the disappearance of some professions, but also to the emergence of new ones that require other skills. Society will face the need for mass retraining of workers, which may increase the social stratification between those who have successfully adapted and those who are unemployed.

It is also important to consider the environmental impacts of technological progress. For example, mining cryptocurrencies consumes a huge amount of energy, and the production of electronics leads to the accumulation of toxic waste. On the other hand, "green" technologies such as hydrogen energy or carbon capture systems can help combat climate change.

Looking ahead, the future of technology holds immense promise, with emerging innovations poised to further reshape society. Next-generation communication networks, such as 6G and quantum internet, promise faster and more secure data transmission, enabling real-time global collaboration. Virtual and augmented reality technologies are expanding beyond entertainment into fields like education, healthcare, and remote work, offering immersive experiences that blur the line between physical and digital realms. Artificial intelligence (AI) continues to advance, with applications ranging from autonomous vehicles to personalized learning assistants, revolutionizing industries and everyday life.

The introduction of artificial intelligence (AI) into various fields of activity marks a turning point in approaches to problem solving and decision-making. Modern

intelligent systems, ranging from sophisticated search engine algorithms to advanced machine learning models in medical diagnostics, are becoming an indispensable tool of our time. As these technologies improve, they open up opportunities for automating routine operations, processing huge amounts of information and obtaining analytical conclusions inaccessible to the human mind. However, the growing reliance on automated decision-making systems raises serious questions about the transparency of processes, the allocation of responsibilities, and the ethical implications of transferring important decisions to digital systems. Responsible development and application of intelligent technologies requires careful analysis of possible biases in algorithms, ensuring the fairness of decisions made and minimizing unforeseen negative consequences.

It can also be said that the development of sustainable technologies will be crucial for solving the environmental problems facing the planet. Renewable energy sources such as solar, wind, and geothermal are viable alternatives to fossil fuels, reducing carbon dioxide emissions and mitigating the effects of climate change. Advances in battery technology are driving the widespread adoption of electric vehicles, further reducing our reliance on traditional gasoline-powered vehicles. Smart grids and energy-efficient buildings optimize energy consumption, and waste management technologies reduce waste in landfills and promote recycling. By investing in and implementing these environmentally friendly technologies, we can create a greener and more sustainable future for future generations.

To harness these advancements responsibly, society must adopt a proactive and balanced approach. The following guidelines can help individuals and communities navigate the complexities of the digital age:

1. Develop digital literacy. Cultivate critical thinking skills to discern credible information from misinformation. Stay informed about digital security practices to protect personal data.

2. Maintain a healthy balance. Allocate time for offline activities, fostering real-world connections and mental well-being.

3. Prioritize data security. Use strong, unique passwords, enable two-factor authentication, and stay vigilant against phishing attempts.

4. Practice ethical communication. Engage in respectful and constructive online discussions, avoiding cyberbullying and hate speech.

5. Monitor technology usage. Be mindful of screen time and its impact on health, seeking professional support if digital habits become detrimental [5, p. 231-255].

In conclusion, technology has undeniably transformed society, offering unparalleled opportunities for progress while introducing new complexities. Its benefits – enhanced communication, improved healthcare, economic growth, and educational access – are counterbalanced by challenges such as privacy risks, misinformation, and social fragmentation. The key to a harmonious digital future lies in responsible adoption, where technological advancements are leveraged to foster connection, equity, and sustainable development. By embracing innovation thoughtfully and ethically, humanity can ensure that technology serves as a force for collective advancement rather than division. Only through mindful integration can we fully realize its potential as an engine of progress in the modern world.

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CALCULATIONS OF THE STRENGTH OF THE HULL, MAST AND RIGGING OF A SAILING YACHT

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Abstract. The article presents an algorithm for performing strength calculations of a sailing yacht in the equilibrium position with roll under sail using the finite element method (FEM). As an example, the strength of a 10-meter-long fiberglass yacht is calculated. Comparison of the results of numerical and analytical calculations obtained in this work allows us to judge about the efficiency of FEM application for strength assessment of small crafts.

Keywords: finite element model, polymer composite, spars, rigging, sails, ultimate wind load, stability margin, safety margin, local load.

О РАСЧЕТАХ ПРОЧНОСТИ КОРПУСА, РАНГОУТА И ТАКЕЛАЖА ПАРУСНОЙ ЯХТЫ

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Аннотация. В статье представлен алгоритм выполнения расчетов прочности парусной яхты в положении равновесия с креном под парусами при использовании метода конечных элементов (МКЭ). В качестве примера в работе выполняется расчет прочности стеклопластиковой яхты длиной 10 метров. Сравнение полученных в работе результатов численных и аналитических расчетов позволяет судить об эффективности применения МКЭ для оценки прочности малых судов.

Ключевые слова: конечно-элементная модель, полимерный композит, рангоут, такелаж, парусное вооружение, предельная ветровая нагрузка, запас устойчивости, запас прочности, локальная нагрузка.

The design of sailing yachts is a difficult task for yacht designers. On the one hand yachts must be reliable, with the necessary hull strength and rigidity to absorb the hydrodynamic loads and forces from the spars and rigging. The masts of yachts should also be reliable and strong, but at the same time they should be light and flexible, have

the minimum necessary cross-sectional dimensions to increase the stability of the yacht, reduce air resistance and the possibility of fine-tuning the mainsail.

Designing yacht hull structures from polymer composite material (PCM) consists in selection of composite materials, their structure, thickness of plating, bulkheads and decks, scheme and sizes of beams, providing general and local strength and stability of hull connections. The hull shape of yachts with curvilinear outlines considerably complicates calculations in comparison with ordinary vessels and causes the necessity of three-dimensional modeling considering the main structural elements.

Designing of masts implies selection of the standing rigging scheme for a particular type and size of the sails, selection of material, shape and dimensions of the mast cross-sections, spreaders and cables, design of the rigging and spar joints to the mast. Calculations of mast strength and stability should consider three-dimensional deformation and be based on the analysis of the spatial model “mast(s)-standing rigging”.

It should be noted, despite the presence of an official document [1], there are no domestic rules and methods for the design and calculation of the strength of the hull and spars of sailing ships and yachts. In [1] (part II “Hull”) only requirements for watertight bulkheads and cockpits are given. As to their construction and strength, in 1.2 it is only stated that “any required watertight bulkhead shall have sufficient strength to withstand the full water pressure without leakage into adjacent rooms” and in 2.1.1 that “cockpits shall be a solid structure forming part of the hull of a sport sailing craft”. In Part 7 “Spars, rigging and sails” in 7.1.1 it is written that “the spars and rigging shall be designed and constructed in accordance with established practice and appropriate to the area of operation of the sport sailing craft”. In this regard, when designing sailing ships and yachts, designers are guided by foreign rules and standards [2-4], e. g. DNV, GL, ABS, PRS rules, ISO 12215 standard and others.

In this paper, the authors propose an approach to the development of a methodology for calculating the strength of sailing yachts based on a refined calculation of wind loads on the spar and numerical three-dimensional FEM modeling of the yacht hull and the system “mast(s)-standing rigging”.

General design methodology. In a recent paper [5], the authors presented an original methodology including computer programs that clarify and automate the whole process of design and verification calculations of general and local strength and stability of the spatial system “mast(s)-standing rigging” of sailing ships and yachts. The description of the methodology and examples of calculations are also given in [6-10].

In this paper, attention is paid to the approach proposed by the authors to the refined calculations of the general and local strength of hull structures of sailing yachts and ships, including those made of PCM, using popular domestic and foreign computer software such as KOMPAS, ANSYS and others in this paper.

The main tasks of the proposed approach, as well as of any strength calculation, are the following: 1 – determination of design loads on the hull; 2 – determination of the stress-strain state (SSS) of the hull; 3 – evaluation of strength and stability of the hull elements.

The specific feature of the approach is the refinement of the calculation models

at all stages of the design process. The specified approach is realized for a 10-meter fiberglass sailing yacht with classical hull contours of the sloop type, the information about the hull design with some strength calculations is contained in [11]. Figures 1-2 show the sail plan and hull construction of this yacht.

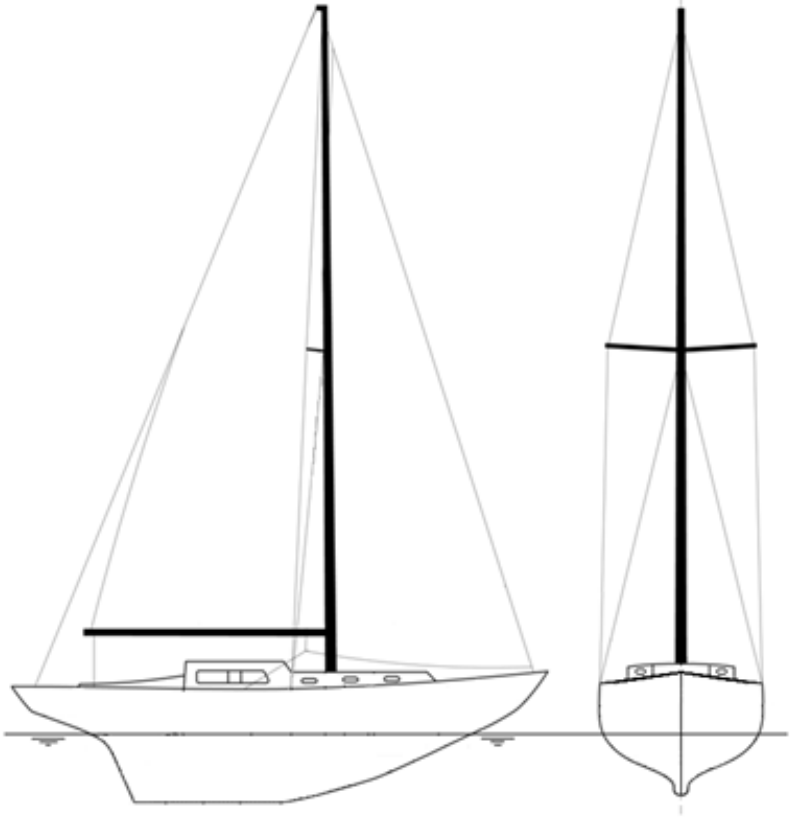


Figure 1 – Sail plan

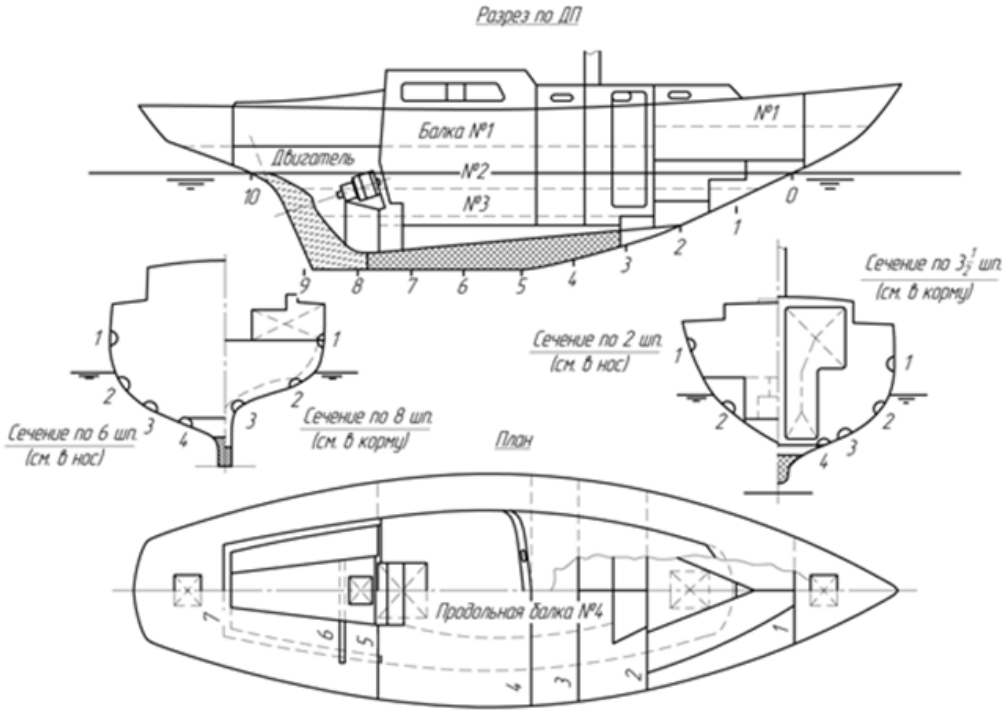


Figure 2 – Hull construction

The external loads on the hull can be divided into loads from water pressure on the hull plating and loads from spars and rigging. When the yacht is moving on a wave, pitching (on a counter course to wind and wave) and rolling (on a cross course to wind and wave) cause additional inertial and shock loads. This paper considers only loads during steady-state motion of the yacht in calm water with roll on an upwind course.

When wind pressure is applied to the sails on upwind courses, a heeling moment is generated, which is balanced by the restoring moment of the yacht at a certain roll angle. The restoring moment in the transverse plane of the yacht is determined by a transverse static stability diagram showing the dependence of the static stability arm (or restoring moment) in the transverse plane on the roll angle.

When designing masts and standing rigging of yachts, in accordance with [6-10], the loads corresponding to the maximum restoring moment in the transverse stability diagram are determined. This means that the wind load in this case will also be the maximum possible load.

The full sail of yacht on upwind courses is usually carried at roll angles not exceeding 30°. Therefore, in this paper, to determine the loads on the hull of the yacht from the spar and standing rigging, only the restoring moment is calculated at a roll angle of 30° and the full sail of the yacht on a hauled course.

Restoring moment. A theoretical drawing and a 3D model of the hull were built in KOMPAS from the hull sections. Using the digital model of the hull for the known draft of 1.2 m in KOMPAS were determined displacement equal to 7438 kg and for a roll angle of 30° the coordinates of the center of buoyancy (CB), as well as the applicate of CB in the absence of roll. To determine the center of gravity (CG) of the yacht, the weights of the falskeel, mast with rigging and sails, hull with crew and stores were taken into account, and their corresponding CG coordinates were determined from the lateral view of the yacht approximated. The calculated stability shoulder and restoring moment were 0.306 m and 22.3 kNm.

For approximate estimation of the restoring moment at roll angles not exceeding 30° we can use the metacentric formula $M = D \cdot h \cdot sin\theta$, where D and h are displacement and metacentric height, respectively. The metacentric radius and the CB and CG applicates must be known to find h, but an approximate formula for the Dellenbaugh angle, can also be used: $\theta = 279 \cdot SA/D \cdot H/h$ where SA is the sail area, m^2; H is the vertical distance between the center of sail (COS) and the center of lateral resistance (CLR) of the yacht, m. The average values are $h = 5.8$ m and $M = 2230$ kgm. Since both approximate estimates of the restoring moment are close to each other, an average value of 22.1 kNm was taken to calculate the wind loads.

Wind loads from sails on spars and rigging. Sail loads on the spars and rigging are calculated using the MAST program [8] for a headsail course with a restoring moment of 22.1 kNm, corresponding to a roll angle of 30° and the dimensions of the spars and sails of the yacht. The MAST loads obtained under these conditions are caused by an apparent wind of 11.3 m/s creating an average sail pressure of 78.5 N/m^2. At the yacht speed of 6 knots, the true wind speed would be 9.6 m/s.

Sail loads on the spar and rigging are distributed and concentrated forces, namely: distributed load on the mast from the mainsail in the DP of the yacht (directed to the stern of the yacht); traverse distributed load on the mast from the mainsail

(directed to the leeward side of the yacht); distributed load on the stay from the jib.

When the mast is vertically standing relative to the hull, forces are transmitted to the mast, the projections of which are: projections of the mainsail halyard force acting on the mainsail halyard block; projections of the boom force acting on the mast at the point where the boom is connected to the mast; the vertical and horizontal components of the mainsail sheet tension at the sheet angle acting on the boom at the point where the mainsail sheet is attached. From the jib, in addition to the distributed force on the stay, the force from the jib halyard is transmitted to the mast; from the jib, the force from the jib sheet also acts directly on the hull. All distributed loads are distributed equally in the MAST. The distributed and concentrated wind loads are shown in Figure 3.

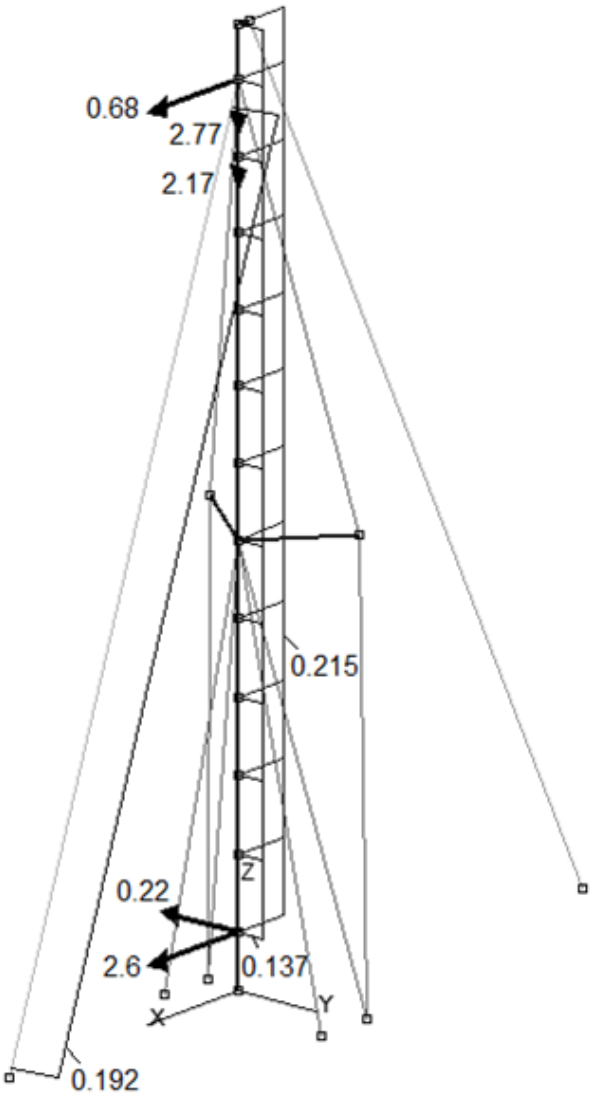


Figure 3 – Wind loads

Loads from the mast and standing rigging on the hull of the yacht. In order to determine the forces transmitted from the spars and rigging to the hull of the yacht through the steps and puttings of the shrouds, stay and afterstay, it is necessary to

calculate the SSS of the spatial cable model “mast(s)-standing rigging”. Such calculation is performed by FEM using the FESTA program [8, 12]. In FESTA, a mast with spreaders and standing rigging are modeled and the loads calculated in MAST are applied to them at a roll angle of 30°. The model nodes corresponding to the steps and puttings are rigidly fixed at the corresponding points of the yacht hull. In the steps, the mast heel is fixed against rotation around the vertical axis Z, but is not fixed against rotation around the horizontal axes X and Y. The calculation is performed for each load step, which is 10 % of the ultimate load calculated in MAST. A beam finite element with tensile-compression, bending with shear deformations in two longitudinal planes of inertia, and torsional stiffnesses is used to model masts and spreaders. The stay is modeled as a cable element able to carry a transverse load uniformly distributed over a part of the span. Shrouds and afterstay are modeled by cable elements having only tensile stiffness. When compressive forces appear in these elements, they are automatically excluded from the calculation model shown in Figure 3. As a result of the calculation of the system “mast(s)-standing rigging” at each loading step, the information on the displacements of the model nodes, on the forces in the model elements and on the highest stresses for each type of cross-sections of the model elements is displayed.

The calculated reactions together with the forces from the sheets give: $\sum R_x$ – thrust force; $\sum R_y$ – drag force; $\sum R_z$ – “vertical” force; $\sum M_x$ – roll moment; $\sum M_y$ – pitch moment; $\sum M_z$ – coming to the wind (falling) moment. In the model the coordinates of the location of the points of the sheets fastening on the yacht hull were set and the values of the projections of the sheets reactions in these points, as well as of the halyards included in the reaction of the steps R_z were selected, which lead to nearly zero values of $\sum R_z$, $\sum M_y$ and $\sum M_z$. The roll moment, thrust force, and drag force were 21.8 kNm, 0.9 kN, and 4.1 kN, respectively.

Hydrostatic load. In addition to the loads from the mast, standing rigging and cables, a hydrostatic load must be applied to the model in order to calculate SSS of the hull. At each point on the underwater part of the hull plating, the water pressure corresponding to the distance of this point to the water surface is applied at an equilibrium position with a roll angle of 30°. The ANSYS software product was used for this application. Figure 4 shows the forces acting on the hull of the yacht from the mast, standing rigging and sheets, and Figure 5 shows the water pressure loads.

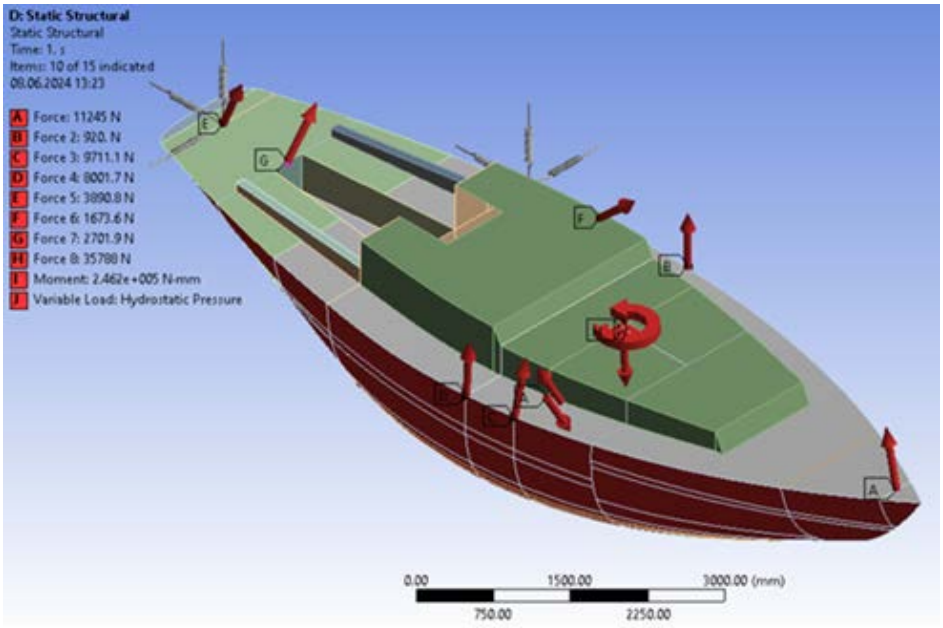


Figure 4 – Spars and rigging reactions

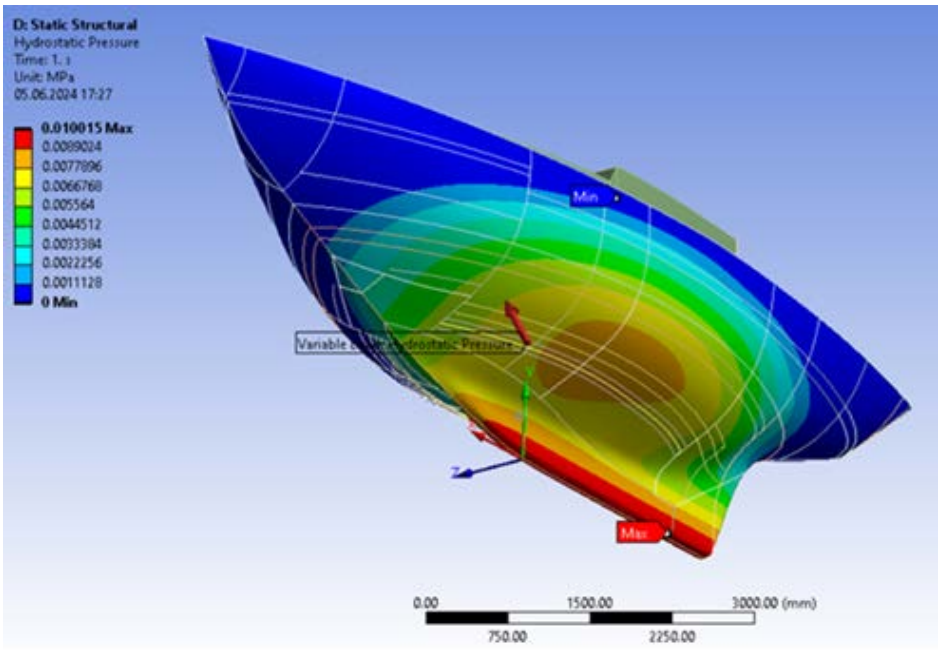


Figure 5 – Hydrostatic load

Balancing the calculation model. In real conditions of the yacht motion all loads acting on its hull are self-equilibrated. In steady-state condition, the projections of water pressure force on X, Y, Z coordinate axes are counterbalanced by the weight of the yacht G, drag force RX and drift resistance force RY, and the projections of water pressure moments relative to the same coordinate axes are counterbalanced by heeling, pitch and coming to the wind (falling) moments.

The proposed approach does not take into account the drag forces, and the loads from the spars and rigging and the water pressure on the plating are calculated independently of each other and are related only by the common roll angle. All these factors can be taken into account using the following scheme. The hull of the boat is

hinged at CG point. This point should be rigidly connected by linear displacements with the upper part of the rigid falskeel by the “rigid region” procedure. To exclude the rotation of the model, weak springs with stiffness $k=10^{-6}$ kN/m in the directions of three coordinate axes (see Figure 4) are introduced at the points of anchoring the boom and jib sheets on the deck. Then the coordinates of the CG point in X and Z axes are selected, and also such projections of forces on the sheets are found, which would provide small values of angular displacements of the model.

Finite element model. The modeling of the hull takes into account all the main structural connections: plating, deck, cockpit, deckhouse, longitudinal and transverse bulkheads, stringers (Figure 6). The original stringers of trapezoidal cross-section were replaced by stringers of equivalent semicircle cross-section to simplify the model. Shell finite elements of SHELL181 type were used, which are capable of modeling multilayer composite shells and sandwich structures. The mesh dimensions can be seen in Figure 9.

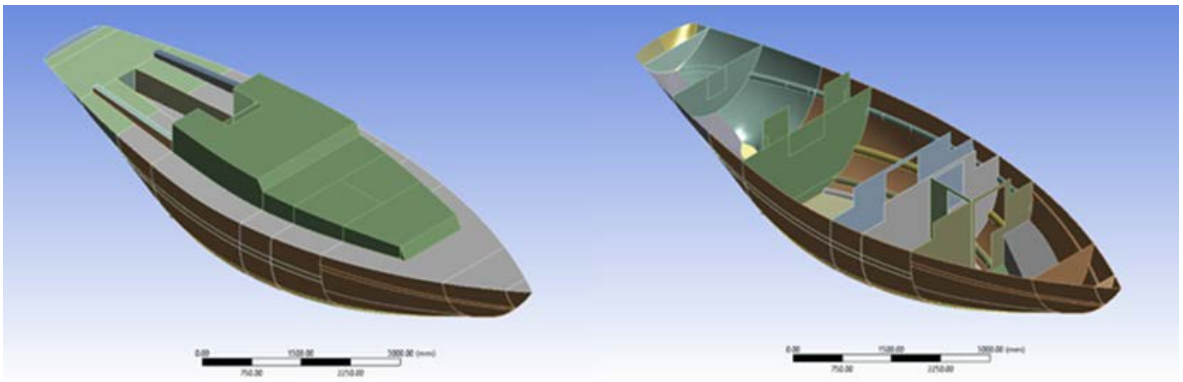


Figure 6 – Finite element model of yacht hull

Material characteristics. The materials used in the model are presented in Table 1. The plating and stringers are made of multilayer fiberglass. The bulkheads, platforms and decks are sandwich structures. The core is foamed PVC with density of 60 kg/m^3. It is assumed that the mast steps and falskeel have a stiffness much greater than the hull material, so they are modeled by a conventional rigid isotropic material “Steel”.

Table 1 – Material characteristics

Hull elemeht	Material and layout	Thickness, mm	Num. of layers	*E1* GPa	*E2* GPa	*G12* GPa
Plating above waterline	fiberglass 0, ±45, 90	6	20	23.6	23.6	8.0
Plating under waterline	fiberglass 0, ±45, 90	9	30	24.7	22.4	8.0
Stringers 1, 2 (bow – bulkhead 5)	fiberglass 0, ±45, 90	4.8	16	22.4	22.4	8.8

Stringer 2 (bulkhead 5 – aft)	fiberglass 0,±30,±60, 90		7.2	24	22.4	22.4	8.8
Stringers 3, 4	fiberglass 0, ±45, 90		6	20	23.6	23.6	8.0
Bulkheads, platforms and decks	Sandwich panel	Shell 0, ±45, 90	3	10	6.5	4.9	1.9
		Core	19	-			
Steps and falskeel	«Steel»		10	-	1000	1000	384.6

Results of SSS calculation. Figures 7-8 show the calculated displacement and stress fields in the hull elements of the yacht. It can be seen that the total displacements are greater in the underwater part of the leeward side plating and reach a maximum value of 1.38 mm in the plate most loaded with water pressure. Equivalent stress reaches the highest values at the points of attachment of the stay, afterstay, boom sheet, windward shrouds. The maximum of 76.4 MPa is observed in the “steel” mast staysail. In the hull of the yacht the maximum stresses are 65.8 MPa in the bulkhead under the stay putting.

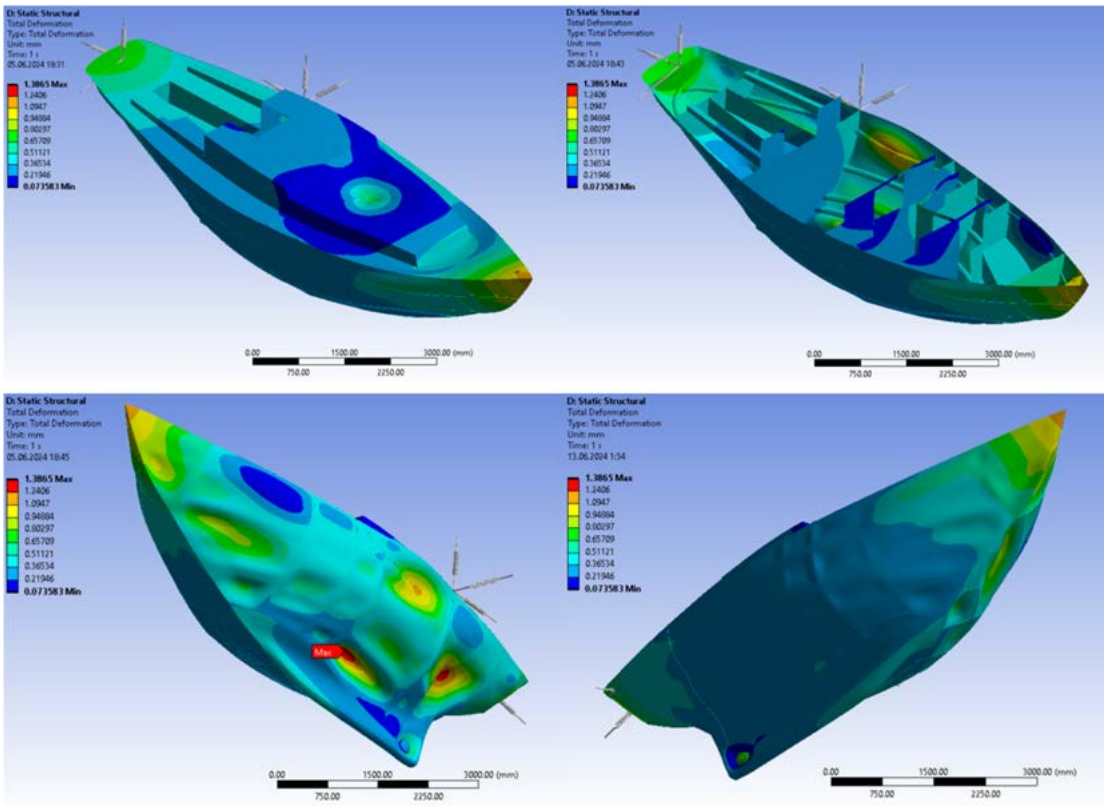


Figure 7 – Total displasement fields

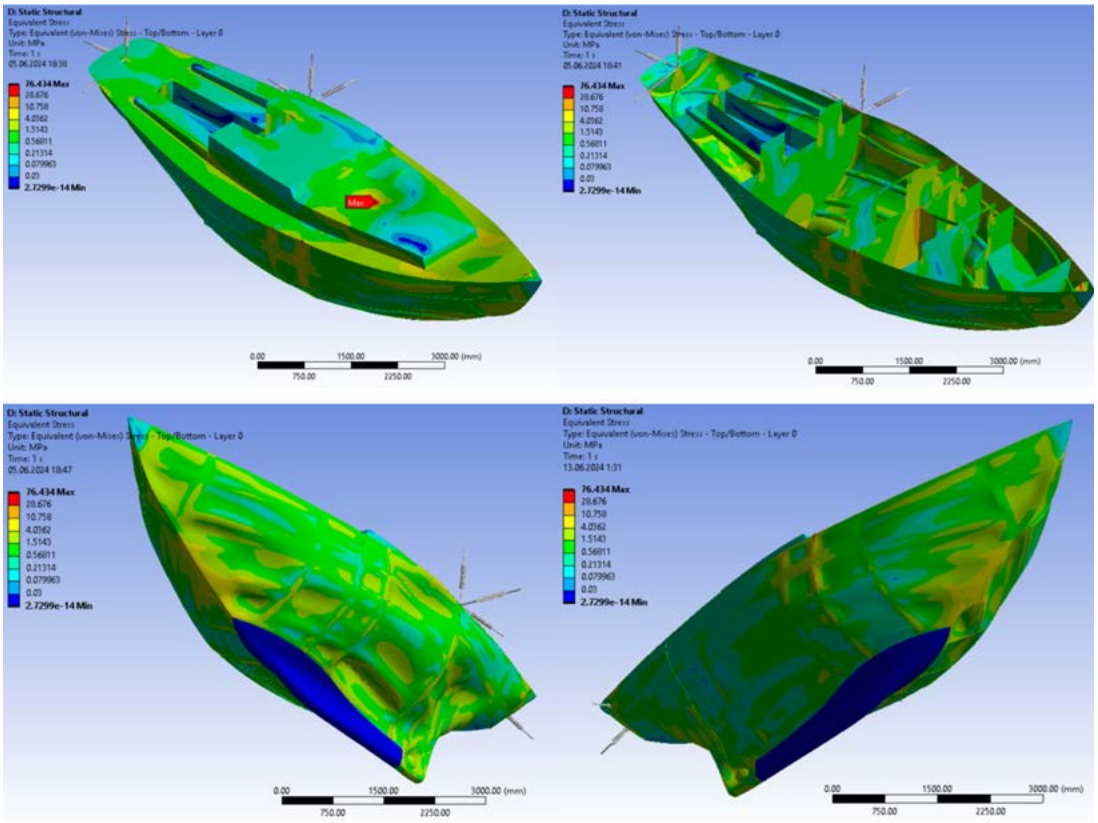


Figure 8 – Equivalent von Mises stress fields

Comparison with analytical estimates. The most stressed stringer 3 on the leeward side between transverse bulkheads 4 and 5 and the plate from the falskeel to stringer 4 in the same area are chosen for comparison of solutions. The calculation schemes in [11] are: for stringers – a beam fixed at the ends, for plating – a rectangular plate fixed along the contour, uniformly loaded by water pressure. Comparison of the largest total displacements and stresses of numerical and analytical calculations for the specified structural elements is given in Table 2.

Table 2 – Comparison of numerical and analytical calculations

Hull element	Type of calculation	Displacement, mm	Stress, MPa
Stringer 3 (between transverse bulkheads 4 and 5)	Analytical	2.81	29.13
	FEM	0.70	4.84
Plate (from the falskeel to stringer 4)	Analytical	1.75	17.27
	FEM	1.39	7.59

The values obtained by analytical calculation significantly higher for both stringers and plating than the values obtained by FEM. This is caused by such factors as curvature of the hull surface, non-uniform pressure, global hull deformations, etc.

Consequently, when sizing, the traditional approach leads to overestimation of thicknesses and, as a consequence, to heavier and more expensive yacht hulls.

Evaluation of spar and hull strength and stability. Conclusions about the reliability of the yacht are based on a comparison of the highest forces and stresses obtained from the calculations with their dangerous values. The dangerous values for the system “mast(s) – standing rigging” are the yield strength of the spar material and the breaking forces of the rigging cables. The calculation shows that the overall stability of the “mast – standing rigging” system of the yacht is ensured up to a load 20 % higher than the maximum load for a roll angle of 30°, i.e. with a safety factor k = 1.2. The strength of the mast, spreaders and cables of the standing rigging and the stability of the spreaders are also ensured.

Dangerous stresses for FRP hull structures are failure and critical stresses, the magnitude of which depends on the characteristics of the used PCM. The ANSYS program module allows to evaluate the reliability of the structure using the inverse reserve strength factor IRF=1/k, the calculation of which can be performed according to various strength criteria of PCM (Tsai-Hill, Hoffman, Tsai-Wu, Puck, etc.). Strength is considered to be ensured when IRF≤1. Since, using a couple of strength criteria, the highest IRF value for the model under consideration does not exceed 0.5 (see Figure 9), it can be concluded that the hull of the yacht is strong with a twofold safety margin for the loading conditions assumed in the calculation.

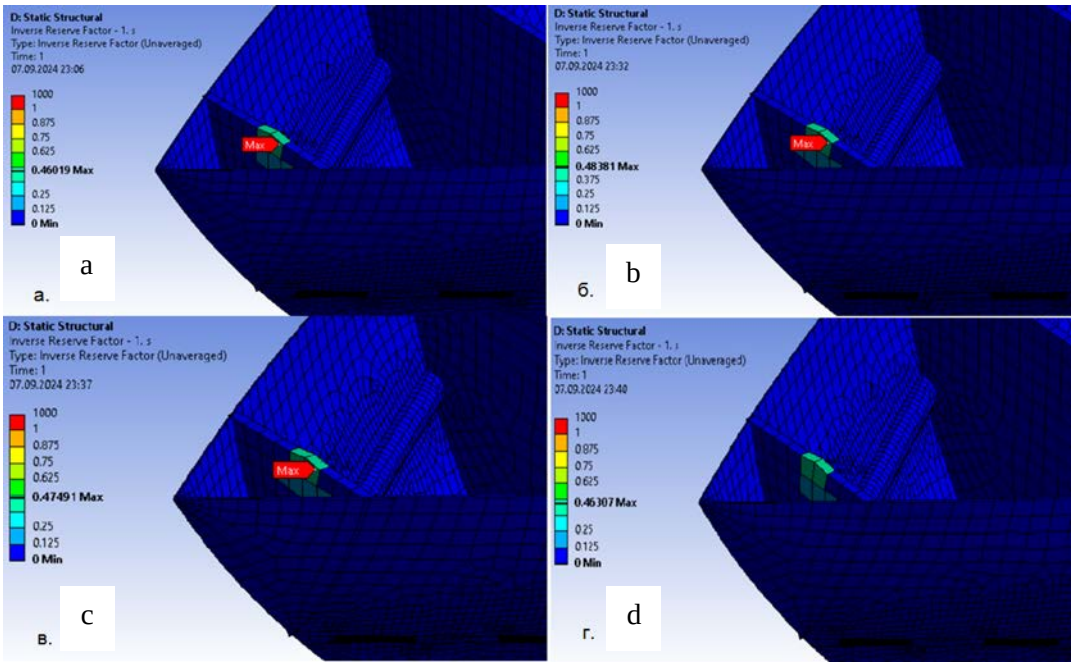


Figure 9 – IRF fields:
a – maximum stress criteria; *b* – Tsai-Wu criteria; *c* – Hoffman criteria;
d – Puck criteria

Conclusion. An algorithm for calculating the hull strength of a fiberglass yacht is proposed and demonstrated by an example. MAST module for calculating loads from sails, spars and rigging acting on masts under different sailing conditions, FESTA

module for determining the SSS of the spatial system “mast(s)-standing rigging” and reactions transmitted to the yacht hull, KOMPAS and ANSYS modules for determining the hydrostatic load and SSS of the spatial model of the yacht hull are used in the calculations. The performed calculations allow us to make the following conclusions:

1. On the background of general deformation of the hull local deformations are distinguished, which lead to stress concentration in the area of shroud and stay puttings, mast steps and in the bottom plating.

2. Comparison of the results of stringer and plating calculations, obtained by simplified traditional design schemes, with the results of FEM, shows a significant overestimation of stresses, both in the stringer and in the plating.

3. Using proposed algorithm in the computational design will allow to reduce the weight of spars, rigging and hull of yachts, and therefore their cost, and at the same time to improve the performance.

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THE HISTORY OF THE INVENTION AND USE OF SYNTHETIC DETERGENTS

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Abstract. This paper examines the history of the emergence of synthetic detergents (SMS), as well as the impact of historical events on their development and use. The research is carried out, ranging from ancient washing methods to the present. In addition, the current trends in the development of new formulations are being considered today.

Keywords: surfactants, alkyl sulfonates, soap, mass production, innovations, biodegradable components, multifunctional synthetic detergents.

ИСТОРИЯ ИЗОБРЕТЕНИЯ И ИСПОЛЬЗОВАНИЯ СИНТЕТИЧЕСКИХ МОЮЩИХ СРЕДСТВ

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Аннотация. В данной работе рассматривается история появления синтетических моющих средств (СМС), а также влияние исторических событий на их развитие и использование. Исследование проводится, начиная от древних методов мытья до настоящего времени. Кроме того, рассматриваются существующие современные тенденции в разработке новых составов на сегодняшний день.

Ключевые слова: поверхностно-активные вещества, алкилсульфонаты, мыло, массовое производство, инновации, биоразлагаемые компоненты, мультифункциональные синтетические моющие средства.

Introduction

Synthetic detergents have become an integral part of modern life, with their use spanning both household and industrial applications. However, their widespread use is associated not only with convenience, but also with a number of problems, including

the impact on the environment and human health. The relevance of the study is due to the need to understand the evolution of these tools and find ways to minimize their negative impact, which becomes especially important in the context of global environmental challenges.

The aim of this study is to analyze the historical development of synthetic detergents, from their invention to the current trends in production and use. To achieve this goal, the following objectives were set: to study the key stages of development, to determine the impact of scientific discoveries and historical events on their popularization.

The topic was chosen because of its importance in understanding how scientific advances and historical events have influenced the development and use of synthetic detergents. In addition, the study of this topic helps to identify contemporary issues and perspectives related to environmental safety and sustainability of production.

Methods and materials

This paper is a review article based on the analysis of Russian and English scientific publications on the history and current state of synthetic detergents (SDS). The material was based on articles from peer-reviewed scientific journals, books, as well as resources of electronic scientific libraries.

The sources were selected based on the relevance to the topic, scientific significance and novelty of the presented data. The analysis included those covering historical aspects of CMC development, current technological trends, environmental innovations and sustainable production perspectives.

The historical approach allowed tracing the evolution of SMS, identifying the key stages of its development and the factors that contributed to its spread. Modern trends, such as the use of biodegradable components, the creation of multifunctional formulations and the introduction of environmentally friendly technologies, were analyzed using comparative and content analysis of the sources studied.

Results and discussions

First experiments and discoveries in the field of detergents.

Ancient washing and cleaning methods predate synthetic detergents and were based on available natural materials and botanicals.

There is evidence that tribes in the ancient world used soap, which appeared in Sumer and Babylon around 2800 B.C. It was made from a mixture of fats and wood ash. This discovery was a significant step in the development of hygiene, as soap had the ability to remove impurities from the surface of the skin and tissues. Subsequently, soap spread to other cultures including ancient Egypt, Rome and Greece where it was also used for cosmetic and medical purposes [1, p. 86].

With the beginning of the Middle Ages, due to the expansion of commercial relations and cultural exchange, soap making methods gradually became more complex. Since the XVII century, industrialized soap making began to gain momentum, in parallel with the increasing demands of society for hygiene standards. It is noteworthy that during this period soap was divided into soap for washing and soap for personal hygiene, which later served as a starting point for the creation of specialized detergents.

The birth of synthetic detergents occurred in 1791, when French chemist Nicholas Lebman was able to obtain baking soda from table salt. This led to this alkaline material replacing potash.

The earliest information about soap in ancient Russia is contained in birch bark writings from the 11th century found in Novgorod. The method of creating soap was most likely borrowed from the Byzantine Empire and eastern countries. Some villages devoted themselves entirely to the production of potash, an alkaline component obtained by evaporating the ashes of burnt trees, which was then used to create soap.

During the reign of Peter the Great in Russia appeared industrial production of soap, but until the XIX century this product remained a luxury item, available only to the upper classes. In the XVIII century, the first enterprises specializing in soap making began to appear. One of the leading centers of production was Shuya, where this craft dates back to the beginning of the XVII century.

By that time there were only two soap factories in Moscow: in Novinskaya and Presnenskaya parts of the city. By the middle of the XIX century (1853) the number of factories in Moscow province increased to eight. The main consumers of soap factory products were textile enterprises engaged in the production of cloth, chintz and dyeing of fabrics. Gradually, production technologies were improved, flavorings were added, and exotic oils, such as palm and coconut oils, began to be used, which led to an increase in demand. In the late 19th century, soap became more widely available to various segments of the population.

With the development of chemistry in the 18th and 19th century, scientists began to study the properties of surfactants, which reduce the surface tension of water. These substances became the basis for the creation of synthetic detergents. At this time, thanks to the French chemist M. E. Chevreul, who studied the composition of fats and the mechanism of soap formation, century-old empiricism began to give way to accurate knowledge. Research in this area deepened understanding of the mechanisms of dirt removal and laid the groundwork for further innovations in the chemical industry that contributed to the development of more effective cleaning agents.

The development of technology in the early 20th century. At the beginning of the 20th century, chemical science took a significant step forward. In 1916, German chemist F. Ponter developed the first synthetic detergent based on alkylnaphthalene sulfonate as a response to the shortage of traditional soap caused by the First World War. This breakthrough was made possible by the development of organic chemistry, which made it possible to replace the natural fats and oils used in soap making with synthetic analogs. This approach not only solved the problem of raw material shortages, but also opened up new possibilities for creating detergents that are more effective. This development was important because it demonstrated the possibility of effective cleaning without the use of traditional fats and oils [2].

Alkyl sulfonates (Figure), as one of the first synthetic compounds used in detergents, have high surface activity. This property allows to reduce effectively the surface tension of water, which contributes to better penetration of detergents into contaminants. Due to their chemical structure, which includes a hydrophobic hydrocarbon tail and a hydrophilic sulfonate group, alkyl sulfonates have excellent

detergent properties, which makes them particularly effective in removing grease and oil contaminants. Approaches to chemical development have evolved over time.

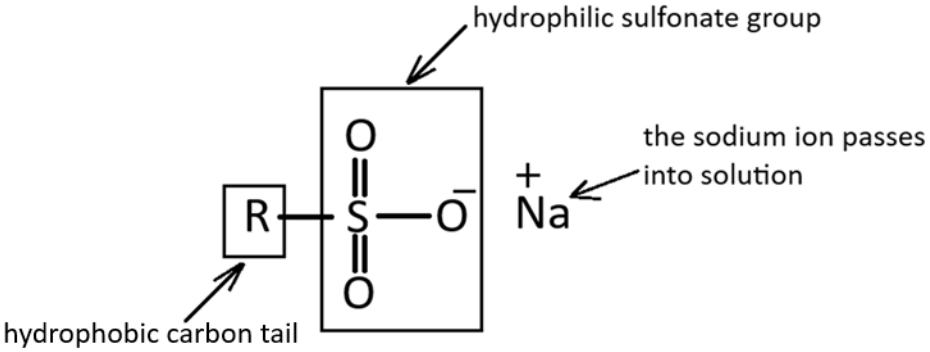


Figure – Structure of alkyl sulfonates

In the 1920s, the standardization of synthetic detergents began, marking an important milestone in their mass production. The established quality standards ensured the production of products with predictable and consistent performance, which helped to popularize them among consumers.

By the 1930s, companies such as Procter & Gamble began mass producing synthetic detergents, which was made possible by the development of oil and gas refining technologies. These technologies provided access to cheap raw materials to produce chemical compounds. While traditional soap production relied on the use of caustic potash, which was readily available, the shift to synthetic detergents opened new horizons for mass production.

The impact of World War II on the detergent industry. In the context of World War II, the need for cleaning products increased dramatically. Warfare, mass mobilization, and the need to maintain hygiene in the field created a significant demand for detergents. Hygiene became an important factor in preventing the spread of diseases among soldiers and civilians. In addition, with the increase in industrial production, there was a need for effective means of cleaning equipment and work areas.

The production of traditional soap during this period faced serious challenges. Key components such as fats and oils were redistributed for military use, resulting in shortages for civilian use. This forced the chemical industry to look for alternative solutions that could compensate for the shortage of raw materials and meet the needs of the population [3, p. 147-148].

Thus, during World War II, the chemical industry made significant strides forward through the development of new technologies. These innovations included the creation of more effective synthetic surfactants, which became the basis of modern detergents. The developments not only met current needs, but also laid the foundation for further development of the industry.

The development of synthetic detergents in the post-war period. After World War II, the countries of Europe and America were in the process of reconstruction, which required effective and affordable products for washing, cleaning and personal

hygiene. As a result, new products based on synthetic compounds appeared on the market to meet the demands of the time.

In the post-war years, a significant increase in investment in the research and development of new chemical compounds contributed to the market introduction of a variety of products: detergents and liquids, gels and capsules. In 1946, the first synthetic detergent, called Tide, was launched in the United States. This was a real breakthrough in the industry, which provided detergents with high parameters of efficiency and versatility of their application [4, p. 936].

The Tide brand became a leader in the US market through aggressive advertising campaigns. These campaigns emphasized the high efficiency of the product, its ability to remove difficult stains and its convenience of use. Advertising strategies included the use of television and radio to reach a wide audience. Visual examples of the effectiveness of detergents presented in the advertisements convinced consumers to switch to synthetic products.

In 1956, the Soviet Union launched large-scale production of the first detergent called Novosti. A unique feature of its composition was the use of whale and sperm whale fats. Six years later, in 1962, the first factory specializing in the production of synthetic detergents (SMS) was opened in the village of Shebekino, Belgorod region. These products were based on synthetic fatty acids obtained from paraffins. Powders such as Novosti-S, Kristall, Astra and Luch appeared on the shelves. In the 1970s, the production of the famous washing powder "Tide" began in the USSR. In addition, Soyuzbytchem has mastered the production of aerosol products.

In the early 1980s, the Perm Plant of synthetic detergents was built. This plant has become a key supplier of detergents for the Ural, Siberian and Far Eastern regions, producing brands such as Lotos, Bio S, Era A, Lotos-Automaton, Slavyanka and Lotos M.

Thus, due to their effectiveness, synthetic detergents occupied about 70 % of the market in Europe by the 1960s and in Russia by the 1970s and began to be used both in industry and in everyday life [5, pp. 115-128].

Today, the modern synthetic detergent industry covers a wide range of products, numbering dozens of categories: from multifunctional cleaners to highly specialized formulations designed to combat certain types of pollutants.

Innovation and sustainable technologies in production. Modern technologies in the production of synthetic detergents (SMS) play a key role in reducing their environmental impact. Companies are actively implementing innovative approaches, such as the use of enzymes and nanotechnology, which makes it possible to increase the effectiveness of detergents. This reduces the amount of chemicals used, which in turn reduces the burden on environmental systems. Thus, the introduction of new technologies not only improves the quality of detergents, but also contributes to more environmentally friendly production.

One of the key trends in the production of synthetic detergents is the use of biodegradable components, which helps reduce the accumulation of harmful substances in the environment. According to a report by McKinsey & Company, the use of such components has increased by 15 % over the past five years, indicating a growing focus on environmental aspects. However, it is important to consider the

potential risks associated with some traditional ingredients. For example, triclosan, which is part of soap, can cause mutational processes in some bacteria with prolonged use [6, p. 277].

In addition, important innovations were the developments aimed at creating multifunctional products. This is very relevant for modern consumers who value multifunctionality and time saving. For example, there are detergents on the market that not only clean, but also disinfect surfaces, as well as prevent the formation of unpleasant odors or are able to repel dirt, increasing the cleanliness of treated surfaces. Such products utilize innovative formulas that include advanced antimicrobial agents and active ingredients that enhance the cleaning properties of the products.

In addition, in the quest for innovation, manufacturers have begun to focus on natural ingredients and plant extracts. In recent years, there has been an increase in offerings based on natural ingredients such as aloe vera extracts, citrus extracts and other essential oils, which not only provide a pleasant fragrance but also have a beneficial effect on surfaces as well as human health. This makes it possible to create synthetic detergents that minimize the negative impact on the body, while maintaining high cleaning properties [7, p. 20]. Thus, the synthesis of traditional chemical components with natural extracts has become a popular trend in the industry.

The problem of detergent packaging waste also remains relevant, as about 300 million tons of plastic are produced annually. To solve this problem, companies are introducing technologies for recycling and reusing packaging materials, which not only reduces the volume of waste, but also reduces the consumption of primary resources. Thus, the introduction of innovative technologies not only contributes to improving the environmental situation, but also optimizes production processes, which in turn enhances the overall efficiency and sustainability of the industry.

Conclusion

The history of synthetic detergents represents an evolution from the first experiments in the field of chemistry to today's highly effective and environmentally friendly products. The paper reviewed the key stages of their development, including the invention of the first synthetic substances, introduction of mass production technologies and popularization in households and industry. The analysis showed that each historical period contributed to the improvement of detergents. Modern trends are aimed at creating new biodegradable components, reducing the environmental impact of synthetic detergents and introducing innovative technologies, which indicates the desire of manufacturers to reduce the negative impact on the environment.

Thus, the history of synthetic detergents demonstrates how scientific progress and social change can transform everyday life. It is important to continue to develop this industry with environmental and social considerations in mind in order to create a sustainable future for generations to come.

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MODERN INFORMATION SECURITY TECHNOLOGIES FOR SPACE STATIONS: CHALLENGES AND SOLUTIONS

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Abstract. This article examines the threats and challenges associated with information security in space systems and discusses contemporary strategies for ensuring cybersecurity within the space industry. It highlights attempts to compromise unreliable firmware code in satellites, attacks on the central points of failure in space systems, the low level of protection for open-source operating systems. Particular emphasis is placed on the necessity of implementing multi-layered defense systems to prevent cyberattacks, espionage, and unauthorized access.

Keywords: space systems, information security, ISS, cybersecurity.

СОВРЕМЕННЫЕ ТЕХНОЛОГИИ ИНФОРМАЦИОННОЙ БЕЗОПАСНОСТИ ДЛЯ КОСМИЧЕСКИХ СТАНЦИЙ: ВЫЗОВЫ И РЕШЕНИЯ

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Аннотация. В данной статье рассматриваются угрозы и вызовы, связанные с информационной безопасностью в космических системах, а также обсуждаются современные стратегии обеспечения кибербезопасности в космической отрасли. В качестве примеров уязвимостей приводятся попытки компрометации ненадежного микропрограммного кода спутников, атаки на центральные точки отказа космических систем, низкий уровень защиты операционных систем с открытым исходным кодом, используемым в коммерческих спутниковых технологиях. Особое внимание уделяется необходимости внедрения многоуровневых систем защиты для предотвращения кибератак, шпионажа и несанкционированного доступа.

Ключевые слова: космические системы, информационная безопасность, МКС, кибербезопасность.

Modern technologies supporting the operation of the International Space Station (ISS) are becoming increasingly complex and interdependent, which makes information security critically important. Astronauts face risks related to unauthorized access to vital data, threatening both the operational activities of the station and the safety of crew members. Among the threats identified by the scientific community are cyberattacks, software vulnerabilities, physical security concerns, data transmission issues, human factors, resource limitations for cybersecurity, irregular system updates, and social engineering risks. Given the limited connectivity to the internet and data transfer capacities, a comprehensive approach to system protection must be adopted to minimize potential threats and ensure the security of missions and scientific research.

Modern space systems, such as satellites and ground control infrastructure, are exposed to various types of threats due to the lack of unified standards for cybersecurity and regulation by authoritative bodies. The main risks are associated with equipment manufacturers and operators, as the compromise of these central points of failure enables hackers to impact multiple systems simultaneously. Moreover, the leasing of commercial satellites by government organizations introduces additional threats to their IT systems, amplifying the risks of cyberattacks. Regulation in this domain remains highly limited, and the existing legal vacuum creates opportunities for the use of satellites in cybercriminal activities. Therefore, establishing stringent standards and implementing more comprehensive regulatory oversight are crucial factors for protecting space systems from potential threats and ensuring security. Currently, the International Organization for Standardization (ISO) and the International Chamber of Commerce (ICC) are developing standards such as ISO/ IEC 27001, which can be adapted for the protection of satellite systems.

An important measure against cyberattacks is training cosmonauts in cybersecurity fundamentals. For example, in 2019, at the Gagarin Scientific Research Training Center in collaboration with Kaspersky Lab, the Global Research & Analysis Team conducted a training session for cosmonauts and IT specialists at the center [1]. Additionally, universities offer programs in aerospace cybersecurity, equipping students with skills and knowledge necessary to secure information systems in the aerospace sector. Furthermore, space technologies are becoming accessible not only to states and large corporations but also to private individuals, which creates new vulnerabilities.

Threats and challenges related to information security. Cosmonauts and researchers working aboard the ISS face a range of threats and challenges associated with information security [2] such as:

1. Cyberattacks (The ISS and related systems may be targeted by cyberattacks aimed at gaining unauthorized access to data).
2. Software Vulnerabilities (Using outdated or unpatched software can create vulnerabilities that malicious actors may exploit).
3. Physical Security (Onboard devices and systems could be vulnerable to threats related to physical access to equipment).
4. Human Factor (Errors or negligence by crew members can lead to sensitive data leaks).

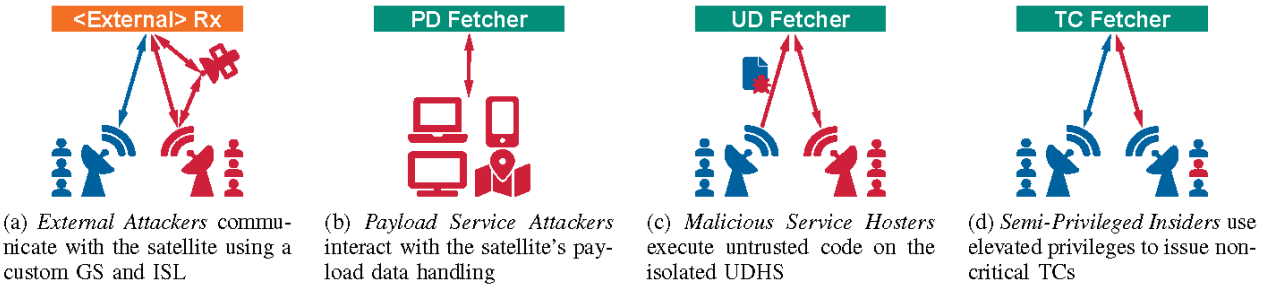
5. Data Transmission (Threats associated with data transfer between the ISS and Earth, including interception or data manipulation).
6. Resource Limitations for Cybersecurity (Limited capabilities for installing and maintaining cybersecurity tools onboard).
7. Lack of Updates (Limited internet connectivity and data transfer may hinder regular updates of antivirus and security software).
8. Social Engineering (Crew members could become targets of manipulative attacks, such as phishing).

Space systems as targets for cyberattacks. Space systems are attractive targets for cyber adversaries due to their critical role in infrastructure that supports the global economy and defense. These systems are essential across various industries, and their compromise could have severe consequences [3]. Hackers aim to minimize their efforts while maximizing their impact on targets. For example, one might assume that to undermine electronic commerce in the United States, malicious actors will target large corporations such as Amazon or PayPal. However, these organizations invest significant resources into protecting their networks and have measures to monitor suspicious activity. Moreover, disrupting the operations of such companies often requires simultaneous hacking of multiple systems.

For cybercriminals, it can be simpler and more effective to attack satellite communications that manage credit card processing, inventory management, and video conferencing. By targeting satellite operators providing these services, malicious actors can achieve a more substantial impact.

Satellites and ground control systems that underpin the functioning of various sectors become vulnerable points, on which many industries depend. For example, companies involved in natural gas rely on satellite links to monitor remote pipelines. If hackers gain access to satellite communications, they could provoke leaks or even explosions, preventing maintenance calls from remote locations to the company's central office.

To understand potential cyberattacks, consider **the possible hacker attack vectors against satellites** (Figure 1). The first involves a direct attack through a ground transceiver or an auxiliary satellite via its interface (access protocol). The second vector targets a ground control station that could be compromised as part of the corporate infrastructure. The third involves delivering malicious code to the satellite through an officially provided access channel. An attack can aim not only to disable payload operations but also to disrupt the functionality of the access channel itself.



(a) *External Attackers* communicate with the satellite using a custom GS and ISL

(b) *Payload Service Attackers* interact with the satellite's payload data handling

(c) *Malicious Service Hosters* execute untrusted code on the isolated UDHS

(d) *Semi-Privileged Insiders* use elevated privileges to issue non-critical TCs

Figure 1 – Hacker Attack Vectors Against Satellites

A comprehensive approach to ensuring the security of space systems plays a crucial role in preventing information leaks and cyberattacks. To minimize the risks of cyber threats to the International Space Station, the implementation of multi-layered defense strategies is necessary. These strategies include data encryption, multi-factor authentication, network traffic monitoring, regular software updates, and crew training. Physical security, data backup, incident management, and network segmentation also significantly contribute to system protection [4]. Let us consider the parameters of a standardized security system:

Data Encryption: Strong encryption methods are applied to protect transmitted and stored information, preventing unauthorized access in case of data interception.

Authentication and Authorization: The use of multi-factor authentication for system and data access, which may include combinations of passwords, biometric data, etc.

Monitoring and Analyzing Network Traffic: Regular monitoring of network traffic for anomalies that may indicate unauthorized access attempts or hacking activities.

Software Updates: Maintaining software and operating systems up-to-date to close known vulnerabilities and safeguard against threats.

Crew Training: Conducting regular training sessions and briefings for crew members on cybersecurity issues, including methods for recognizing phishing and other threats.

Physical Security: Implementing physical security measures to protect servers and workstations from unauthorized access, such as locks, surveillance systems, and access controls.

Data Backup: Regularly creating backups of critical information to prevent data loss in case of system failures or cyberattacks.

Incident Management: Developing and implementing incident response plans, including protocols for responding to cyberattacks and data leaks, facilitating rapid damage mitigation.

Network Segmentation: Dividing the network infrastructure into segments to restrict access to sensitive data and systems solely to authorized personnel.

International Collaboration: Engaging with cybersecurity organizations to share information about emerging threats and vulnerabilities.

To minimize risks, the implementation of multi-layered defense strategies is essential. It should be noted that this issue must be approached very seriously, as the information security systems on the International Space Station not only protect scientific data but also support the development of space technologies necessary for future missions, such as lunar and Mars exploration. Ongoing research in the field of cybersecurity remains crucial for the successful execution of modern space programs.

Specific Aspects of Space Systems Security. The space industry faces unique and specific challenges in the field of information security. For example, there is a potential risk of compromising unreliable code within satellite firmware [5]. Like any computer system, satellites support an update function. This capability is even available for long-deployed spacecraft.

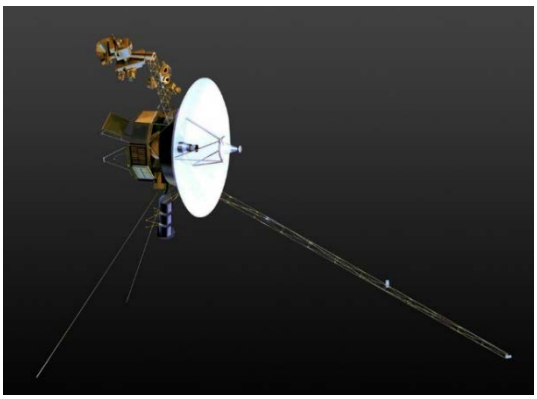


Figure 2 – Voyager 1 Spacecraft

For example, in October 2023, National Aeronautics and Space Administration (NASA) reported a successful firmware update of the Voyager 1 spacecraft, which was launched as far back as 1977 (Figure 2). This update increased the spacecraft's angular deviation range by 1°, allowing for a reduction in the number of thruster pulses needed for attitude corrections [6]. However, it also demonstrated that firmware updates can potentially provide access to all fundamental commands of the control system. The risk of satellite compromise still exists even many years after launch.

There are also various methods of attacking the central points of failure in space systems, with the two primary ones being the manufacturers of space equipment and their operators or managing agencies. The ability to influence multiple systems by compromising a single point of failure makes space systems attractive targets.

Another significant issue is the extremely weak regulation concerning space information security. The International Telecommunication Union (ITU), a specialized agency of the United Nations, manages frequency allocation for satellite communications to prevent interference and registers satellite orbits, but its responsibilities are limited to these tasks. Space systems, such as satellites and their ground control systems, are typically complex devices that consider requirements for communication, radiation resistance, and computational capacity. However, any authoritative body, leading to the absence of unified cybersecurity standards for satellites, does not govern cybersecurity standards for space assets. Consequently, satellites can be used for cyberattacks virtually unpunished and anonymously. Currently, there are no institutions that regulate satellite usage, nor is there a supervisory authority overseeing their operation. This legal vacuum creates conditions for some satellites to be exploited as platforms for launching cyber activities or other illicit actions in cyberspace. This situation contrasts with other industries, such as the energy sector, which is regulated by entities like the Federal Energy Regulatory Commission (FERC).

Although the absence of standards for such critically important systems presents a challenge, the complexity of the supply chain required to develop these systems makes them attractive targets for hackers. In some cases, collaboration among multiple manufacturers with different specializations is necessary to develop the technologies, along with a systems integrator to assemble all components into a unified system. Each

additional supplier introduces new access points for hackers to exploit in the satellite, and as the number of suppliers increases, so does the risk of compromise.

For the most complex systems, strict security protocols are in place; however, not all satellites are that sophisticated. Recently, there has been a trend toward launching low-cost satellites utilizing off-the- shelf commercial technology (COTS). The development of CubeSats (Figure 3), from a technical perspective, has a low barrier to entry, and more large companies or wealthy enthusiasts can afford to launch them (most often costing less than $100,000 USD). As of 2017, approximately 700 CubeSats had been launched into space [6].



Figure 3 – Satellite Using COTS Technology

Given the specifics of COTS satellites, it can be assumed that components such as open-source operating systems play a significant role in their operation, which may contain numerous security vulnerabilities. There are serious security issues associated with these systems because:

- The widespread use of COTS products allows many individuals to access the devices, providing hackers with opportunities for detailed vulnerability analysis;
- COTS products require active maintenance and updates to fix vulnerabilities, which are not implemented often;
- The ability to modify open-source code can allow malicious actors to introduce deliberately vulnerabilities (e. g., backdoors).

Various companies may launch CubeSats to optimize their operations on Earth, which could introduce vulnerabilities into their IT systems. It is known that government organizations lease bandwidth on commercial satellites, which could pose threats to military or other government IT systems if the CubeSat is not adequately protected.

Information Security Systems on the ISS and Its Satellites. These systems constitute a complex infrastructure that ensures data protection, process integrity, and the safety of all participants in space activities. Protecting information in space requires a comprehensive approach. This complexity arises because space technologies have long ceased to be the exclusive domain of governments and large corporations – they are now accessible to various actors, including private companies and even individuals.

Such realities create potential vulnerabilities that can be exploited for espionage or cyberattacks. The first step in ensuring security in space is developing reliable protection systems for the spacecraft themselves and ground equipment. Moreover, software must be safeguarded against unauthorized access and vulnerabilities, which requires constant updates and patching. Using open standards and protocols can reduce risks, but this also necessitates serious control and testing to prevent possible attacks.

International cooperation, knowledge sharing, and exchange of best practices between space agencies such as NASA, Roscosmos, the European Space Agency, and others play a crucial role in ensuring secure information protection. Consequently, information security systems on the ISS and its satellites form the foundation for the further development of space technologies. In the context of rapid advances in information technology and constantly evolving threats, it is essential to continue conducting research and exploration in the field of information security to guarantee the safety and success of future space programs.

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PROBLEMS AND PROSPECTS OF USING MAGNETOHYDRODYNAMIC GENERATIONS IN SPACECRAFTS

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Abstract. The article examines the problems and prospects of using magnetohydrodynamic (MHD) generators in spacecrafts. The author presents the principles of operation of the device, various types of MHD generators, as well as the advantages and disadvantages of an MHD generator compared to competitive installations. Special emphasis is placed on the fact that MHD generators can make significant improvements to the power systems of spacecraft, increasing autonomy and reducing dependence on solar panels.

Keywords: plasma, generator, jet engine, inductance, magnetic field.

ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ МАГНИТОГИДРОДИНАМИЧЕСКИХ ГЕНЕРАТОРОВ В КОСМИЧЕСКИХ АППАРАТАХ

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Аннотация. В статье рассматриваются проблемы и перспективы использования магнитогидродинамических (МГД) генераторов в космических аппаратах. Автор представляет принципы работы устройства, различные типы МГД генераторов, а также преимущества и недостатки МГД генератора по сравнению с конкурентоспособными установками. Особое внимание уделяется тому, что МГД генераторы могут значительно улучшить энергетические системы космических аппаратов, увеличивая автономность и снижая зависимость от энергии солнечных панелей.

Ключевые слова: плазма, генератор, реактивный двигатель, индуктивность, магнитное поле.

The eternal problem for aircraft of any complexity has been and remains the obtaining of electricity, especially when there are no other sources of energy or when there is a lack of them. Key characteristics that play an important role in modern rocket

systems include increasing the autonomy and energy stability of spacecraft. The use of magnetohydrodynamic (MHD) generators may be one of the solutions to the problem of obtaining electrical energy for complex aircraft and spacecraft systems. An MHD generator directly converts thermal or flame energy into electricity, making it particularly relevant for rocket or jet engines (Figure 1).



Figure 1 – An MHD generator

The application of MHD generators in aviation systems is an important area of research and development. Aircraft and spacecraft require reliable and efficient sources of energy, and MHD generators can offer unique advantages in this context. For example, the use of MHD generators in aircraft power systems can significantly improve energy efficiency and ensure reliable operation in various flight conditions.

An MHD generator is a device that differs from conventional electric generators in that it directly converts the thermal and kinetic energy of the working fluid (liquid or gaseous electrically conducting medium) moving in a magnetic field into electrical energy (Figure 2). Unlike conventional electric generators, where energy is converted from rotation to electricity, in an MHD generator, the working fluid acts as the conductor. When the working fluid moves across the magnetic field, oppositely directed flows of charges with different signs are generated, leading to the generation of electric current. The power of an MHD generator depends on the conductivity of the working fluid, the speed and strength of the magnetic field, and the flow velocity can vary widely. In an MHD generator, the process of generating electric current is based on electromagnetic induction and the emergence of current in a conductor crossing magnetic field lines [1].

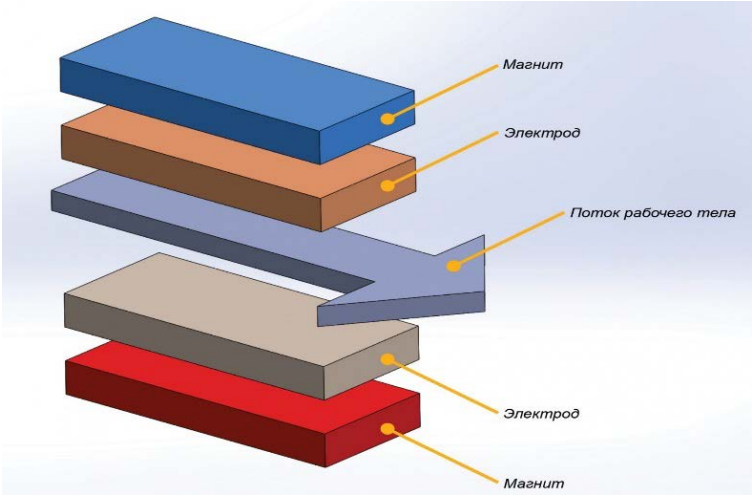


Figure 2 – MHD generator’s layers

The principle of operation of an MHD generator is based on Michael Faraday's law of electromagnetic induction. The idea of using a liquid conductor was first proposed by Faraday in 1832. He demonstrated that a moving conductor subjected to a magnetic field generates an electric current. Thus, the English scientist William Hyde Wollaston was able to measure the electromotive force induced by tidal waves in the English Channel in 1851. Research on MHD generators began in the 1930s when scientists started studying the possibility of using magnetic fields for energy conversion. In 1937, American scientist Lester H. Hunt proposed the idea of using the magnetohydrodynamic effect for electricity generation.

The first experiments to create MHD generators were conducted in the 1940s and 1950s. These early experiments laid the foundation for further research and development in the field of magnetohydrodynamics. In the 1960s, research was conducted to improve the efficiency of MHD generators and expand their applications. As a result, more compact and efficient MHD generators were developed, which can be used in various fields, including space and industry. In the 1970s, research was carried out to create MHD generators that can operate at higher temperatures and pressures. This led to the development of more efficient MHD generators suitable for generating electrical energy on spacecraft and other objects. This idea was also implemented in our country. For example, in 1971, the world's first U-25 MHD generator suitable for industrial electricity generation was put into operation in Moscow. Currently, MHD generators continue to evolve. Modern MHD generators can be used for electricity generation in large power plants, as well as in space and other areas. They are more efficient and environmentally friendly than traditional generators, making them increasingly popular in various industrial and scientific fields.

There are many different types of MHD generators, each with their own characteristics and applications [2, p. 122]. Let us consider some of them in more detail.

Open-cycle MHD generators are high-temperature enhancements to conventional power cycles, capable of increasing their efficiency to 60 %. They can also serve as powerful sources of short-duration electrical energy.

Closed-cycle MHD generators utilize gas and coal to heat inert gas in regenerative heat exchangers. However, they face a drawback related to the sealing of the closed-loop system with minimal impurity content and prevention of contamination in the regenerative heat exchangers.

Pulsed MHD generators employ self-exciting magnetic systems with an induction of 3–3.5 T and uncooled MHD channels. Gunpowder serves as the fuel for these installations.

Liquid MHD generators generate electricity solely by converting the kinetic or potential energy of a flow of constant-temperature conducting liquid.

Conduction MHD generators use a magnetic field to generate electric current as the working fluid passes through it. This current is then extracted through removable electrodes to harness energy.

Induction MHD generators lack electrodes and generate only alternating current. They require the creation of a magnetic field running along the channel to function [3].

Each of these types of MHD generators possesses unique characteristics that determine their applications in different fields. The choice of a specific generator type depends on the required power, operating conditions, and other technical specifications necessary for the device's operation. Studying and understanding the differences between open-cycle, closed-cycle, pulsed, liquid, conduction, and induction MHD generators enables engineers and energy specialists to select the most suitable solution for a particular task. The various types of MHD generators represent crucial engineering solutions that contribute to the advancement of energy technology and the enhancement of electricity production efficiency.

Features of MHD generators. Magnetohydrodynamic (MHD) generators are devices that can operate in both open and closed cycles. In closed MHD generators, the thermal energy obtained from fuel combustion is transferred to a heat exchanger with a working fluid, which, after passing through the MHD generator, returns and repeats the work cycle. Nuclear reactors and heat exchange devices based on the principle of releasing a large amount of heat can act as heat sources.

In open devices, combustion products serve as the working fluid, and used gases, after removal of alkali metal impurities, are released into the atmosphere. The working fluid in an MHD generator can be electrolytes, liquid metals, and plasma.

Liquid metals and electrolytes are natural conductors, but gas needs to be ionized to a certain degree to become electrically conductive. This is mainly achieved by heating to temperatures sufficient to initiate thermal ionization (at temperatures around 10,000 K). To operate at lower temperatures, alkali metal vapor (e. g., K, Cs, Na) or their salts are added to gases, making them conductive at a mixture temperature of 2.2–3 K, allowing the plasma to be accelerated to high speeds of 2000–3000 m/s [4, p. 25].

In most MHD generators, plasma is utilized, where free electrons and positive ions are the charge carriers, deviating under the influence of magnets from the trajectory the gas would follow in the absence of a magnetic field. In strong fields, charged particles can shift relative to each other between collisions. This directed displacement of charged particles in an MHD generator leads to the emergence of an additional electric field.

The MHD channel is the main and technically most complex element that determines the characteristics of an MHD generator. The design of the channel depends on the type, purpose, and operating mode. The channel must provide maximum operational lifespan and minimal thermal, hydraulic, and electrical losses. The magnetic system is intended to create the maximum possible induction force and its distribution in the working volume.

There are various forms of channels, such as linear, disk, and coaxial Hall channels in conduction generators, as well as radial channels in induction generators. Sectioning of electrodes in the MHD generator channel is done to reduce current circulation along the channel and through solid electrodes, in order to direct charge carriers' perpendicular to the channel axis towards the electrodes and into the load. The greater the Hall effect, the more sections are needed to divide the electrodes. Since the 1970s, conduction linear MHD generators using combustion products with alkali metal additives in an open cycle have become widely used. Obstacles in the development of open-cycle MHD systems included challenges in MHDG settings affecting device efficiency and reliability, as well as issues with combustion chambers and the creation of a superconducting magnetic system with an induction of 4.5–6 T. It is worth noting that the application of a Hall MHD generator scheme is most advantageous with high magnetic fields. By having a longitudinal electric field in Hall and MHD generators with diagonal electrode connections, significant output voltage can be obtained from the generator (Figure 3).

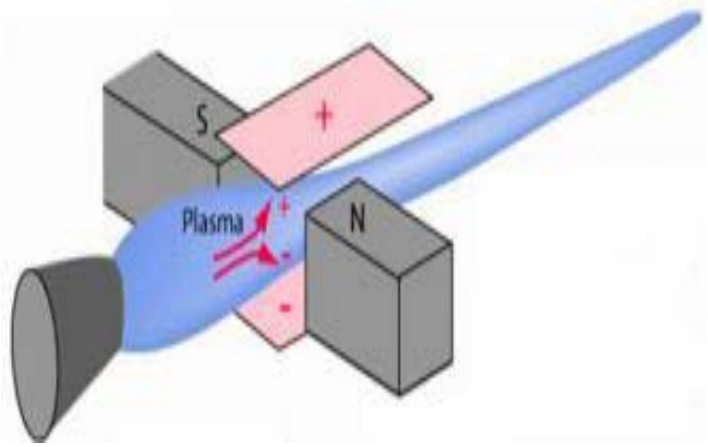


Figure 3 – A diagram of an MHD generator

The use of MHD generators for increasing the efficiency of power systems, for onboard power systems of space technology, and as power sources for devices requiring high power for short periods of time (e.g., powering aerodynamic tube electric heaters, etc.) is discussed. The main advantages of an MHD generator as a powerful device for generating electricity are highlighted:

The absence of moving nodes or details directly involved in the conversion of thermal energy into electrical energy, allowing for a significant increase in the initial temperature of the working fluid and, consequently, the efficiency of the energy installation.

The simplicity of the MHD energy conversion cycle, which does not require complex equipment such as a “steam boiler and steam turbine”.

Furthermore, the MHD generator differs from steam/gas turbine installations in its quick start-up time, ability to be in constant readiness in a preserved state, important for peak and emergency power stations, and better environmental performance compared to competitive installations at the same output power levels [5].

The main disadvantage of the MHD generator is the insufficient level of achieved characteristics of high-temperature generator nodes, MHD channels, and the high cost of the generated energy, hindering the industrial implementation of powerful MHD generators for a long time. However, these issues can be addressed by installing such a generator on a rocket nozzle, where the surrounding space would cool the external parts of the device and enhance the efficiency of the magnets. Engine modifications would provide the spacecraft with additional energy, particularly beneficial for long-distance space travel. For example, within the NERVA (Nuclear Engine for Rocket Vehicle Application) program, a project was developed for onboard power sources for spacecraft based on a 2.5 m diameter disk MHD generator operating in a closed cycle and gas-cooled by a nuclear reactor.

Prospects for the application of MHD generators in everyday society include their use in transportation to create more efficient and environmentally friendly power systems. Electric vehicles, such as trains and buses, could be equipped with MHD generators to generate power without the need for traditional fuel sources or as an additional power source in unforeseen circumstances. Additionally, MHD generators can be applied in the field of renewable energy sources by utilizing various working fluids and heating systems. Their use in nuclear and hydroelectric power plants could improve the efficiency and reliability of these systems, contributing to the development of renewable energy. Furthermore, MHD generators can be used to create more efficient power supply systems in households, leading to reduced energy consumption and increased energy efficiency of various devices and energy systems.

Moreover, MHD generators can be utilized in industry to establish more efficient power supply systems at manufacturing plants. Their use could reduce energy costs and increase production capacity, thereby enhancing the competitiveness of enterprises. MHD generators could find application in the power supply systems of large infrastructure facilities such as hospitals, educational institutions, airports, and other public establishments as a primary or backup source of energy, depending on the type and role of the installation. Their use could ensure more reliable and economical energy supply for facilities where uninterrupted operation is crucial.

So, there are numerous potential applications for MHD generators in various aspects of society's daily life. Their implementation could lead to the creation of more efficient, environmentally friendly, and sustainable energy supply systems, contributing to the development of infrastructure, increased energy efficiency, and reduced negative impact on the environment.

Prospects for the application of MHD generators in space. In space conditions, where access to traditional sources of energy is limited, MHD generators can become an important source of energy for spacecraft and stations [6]. One example of the application of MHD generators in the space industry is their use as a power source for spacecraft modules. This can significantly improve the efficiency and maneuverability of spacecraft, which is particularly important for long-duration space missions. Additionally, MHD generators can be used to provide power on space stations and bases, where they can replace traditional energy sources such as solar panels or nuclear reactors. This can enhance the reliability and durability of energy systems in space and ensure more stable operation of spacecraft.

Advanced technologies in the field of MHD include the development of new materials to improve the efficiency of generators, design optimization to minimize weight and volume, and integration with other aircraft systems to ensure synergy and optimal operation. Potential future developments in the field of MHD generators include the creation of compact and highly efficient devices capable of providing power for complex space systems. It is also possible to develop integrated systems that combine MHD generators with other energy sources to ensure continuous and stable power supply. These research and development directions in the field of MHD generators in spacecraft can significantly expand the possibilities of applying this technology and contribute to the development of more efficient and innovative solutions in aviation and space.

Thus, the application of MHD generators in the space industry represents a promising direction of development that can lead to significant improvements in energy efficiency, reliability, and performance of space technologies. Further research and development in the field of MHD generators for the space industry could lead to the creation of more sustainable and self-sufficient power supply systems for long-duration space missions, including manned and unmanned space flights, exploratory missions to other planets, and prolonged stays in orbit. Moreover, the use of MHD generators in the space industry could reduce dependence on traditional energy sources such as solar panels or nuclear reactors and provide a more stable and environmentally friendly alternative for space missions. Thus, the integration of MHD generators into the space industry represents a promising direction of development.

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USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN TEXT RECOGNITION

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Abstract. The paper discusses the principles of optical character recognition (OCR) technology. The possibility of improving the accuracy of text recognition by adding models based on deep learning methods. The structures of neural networks used for text image recognition are described.

Keywords: OCR, optical character recognition technology, text recognition, deep learning methods, convolutional neural networks, recurrent neural networks.

ИСПОЛЬЗОВАНИЕ ТЕХНОЛОГИЙ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА ПРИ РАСПОЗНАВАНИИ ТЕКСТА

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Аннотация. В статье рассматриваются принципы работы технологии оптического распознавания символов (OCR). Возможность повышения точности распознавания текста посредством добавления моделей на основе методов глубокого обучения. Описаны структуры нейронных сетей, используемые для распознавания текстового изображения.

Ключевые слова: OCR, технология оптического распознавания символов, распознавание текста, методы глубокого обучения, сверточные нейронные сети, рекуррентные нейронные сети.

One of the necessary and demanded capabilities of modern development of information technologies is automatic recognition of text and symbolic information. The development of artificial intelligence technologies, such as machine learning and deep learning, has brought this area to a new level of demand.

The result of text recognition depends largely on the representation of the source data. The source text can be written in different languages, different fonts and styles, represented by machine, handwritten characters, different source of text representation, etc. All these factors affect the process of recognition and requires study to identify

shortcomings and form directions for improvement of systems for recognizing symbolic information.

Automating the recognition of text images will make it possible to convert the source text into a convenient and computer-readable format for further analysis, search, processing and storage. At the same time, the time spent by humans on this operation should be minimized.

At the moment in text recognition is widely used basic OCR-technology. OCR (Optical Character Recognition) is an optical character recognition technology that converts a picture into editable text. The technology is used to process the results of scanning various types of documents and is based on the use of many saved fonts and images of text characters as standards during recognition.

First of all, the document must be scanned. Then the algorithm analyzes the captured image, divides it into characters and character by character compares each character in the image with a reference from an existing character database. The result is a modifiable text.

The advantages of this technology, and the software based on it, include the reduction of manual text input in case of its automatic recognition, the possibility of further editing and use.

The disadvantages include the low quality of the result, which relies heavily on the original data. If the original scan of the document was not clear, the result will be unreadable. Any fonts that differ from standard fonts, rare or obsolete languages cannot be recognized using this technology. The result may be affected by changes in the illumination of the source text or distortion of characters during scanning.

By supplementing the traditional OCR technology with new methods, the recognition capabilities grow by leaps and bounds.

The development of artificial intelligence methods allows to improve the technology of optical character recognition. The development of machine learning and deep learning models, the use of convolutional and recurrent neural networks allows to obtain much better results, accurately recognizing and obtaining editable transcription of text from handwritten and photo sources.

Artificial intelligence methods offer an alternative to classical statistical methods, while possessing the following advantages: they have the ability to efficiently process large arrays of multidimensional data, can automatically identify hidden patterns and key features of the processed data, and can easily adapt to changes in the original data.

A machine learning model is aimed at solving a specific problem and to solve this problem the model learns from a specific set of input data provided to it. The result of training the model will reflect the data sample on which the model was trained. The model takes an image with a handwritten text character and identifies a particular letter based on the training data [1].

Improving the accuracy of text recognition should be based on the following aspects of this task: the quality of the training data sample, its diversity. The dataset should include a variety of fonts, languages and styles. It is the choice of the initial training sample that will determine which documents and texts will be successfully recognized in the future. The sampling should take into account cultural and linguistic

aspects, which may differ from one language to another. It is necessary to allow for the possibility of different arrangement and layout of texts. For example, the text may be upside down or skewed.

A machine learning algorithm learns patterns and features of characters through a computer. The conditions for training such a model are the need for a large set of data for training and a certain period of time spent on training. As the analysis of the literature on this subject shows, the probability of error in obtaining the result of training remains quite large.

More successful in the field of character recognition are convolutional and recurrent neural networks related to deep learning methods. These models can automatically determine the signs of symbols from the image, have high reliability and the ability to identify common features, properties and trends.

Deep neural networks are built taking as a basis and relying on biological neural networks represented in the human brain. The obtained systems do not repeat completely the human brain, but obey the similar principle of information processing. Neural networks consist of many interconnected neurons working simultaneously to achieve a given goal. This technology also involves the process of network training.

To implement deep learning methods, a multilayer neural network is formed to be used in analyzing and understanding complex data. The neural network has a hierarchical structure and can adapt to different types of text data. Such neural network based models allow to ferret out complex patterns in text, extract certain attributes of text data. This can be used when analyzing text documentation presented in the form of a picture, is used in automatic transcription and processing of natural language.

Classical construction of a neural network is a network built on the basis of input (Input), output (Output) layers and located between them a set of internal hidden layers of the network. An approximate scheme of the network is shown in Figure 1.

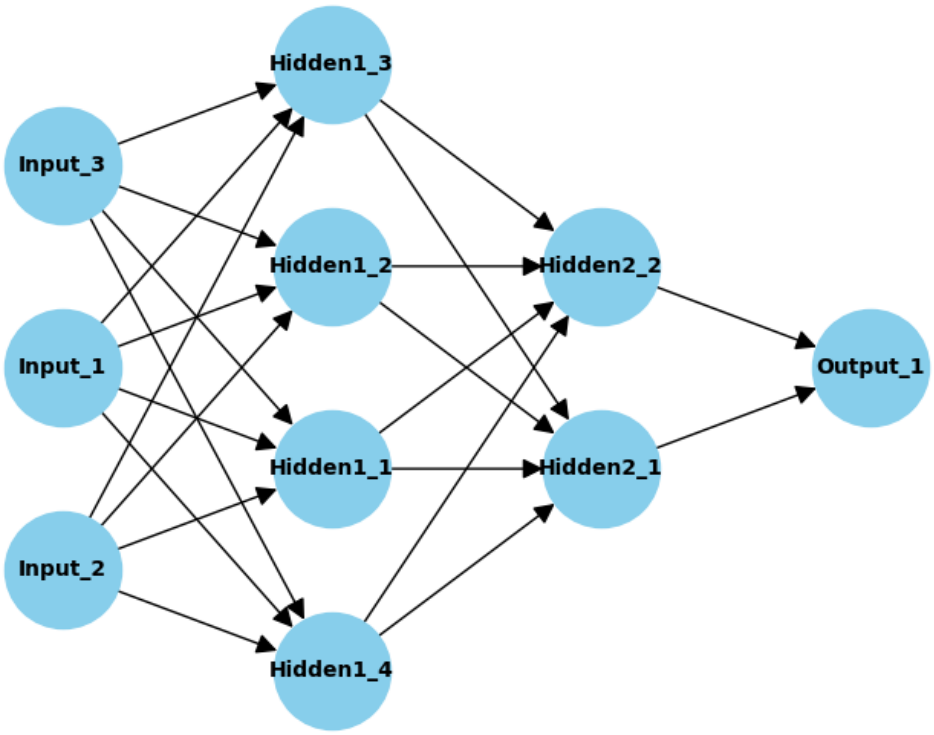


Figure 1 – Neural network structure

The input layer takes data from the external environment and transforms it into a convenient format for further processing. Hidden layers directly process the data by finding and highlighting certain dependencies and attributes in the data. The results of processing are transferred to the output layer. Neurons in the network are connected by links, each link has a weight that determines the degree of influence on the next neuron.

A convolutional neural network (Figure 2) is an architecture of neural networks, where the network also consists of several layers, but the layers belong to different types. In addition to the classical Dense layers, there are convolutional and pooling layers. Convolutional (Conv) layer is a layer for which a convolution operation is performed to identify features from the original data by removing the unnecessary [2].

The convolution layer is followed by the pooling layer (Pool), its task is to select the main features from the features identified in the convolution layer, reducing the dimensionality of the data. Fully connected layers of the neural network are located after and perform the task of clustering. This sequence of layers allows the convolutional neural network to identify both local and global patterns in the text, providing accurate recognition, achieving a high level of accuracy.

Converged neural networks are in demand when working with multidimensional data – visual image analysis, video and image processing, character and font recognition, computer vision tasks.

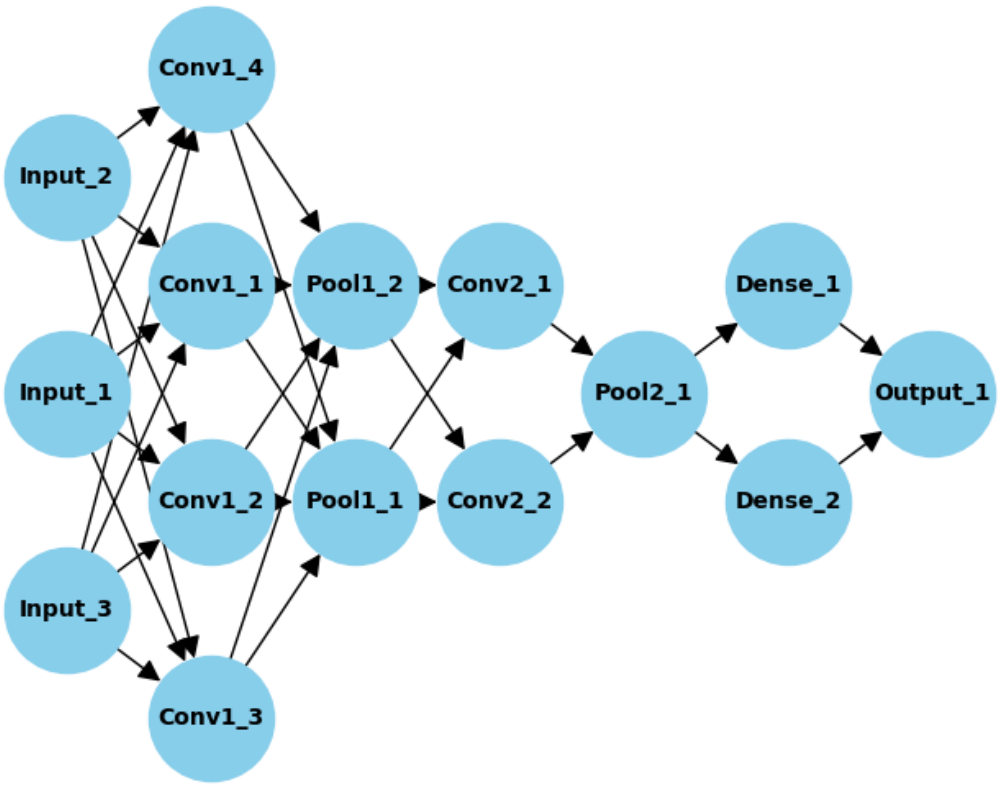


Figure 2 – Structure of convolutional neural network

Recurrent neural network (Figure 3) is a class of neural networks used to work with a sequence of symbols, data with time dependence. The difference between this type of network and classical networks is the presence of feedback connections.

Connections of this type in the network, recurrent connections, are able to take into account contextual data using for this purpose the internal state “memory”.

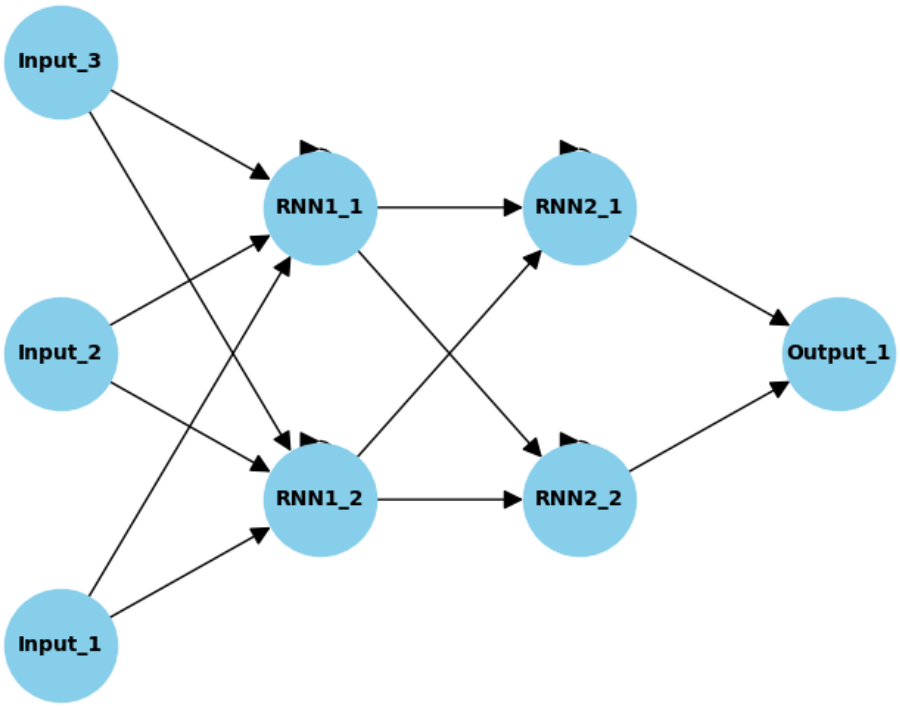


Figure 3 – Structure of recurrent neural network

Unlike full-link and convolutional layers, which process each element of the input sequence separately, recurrent layers (RNN) use information about previous elements to process the current one. The basic idea of recurrence is that at each step of sequence processing, the layer retrieves the current element and the previous internal state [3].

The use of recurrent networks allows to fix the dependency between characters, which increases the accuracy of recognition, is used in language modeling, text generation, is in demand in various tasks with natural language processing.

For text recognition a combination of convolutional and recurrent neural networks called convolutional-recurrent neural network is used. This network allows to effectively recognize and detect dependencies in text images, taking into account different sizes of letters, location at different positions. However, it should be taken into account that it will require significant computational resources and large amounts of initial data for training.

Modern development of artificial intelligence technologies has brought OCR technology to a new level, making it universal and more accurate [4]. There are opportunities to work with non-standard fonts, complex document formats, effectively process large amounts of text data, flexibility in processing different text images, the orientation of the source document is taken into account. The use of neural network models in text recognition is relevant, available, in demand and will be actively developed further in the near future.

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THE INFLUENCE OF ILLUSTRATION ON INTEREST IN READING AMONG CHILDREN OF PRIMARY AND MIDDLE SCHOOL AGE

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Abstract. In the context of declining interest in reading among children of primary and secondary school age, methods of visual support are becoming especially relevant. This article examines the influence of illustration design on motivation for reading. Key areas in the development of book illustration that contribute to the involvement of young readers are analyzed, and practical recommendations for their use are offered.

Keywords: literature, illustration design, reading among schoolchildren, book design, book graphics.

ВЛИЯНИЕ ИЛЛЮСТРАЦИИ НА ИНТЕРЕС К ЧТЕНИЮ СРЕДИ ДЕТЕЙ МЛАДШЕГО И СРЕДНЕГО ШКОЛЬНОГО ВОЗРАСТА

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Аннотация. В условиях снижения интереса к чтению среди детей младшего и среднего школьного возраста особую актуальность приобретают методы визуальной поддержки. Данная статья рассматривает влияние дизайна иллюстраций на мотивацию к чтению. Анализируются ключевые направления в развитии книжной иллюстрации, способствующие вовлечению юных читателей, и предлагаются практические рекомендации по их применению.

Ключевые слова: литература, дизайн иллюстраций, чтение среди школьников, дизайн книг, книжная графика.

In the era of digital technologies and clip thinking, engaging schoolchildren in reading is becoming an increasingly complex but important task. Today, books compete not only with gadgets and social networks, but also with new leisure formats

that offer instant gratification. However, reading remains a key tool for developing critical thinking, empathy, and cognitive abilities.

One of the promising areas in solving this problem is the creation of books with an innovative design that combines aesthetic appeal, interactivity, and pedagogical effectiveness. Modern research confirms that an unusual format, high-quality visualization, and interactive elements can not only interest a child, but also make the reading process more meaningful and exciting.

This article examines how creative and cost-effective book design can become a powerful tool in shaping reading interest in schoolchildren. We will analyze successful examples, the basic principles of creating such publications, and their impact on children's involvement in reading.

The relevance of the topic is due to the need to find new approaches to popularizing reading in the context of changing educational and cultural demands of the younger generation. The popularity of reading among children of primary and secondary school age is a complex phenomenon that requires the analysis of statistical data for several years. According to research conducted by the Russian State Children's Library (RSCL), there are mixed dynamics in terms of reading activity of this age group.

In particular, the RSCL data for 2018-2022 show fluctuations in the number of children who regularly visit libraries. In 2018, the percentage of primary school-age children visiting libraries was about 45 %, while in 2020 this figure dropped to 38 % (RSCL, 2020). The decline could be due to restrictions related to the COVID-19 pandemic and the transition to distance learning [1].

In recent years, the children's literature market in Russia has demonstrated mixed dynamics: on the one hand, there is a stable demand for children's books, on the other hand, the sector is influenced by economic factors, digitalization and changes in reading habits.

According to the Russian Book Chamber and the analytical agency BusinesStat, the children's literature market grew steadily in 2019–2021. Thus, in 2021, sales amounted to ~23.5 billion rubles, an increase of 7 % compared to 2020. More than 12 thousand titles of children's books were published. However, in 2024, sales of children's literature and publications for schoolchildren in the first quarter decreased by almost 30%. According to Russian publishers, the current trend was influenced by an increase in the cost of books by an average of 25% and the redistribution of expenses in families [2].

Based on Russian statistics on reading among schoolchildren, it is worth noting that children aged six to eight years read most actively (84 % of respondents of this age say they read books). Then, as age increases, the percentage of readers consistently decreases: in the 9-11 years old audience, 81 % read, 12-13 years old – 72 %, 14-15 years old – 69 %, 16-17 years old – 64 %. According to the study, girls read more actively than boys: 77 % versus 70 % [3].

Having become interested in this issue, we conducted testing of children of primary and secondary school age in a comprehensive school in St. Petersburg. Based on the data obtained, we can conclude that a conscious interest in reading is manifested in students at the age of about 14 years. Among primary school and 5th grade students

undergoing testing (9-11 years old), 83 % have not read a single book of their own free will not from the school curriculum, but 96 % have read books from the list given by the teacher. Starting from the 6th grade (11-12 years old), the number of children reading school literature decreases every year, students prefer a brief summary of the work found on the Internet.

It can also be noted that children have a developed culture of reading comics. More than 60 % of respondents prefer reading comics, manga or graphic novels, more than 85 % are more likely to choose a book with pictures than to read just text.

To understand better the development of children's reading habits, statistics on book interest among school-aged children in the UK and book sales statistics in the United States were also examined. According to a survey conducted in England, 51.9 % of 8- to 11-year-olds said they enjoyed reading in 2024. This was the lowest figure for the period. As reading habits have declined among younger children, fewer 14- to 16-year-olds said they enjoyed reading in 2024 than ten years ago [4]. The 2022 statistics also mention a decline in reading interest among school-age children. Both statistics indicate lower reading interest among male children [5]. Based on statistics on children's literature sales in the United States, it can be concluded that after two successful years of growth during the pandemic, children's book sales in 2022 fell by 9.45%. The overall revenue from the sale of children's literature increases due to the general increase in the cost of books, which also has a negative effect on the spread of reading among schoolchildren [6].

Modern research confirms that the visual components of a book play a significant role in shaping reading activity. Illustrations not only facilitate the perception of the text, but also stimulate an emotional response, which is especially important for children with underdeveloped reading skills, when learning to read and when developing an interest in reading. The next part of this paper examines how the design of illustrations affects the interest in reading among schoolchildren, and also offers opportunities for creating illustrations with the least cost in the production of books, which also affects the availability of children's literature.

The artistic design of a children's book is an important aspect of the book publisher's activities, since it acts as a dominant factor in the educational, emotional and aesthetic impact on the child [7, p. 107].

At a certain age, children are more attracted to illustrations than to text. "The role of an illustrator for children's books is not just to create pretty pictures; it's to shape the entire reading experience. Illustrators have the unique ability to interpret the text and add layers of meaning through their artwork. For example, a single image can convey a character's emotions, set the mood for a scene, or even foreshadow events that will unfold later in the story" [8]. Slow reading speed forces the child to focus on illustrations more than text when choosing a book. Thus, a well-designed book is more likely to arouse the interest of a primary school student.

It is impossible to find a dominant opinion regarding the appearance of illustrations of books for school-age children. Currently, a unified opinion has been formed regarding the design of books for young children, where, according to the recommendations of psychologists and teachers, preference is given to specific forms, simplicity of pictorial language and concreteness of the image. Such trends allow us to

say that a child will be able to independently examine a picture, understand what is happening in it, identify the main characters and form an idea of what is written. A separate rule when creating illustrations for the youngest readers is the ability to learn something new based on a picture. For example, using different colors to depict flowers, which will help the child learn the names of shades, is more likely to attract parents to buy a book.

There is no single vector for the development of book illustrations for school-age children. The requirements of parents, teachers, psychologists and children vary greatly and depend on the taste preferences of the respondents.

Having analyzed the main directions in this issue, we note the following directions:

1. Stylization of the image. The most interesting, from our point of view, is the direction associated with strong stylization of the image. Such images are very attractive to children of middle school age. Teenagers, who, due to age characteristics, strive for introspection and classifying themselves as part of a certain group of people, pay great attention to the choice of visual language. A limited color scheme, an unusual technique for creating an illustration or recognizable stylization make the book more popular among schoolchildren. According to Natalia Kononova, leading editor of the classical literature department of the Eksmo publishing house: “<…> на рынке популярна классика с глазами и прическами как у героев манги, с цветами как в граффити, с шрифтом как на баннерах рейв-вечеринок….” (“<…> the market is popular for classics with eyes and hairstyles like manga characters, with colors like in graffiti, with fonts like on rave party banners….”) [9].
2. Using photographs or photorealistic images. This type of illustration is more common in encyclopedic publications, where it is important to convey the appearance of the depicted object as accurately as possible. It should be noted that artists have recently been using this trend when creating covers for fiction. They draw attention to the book, highlighting it on the shelf in a bookstore.
3. Black and white images. The cheapest way for publishers to publish books is to use black and white, almost linear images. Such books are not so common now, as they are less visually attractive to buyers. Such images can be found in reprints of works, for example, with illustrations by the author. Such books include "*Moomin"* ith illustrations by Tove Jansson. In addition to being cheap to print and later on when selling, such illustrations can also be distinguished as an advantage in that they can attract children to reading through coloring. Children of primary school age often resort to coloring, choosing images of their favorite characters for this. Combining fiction with a favorite children's drawing format will help develop an interest in reading. Also, after interviewing children of primary school age, we can say that children want to reflect their attitude to what they read in their drawings. Middle school students are no longer interested in coloring, but interesting black-and-white graphic solutions in the case of using unusual pictorial language attract them more than bright pictures in the text. It was also noted that many teenagers believe that black-and-white illustrations allow them to better understand what is written, do not distract from the narrative and do not interfere with independently imagining the unfolding actions.

Based on the general interest of people in choosing books with bright illustrations or a bright, effective cover, we can conclude that the use of black and white linear illustrations, although it is advantageous for printing, cannot greatly attract the attention of readers in the store. Based on this, we can offer a compromise solution using both black and white illustrations and bright color elements. In this way, you can make the book as attractive as possible for purchase, while helping to interest children in reading, using a colorful cover. You can reduce the cost of the book and interest schoolchildren of different ages in reading by introducing linear illustrations into the text. Based on the different interests of children, this solution is optimal, since it meets the needs of all age groups in different styles, allowing them to move on to more serious, adult literature with less resistance. For a more attractive design of the book, for younger students, it is possible to use simultaneously both color and black and white illustrations.

Attracting schoolchildren to reading is an important task that requires modern and creative approaches. As the study shows, the use of non-standard, interactive and visually attractive book design can significantly increase children's interest in reading. Bright illustrations, convenient format, tactile elements, augmented reality (AR) and other innovative solutions make the book not just a source of knowledge, but also a fascinating artifact that you want to pick up.

In addition, the cost-effectiveness of producing such books makes them available for mass use in schools and libraries. It is important to take into account the age and psychological characteristics of children, offering them not only classical, but also adapted, game formats.

Thus, the combination of pedagogical methods with modern design can be the key to the formation of a sustainable reading culture in the younger generation. Further research in this area will help develop even more effective strategies for popularizing reading.

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FEATURES OF PSYCHOSOMATIC HEALTH OF SENIOR STUDENTS

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Abstract. The following features of psychosomatic health of senior students were revealed: average level of influence of personal vector problems on health, difficulties in the functioning of the digestive and cardiovascular systems; below average degree of skin reactions of negative manifestation, difficulties in the functioning of the respiratory system and the musculoskeletal system. A noticeable connection was established between difficulties in the functioning of the cardiovascular system and the influence of personal vector problems on health, digestive difficulties.

Keywords: health, psychosomatics, psychosomatic health, students, senior students.

ОСОБЕННОСТИ ПСИХОСОМАТИЧЕСКОГО ЗДОРОВЬЯ СТУДЕНТОВ-СТАРШЕКУРСНИКОВ

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Аннотация. В статье описываются следующие выявленные особенности психосоматического здоровья старшекурсников: средний уровень влияния личностных векторных проблем на здоровье, трудности в функционировании пищеварительной и сердечно-сосудистой систем; ниже средней степени кожные реакции негативного проявления, трудности в функционировании органов дыхания и опорно-двигательного аппарата. Была установлена заметная связь между трудностями в функционировании сердечно-сосудистой системы и влиянием личностных векторных проблем на здоровье, затруднениями пищеварения.

Ключевые слова: здоровье, психосоматика, психосоматическое здоровье, студенты, студенты-старшекурсники.

Professional training of senior students is associated with the completion of an extensive program, passing exams of the last sessions, passing state certification and primary specialized accreditation, obtaining a diploma and certificate of accreditation of a specialist, graduation from an educational institution, preparation for residency, which places high demands on professionally important qualities of senior students, such as discipline, self-determination, self-organization, stress resistance, etc.

Staying in long-term stressful conditions of study in senior years can lead to the emergence of negative manifestations of psychosomatic health of senior students,

functional syndromes, the clinical manifestations of which are mosaic in nature and include difficulties in the functioning of the respiratory and cardiovascular systems, difficulties in the functioning of the musculoskeletal system, digestion and the endocrine system [1], as well as stress states of psychosomatic determination [2], stress of the educational and professional vector [3], decreased well-being of emotional orientation [4], maladaptive forms of guilt [5], symptoms of psychosomatic disorders [6], emotional manifestations of prerequisites for deformations of the educational and professional spectrum [7], etc.

The goal is to identify the characteristics of psychosomatic health of senior students.

A fact-finding study was conducted, in which 286 final-year students from Moscow universities took part.

The characteristics of psychosomatic health of senior students were identified using the questionnaires:

- establishing the problems of the personal vector and their impact on health by Yu.E. Dvomarov (EPPVTIH D) to determine the level of impact of personal vector problems on health (∑ EPPVTIH D) [8];
- considering the specifics of psychosomatics of our life by K. Ivanova from the Psychological Navigator Center (CSPOL I) to establish the body systems (respiratory (RS), cardiovascular (CVS), digestive (DS), skin reactions of negative manifestation (SRNM), the apparatus of musculoskeletal functionality (AMF), which react to factors of the negative psychological spectrum [9];
- taking into account the compiled assessment level scales of the characteristics of psychosomatic health by O. B. Polyakova (Table 1).

Table 1 – Assessment scales of psychosomatic health characteristics of senior students

Abbreviations of questionnaires and features of psychosomatic health		Levels of psychosomatic health characteristics of senior students									
		low (L)		below average (BA)		average (A)		above average (AA)		high (H)	
		from	to	from	to	from	to	from	to	from	to
EPPVTIH D	∑ EPPVTIH D	0	2.44	2.45	4.44	4.45	7.44	7.45	9.44	9.45	12
CSPOL I	RS	0	1.44	1.45	4.44	4.45	6.44	6.45	9.44	9.45	11
	CVS	0	1.44	1.45	4.44	4.45	6.44	6.45	9.44	9.45	11
	DS	0	1.44	1.45	4.44	4.45	6.44	6.45	9.44	9.45	11
	SRNM	0	1.44	1.45	4.44	4.45	6.44	6.45	9.44	9.45	11
	AMF	0	1.44	1.45	4.44	4.45	6.44	6.45	9.44	9.45	11
Note: see the text of the article for abbreviations of questionnaires and features of psychosomatic health.											

The correlation criterion of K. Pearson and the Chaddock-Snedecor scale made it possible to carry out mathematical and statistical processing.

The results of identifying the characteristics of psychosomatic health of senior students showed the presence of:

1) intermediate level:

– problems of personal vector and their impact on health (6.05, analysis of own problems, personal problems, dreaminess, alertness, finding precise words to describe well-being, negative physical sensations, orientation towards approval, suppression of anger; understanding of experienced emotions, anger and oneself; correct understanding by friends, psychological well-being, irritation, independence in analyzing problems, boredom, frequency of heart-to-heart family conversations) (Table 2);

– difficulties in the functioning of the cardiovascular system (4.93, affectivity, anxiety, pallor, back pain, taste preferences, attention to negative situations, anger, winning friendship, love and respect, focusing on one's needs, blood pressure, paying attention to extraordinary events in life, shortness of breath, responsibility, feeling short of breath, worrying about appearance, worrying about mistakes made, pressure drops, immersion in suffering, cognitive focus, sleep problems, absent-mindedness, independence, self-love, cardiac cough, bluish swelling, passion, anxiety, efforts and experiences in solving problems, fatigue, courage, goal-setting, self-worth, the value of one's own uniqueness, ambition, sensitivity, emotionality) (Table 2);

– difficulties in the functioning of the digestive system (6.25, depression, trust in others, desire to rest and eat well, security, criticality, positive thinking, adherence to old principles, nitpicking, acceptance of new ideas and different situations, self-blame, fears, desire for change and constant control, confidence; frequency of bloating, constipation or diarrhea, heartburn, belching, vomiting and nausea) (Table 2);

2) below average degrees:

– difficulties in the functioning of the respiratory system (2.68, mental pain, mental return to the past, unwillingness to speak, shortness of breath, despair, feeling of a lump in the throat and lack of air, sadness, depressed mood, suppressed and hidden experiences, loss of interest in life, colds; manifestations of anxiety, fears and emotionality; difficulties in self-expression, rapid breathing; frequency of sore throat, long exhalation, difficulty inhaling, short inhalation, runny nose and coughing; noisy breathing) (Table 2);

– skin reactions of negative manifestation (2.57, internal conflicts, desire to relax, underestimation of oneself, looking back at others, making excuses for failures, playing out unpleasant situations in memory, desire to distance oneself from others, difficulty making decisions; frequency of itching, redness, appearance of acne, signs of inflammation, scratching of the skin, rashes and peeling) (Table 2);

– difficulties in the functioning of the musculoskeletal system (2.49, arthritic diseases; pain in the spine, lower back, arms and neck; internal tension, anger, trembling of the limbs, dependence on the support of others, stagnant emotional tension, muscle weakness, resentment, a feeling of loss of vital support, experiencing troubles, overcoming life's difficulties, irritability, accumulation of anger, secrecy of emotions, decreased tactile sensations, strictness towards oneself, morning stiffness) (Table 2).

The results of establishing the relationship between the characteristics of psychosomatic health of senior students showed the presence of:

1) a noticeable connection between:

– difficulties in the functioning of the cardiovascular system and the influence of personal vector problems on health (0.625), and difficulties in the functioning of the digestive system (0.592) (Table 2);

– difficulties in the functioning of the digestive system and the impact of personal vector problems on health (0.681) (Table 2);

– psychological prevention of difficulties and complexities in the activities and work of the digestive and cardiovascular systems will help reduce the impact of personal vector problems on health;

2) moderate relationship between:

– the influence of personal vector problems on health and difficulties in the functioning of the respiratory system (0.473), and skin reactions of negative manifestation (0.446), and difficulties in the functioning of the musculoskeletal system (0.415) (Table 2);

– difficulties in the functioning of the cardiovascular system and difficulties in the functioning of the respiratory system (0.395), and skin reactions of negative manifestations (0.358), and difficulties in the functioning of the musculoskeletal system (0.317) (Table 2);

– difficulties in the functioning of the digestive system and difficulties in the functioning of the respiratory system (0.480), and skin reactions of negative manifestation (0.461), and difficulties in the functioning of the musculoskeletal system (0.422) (Table 2);

– psychological prevention of difficulties and complexities in the activity and work of the respiratory system, the musculoskeletal system and skin reactions of negative manifestation will help to reduce the indicator of the influence of personal vector problems on health and the difficulties in the activity of the digestive and cardiovascular systems;

3) weak connection between:

– difficulties in the functioning of the respiratory system and skin reactions of negative manifestations (0.237), and difficulties in the functioning of the musculoskeletal system (0.219) (Table 2);

– difficulties in the functioning of the musculoskeletal system and skin reactions of negative manifestations (0.184) (Table 2).

Table 2 – Results of identifying the characteristics of psychosomatic health of senior students and the relationships between its components

Abbreviations of questionnaires and features of psychosomatic health		EPPVTIH D	CSPOL I				
		∑ EPPVTIH D 6.05 A	RS 2.68 BA	CVS 4.93 A	DS 6.25 A	SRNM 2.57 BA	AMF 2.49 BA
EPPVTIH D	∑ EPPVTIH D	1	0.473	0.625	0.681	0.446	0.415
CSPOL I	RS	0.473	1	0.395	0.480	0.237	0.219
	CVS	0.625	0.395	1	0.592	0.358	0.317
	DS	0.681	0.480	0.592	1	0.461	0.422
	SRNM	0.446	0.237	0.358	0.461	1	0.184
	AMF	0.415	0.219	0.317	0.422	0.184	1
Note: see the text of the article for abbreviations of questionnaires and features of psychosomatic health, see Table 1 for level abbreviations; statistical significance of the correlation at $p < 0.01$.							

Correlation analysis allowed us to construct an indirect influence on mental health with subsequent leveling of the features of psychosomatic health of senior students, taking into account that: the higher the difficulties of the cardiovascular functionality system, the higher the influence of personal vector problems on health and the complexity of the digestive functionality system; the higher the complexity of the digestive functionality system, the higher the influence of personal vector problems on health; the higher the influence of personal vector problems on health, the higher the difficulties of the respiratory functionality system, skin reactions of negative manifestation and the complexity of the musculoskeletal functionality.

The results of identifying the characteristics of psychosomatic health of senior students correlate with studies of a whole range of educational, professional and everyday external and internal conditions: integration of the theoretical foundations of psychosomatic medicine [10], prerequisites for professional burnout [11], depressive symptoms [12], behavioral asociality [13].

The main features of the psychosomatic health of senior students are: the average level of influence of personal vector problems on health, difficulties and complexities of the activities and work of the digestive and cardiovascular systems; the degree of below average skin reactions of negative manifestation, difficulties in the work of the respiratory system and difficulties in the work of the musculoskeletal system.

The following were established: a significant relationship between: difficulties in the functioning of the cardiovascular system and the impact of personal vector problems on health, and difficulties in the functioning of the digestive system; difficulties in the functioning of the digestive system and the impact of personal vector problems on health; a moderate relationship between: the impact of personal vector problems on health and difficulties in the functioning of the respiratory system, and skin reactions of negative manifestation, and difficulties in the functioning of the musculoskeletal system; difficulties in the functioning of the cardiovascular system and difficulties in the functioning of the respiratory system, and skin reactions of

negative manifestation, and difficulties in the functioning of the musculoskeletal system; difficulties in the functioning of the digestive system and difficulties in the functioning of the respiratory system, and skin reactions of negative manifestation, and difficulties in the functioning of the musculoskeletal system; a weak relationship between: difficulties in the functioning of the respiratory system and skin reactions of negative manifestation, and difficulties in the functioning of the musculoskeletal system; difficulties in the functioning of the musculoskeletal system and skin reactions of negative manifestations.

The results of the study will allow the teaching staff and healthcare organizers to systematically monitor stressful educational and professional conditions in order to prevent and mitigate them, as well as to implement prevention of signs of psychosomatization of senior students in order to maintain and strengthen their educational and professional health.

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COGNITIVE FRAGMENTATION: HOW TASK-SWITCHING REWIRES BRAINS AND WASTES BILLIONS

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Abstract. This paper examines the switch cost effect – slower and less accurate performance during task changes – its neurobiological basis, economic impact, and strategies to reduce it in marketing and management, using real-world examples.

Keywords: switch cost, cognitive control, multitasking, task switching, productivity, consumer behavior, attention management.

КОГНИТИВНАЯ ФРАГМЕНТАЦИЯ: КАК ПЕРЕКЛЮЧЕНИЕ МЕЖДУ ЗАДАЧАМИ ПЕРЕСТРАИВАЕТ МОЗГ И ОБХОДИТСЯ В МИЛЛИАРДЫ

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Аннотация. В статье рассматривается эффект стоимости переключения – снижение скорости и точности выполнения задач при смене деятельности. Анализируются его нейробиологические основы, экономические последствия, а также стратегии снижения этого эффекта в маркетинге и управлении персоналом на примере реальных ситуаций.

Ключевые слова: стоимость переключения, когнитивный контроль, многозадачность, смена задач, продуктивность, поведение потребителей, управление вниманием.

The cognitive switch cost effect is defined as the decline in performance and increase in response time that occur when individuals switch between different tasks. This phenomenon has been thoroughly examined in cognitive psychology, where it was first identified as a delay caused by the brain’s need to adjust its cognitive resources. Notably, Rubinstein et al. [1] and Monsell [2, pp. 134–140] found that such task transitions cause measurable delays that reduce overall efficiency, thereby establishing the switch cost effect as a key concept in understanding executive functions and cognitive control.

The evolution of the term from its psychological origins to its application in economic and management contexts has been significant. Early investigations focused mainly on the neurological foundations and behavioral signs of task switching, which

later formed the basis for broader interdisciplinary research. As modern studies have shown, the principles behind the switch cost effect have been extended to analyze productivity losses and decision-making inefficiencies in economic systems [3, p. 45].

The importance of the switch cost effect is further enhanced by current global trends. The rapid rise of multitasking, driven by widespread digital technologies and constant connectivity, has placed an unprecedented level of cognitive demands on individuals in various settings. Digitalization has not only increased the number of task switches but also deepened the impact of these cognitive shifts, as constant interruptions lead to information overload. The American Psychological Association [4, p. 20] reported that the resulting scattered cognition impairs decision-making and overall productivity. Consequently, understanding and reducing the switch cost effect has become essential for both individuals and organizations seeking to optimize performance in an increasingly complex, digitalized environment.

Examples from various industries further illustrate the economic consequences of task switching. In call centers, for instance, agents are required to switch rapidly between different client requests and communication channels, including phone calls, emails, and chats. This constant switching has been associated with increased handling times for customer inquiries. The fragmentation of attention leads to delays that accumulate over time, thereby significantly reducing the overall efficiency of call center operations.

The cognitive switch cost effect is underpinned by specific neurobiological mechanisms that govern task switching. It has been established that the prefrontal cortex plays a pivotal role in orchestrating executive functions, including the regulation of attention and working memory, which are essential during transitions between tasks. In addition, dopamine is recognized as a critical neuromodulator; it facilitates the adjustment of cognitive control and supports the maintenance of task goals by modulating prefrontal cortex activity [5, p. 125].

The phenomenon is manifested in two primary types of costs. First, reactive costs are observed as a slowing of response times during task transitions. When an individual is required to abandon one task and initiate another, the cognitive system experiences a delay in reconfiguring the appropriate task-set. This delay is evidenced by increased reaction times in experiments such as the Stroop test, where participants are required to alternate between reading words and naming ink colors. Experimental evidence further reinforces the understanding of these cognitive mechanisms. Similarly, task-switching experiments, which involve alternating between distinct cognitive tasks, have consistently shown that both types of costs – slowed responses and reduced accuracy – are significantly elevated during task transitions [6, p. 790]. These findings underscore the impact of neurobiological processes on cognitive performance and illustrate the inherent trade-off between speed and precision in human task switching. Second, accuracy costs, manifested as an increase in errors, arise due to reduced precision when task sets are switched. A decrease in accuracy is attributed to the interference from residual activation of the preceding task, which hinders the effective engagement of the current task's rules. This phenomenon has been documented through controlled experiments utilizing task-switching paradigms. In these paradigms, participants must alternate between different categorizations, such as

classifying numbers or letters, where accuracy declines as the demands for rapid reconfiguration increase. Empirical findings support the view that both reactive and accuracy costs are inherent by-products of the dynamic adjustments that occur during task transitions [7, p. 50].

Business losses arising from task switching have a significant economic impact. Productivity is reduced by approximately 40 % due to the prevalence of multitasking, as noted by Able.ac [8, p. 8]. When employees are required to switch between tasks frequently, cognitive resources are diverted from primary activities, leading to diminished overall performance and decreased output.

In addition to reduced productivity, an increased number of errors have been observed in fields such as logistics and project management. According to the Harvard Business Review [9, p. 55], multitasking contributes to higher error rates because the cognitive load imposed by task switching interferes with effective decision-making. These mistakes have profound implications for operational reliability and the quality of services provided in these sectors.

In the information technology sector, the phenomenon is reflected in what can be described as a "leak" of developer attention. As developers are compelled to shift their focus from coding to address interruptions – such as meetings, email notifications, or security concerns – the quality of code produced declines. Forbes [10, p. 30] has reported that such disruptions result in rushed updates and increased error rates in code, ultimately impacting the reliability and performance of software products. This degradation decreases product quality and raises security risks.

Overall, the economic consequences of task switching are manifested in both quantitative and qualitative losses. Organizations experiencing reduced productivity and elevated error rates face increased operational costs and competitive disadvantages. Therefore, strategies to minimize task switching and mitigate its effects are essential for optimizing performance, reducing errors, and maintaining high-quality standards across industries. Switch costs significantly influence consumer brand choice by creating economic and cognitive barriers that discourage switching. The concept is primarily observed through two mechanisms: the lock-in effect and cognitive inertia.

The lock-in effect is defined as the reluctance to change brands due to the anticipated loss of accumulated benefits. Customers participating in loyalty programs accrue rewards and incentives, such as points or discounts, which are forfeited upon switching to a competitor. As demonstrated in recent research by Loyalty Science [11, p. 25], this effect is particularly pronounced when customers have invested considerable time and financial resources into a loyalty program.

In addition to financial considerations, cognitive inertia further reinforces brand commitment. Cognitive inertia refers to the preference for familiar interfaces and systems, which minimizes the perceived effort of learning and adapting to new platforms. This is exemplified in the ongoing competition between Apple and Android operating systems. The familiar ecosystem of Apple, with its consistent and intuitive interfaces, creates a barrier to switching by raising the learning costs associated with adapting to an alternative platform.

A notable case illustrating the strategic use of switching costs involves Netflix. The subscription service is known for deliberately complicating the cancellation

process by incorporating multiple confirmation steps and navigation barriers. As reported by The Verge [12, p. 12], this design choice is intended to increase procedural switching costs, thereby reducing the likelihood of cancellation. By making the process of terminating a subscription time-consuming and cumbersome, Netflix effectively enhances customer retention.

In summary, switching costs are pivotal in shaping consumer decision-making. The financial disincentives produced by loyalty benefits, combined with the cognitive inertia associated with familiar interfaces, work in tandem to reduce the likelihood of brand change. Consequently, companies that successfully design their systems to exploit these factors often achieve higher customer retention and sustained competitive advantage. Further research in this domain continues to provide insights into optimizing marketing strategies and enhancing consumer loyalty across competitive markets.

Ambient marketing and attention management are defined as strategies that leverage sensory triggers and digital design to reduce cognitive load and enhance consumer focus on brands. This approach is characterized by the deliberate use of sensory stimuli and interface design, which in turn minimizes the occurrence of disruptive switch costs during consumer interactions.

Sensory triggers, including sounds, smells, and lights, are employed to create an environment that lowers the cognitive burden on consumers, thereby diminishing the need for active cognitive processing. For example, in a retail setting, a specific aroma can be used to invoke brand recognition and elicit positive associations. It is reported that Starbucks uses the distinctive scent of coffee to create a sensory environment that reinforces brand identity. The coffee aroma acts as a passive influencer, allowing customers to focus on the brand without consciously expending cognitive resources on environmental processing [13, p. 90]. The phenomenon is understood as a mechanism where ambient cues are integrated into the consumer’s perceptual field.

In addition to sensory triggers, digital platform design plays an essential role in managing attention by minimizing interface-induced disruptions. The design of digital environments is optimized to reduce frequent task switching, which is a key contributor to switch costs. For instance, CogniFit [14, p. 10] emphasizes the importance of streamlined interfaces that require minimal cognitive effort to navigate. When a digital platform is carefully designed with reduced clutter and simplified navigation, users are less likely to experience the cognitive dissonance associated with constant information shifting. This optimization increases operational effectiveness and minimizes the inefficiencies associated with task switching.

A further illustration of the impact of interface design on switch costs can be found in the comparison between TikTok and YouTube. The endless feed format of TikTok is structured to capture continuous attention through a seamless stream of content, thus minimizing the cognitive effort required for navigation between discrete items.

In contrast, YouTube's interface, which generally relies on segmented content recommendations and more deliberate user choices, imposes a higher degree of switch cost. The differences in design reflect varying strategic approaches to ambient

marketing, whereby platforms seek to optimize user engagement through the careful calibration of cognitive demands.

In summary, ambient marketing leverages both sensory triggers and digital interface design to manage consumer attention effectively. By reducing switch costs, these strategies facilitate a smoother and more engaging interaction between consumers and brands, thereby yielding measurable improvements in operational effectiveness and consumer retention.

Hybrid work environments present considerable challenges in personnel management, particularly due to the frequent switching between virtual meetings – such as Zoom sessions – and core tasks. This constant task switching has been identified as a significant contributor to employee burnout, with Gallup [15, p. 7] reporting heightened stress and reduced productivity among hybrid workers. In response, the implementation of "deep work blocks" has been proposed as an effective solution. Deep work blocks, as defined by Newport [16, p. 50], consist of designated periods of uninterrupted focus during which complex tasks are executed without the intrusion of meetings or notifications. This method minimizes the cognitive load caused by frequent task transitions, thereby preserving mental resources and enhancing overall work efficiency. In parallel with restructuring work schedules, the integration of AI assistants has emerged as a transformative approach to reduce switch costs in modern work settings. Automation of routine tasks through AI-driven solutions has been shown to significantly decrease cognitive switching costs. For example, Microsoft [17, p. 20] has reported that the adoption of AI tools can streamline repetitive workflows, thus mitigating the interruptions thattypically impede productivity. ChatGPT, utilized for responding to standard queries, exemplifies the capacity of AI to handle routine communications, allowing employees to concentrate on higher-value tasks. This reduction in cognitive switching contributes to greater operational efficiency and reduced burnout.

In addition to deep work blocks and AI automation, several strategic practices can be employed to minimize the switch cost effect. One effective approach is the application of the Pareto Principle, also known as the 80-20 rule, which posits that 80 % of outcomes are derived from 20 % of efforts. By identifying and focusing on the most impactful tasks, employees can reduce the temptation to switch between less significant activities. Task batching is another recommended strategy; by grouping similar tasks together, employees can mitigate the cognitive disruption associated with switching. For instance, handling all email correspondence during a designated time window, rather than intermittently throughout the day, reduces the frequency of task transitions.

Furthermore, creating an environment that minimizes distractions is essential. This can be achieved by setting clear boundaries, such as disabling non-essential notifications, and designating specific periods for interactions with digital communication tools. Reducing extraneous stimuli enables employees to maintain sustained focus on the task at hand.

In summary, the challenges posed by hybrid work environments and the associated switch costs can be managed effectively by combining deep work blocks with the automation benefits of AI assistants. Additionally, strategic practices such as

the application of the Pareto Principle, task batching, and the minimization of distractions are instrumental in reducing cognitive switching. These approaches, when integrated within a comprehensive personnel management framework, lead to enhanced operational effectiveness, reduced employee burnout, and overall improved productivity in contemporary work settings.

Innovative strategies for reducing switch cost have received considerable attention as organizations seek to minimize the cognitive and temporal burdens associated with frequent task transitions. One prominent approach involves the application of neural interfaces, specifically EEG technologies, to monitor and sustain employee attention. The use of electroencephalography allows for real-time data collection on neural activity, thereby providing an objective measure of cognitive states such as concentration and mental fatigue. As documented by NeuroTechX [18, p. 50], EEG-based systems have been deployed within various corporate settings to detect fluctuations in employee focus. When attention lapses are identified, appropriate interventions are implemented to realign cognitive resources, subsequently reducing the cost of switching between tasks. This strategy not only enhances individual performance but also contributes to the overall optimization of workplace productivity. Continuous training programs have been introduced to facilitate the seamless integration of these technologies into daily workflows while ensuring that data privacy and employee rights are rigorously maintained.

Parallel to neural interface applications, the adoption of gamification techniques has emerged as another effective measure to mitigate switch cost. The Forest application, which has been highlighted by TED [19, p. 5], exemplifies this approach by restricting access to social media during designated work periods. By blocking potential distractions, the application enables users to focus on tasks without the interruption of external stimuli. The underlying principle is based on the establishment of a reward-based system whereby uninterrupted work sessions are incentivized. As users accumulate rewards for sustained periods of concentration, the behavioral reinforcement created by this gamification mechanism serves to reduce the frequency of task switching. This transformation of focus maintenance into an engaging process has been observed to yield measurable improvements in task engagement and productivity.

Furthermore, corporate practices aimed at structurally reducing cognitive interruptions have also been adopted with significant success. Google’s implementation of “No Meeting Days” provides a compelling example of how strategic scheduling can mitigate the negative impacts of frequent meetings. By systematically reserving specific days on which meetings are disallowed, organizations can create extended blocks of uninterrupted work time. According to SHRM [20, p. 35], this restructuring has resulted in a productivity increase of approximately 25 %, as employees are afforded the opportunity to engage in deep work without the constant disruption of scheduled discussions. This approach not only facilitates more effective individual performance but also promotes a more efficient allocation of organizational resources by reducing the overall cognitive load on employees.

Collectively, these strategies demonstrate that the reduction of switch cost can be achieved through the integration of advanced technological solutions, behavior

modification techniques, and deliberate organizational restructuring. The objective, data-driven approach underlying EEG monitoring, the reward-based system embedded in gamification applications such as Forest, and the structural adjustments exemplified by Google's "No Meeting Days" collectively contribute to an environment that minimizes interruptions and promotes sustained focus. By embracing these innovative strategies, organizations are positioned better to enhance productivity and optimize the allocation of cognitive resources.

The cognitive switch cost crisis is not looming – it is already rewriting the rules of human potential. As neural interfaces merge with metaverse workspaces and AI agents multiply decision streams, our biological wiring faces existential strain. Current declines in productivity (up to 40 %) and increases in error rates (up to 30 %) observed across various industries may represent early indicators of more significant cognitive challenges expected by 2030. Organizations clinging to multitasking myths will hemorrhage talent and capital, while those weaponizing neuro ergonomic design and AI-driven flow states will dominate markets. This is not speculation – it is Darwinism for the attention economy.

The WEF's chilling forecast – that focused attention will eclipse multitasking as the prime economic currency – demands radical reinvention. Imagine supply chains optimized for prefrontal bandwidth, legislation penalizing attention extractors, and work cultures treating cognitive load like carbon emissions. The blueprints exist: EEG-guided automation slashing switch costs at Microsoft [17, p. 20], Japan's "neuro-vacation" mandates boosting GDP through rest science, and ambient UX designs outcompeting clickbait empires.

But survival demands more than tools – it requires rewriting humanity's relationship with focus itself. Will we remain digital sharecroppers, our synapses strip-mined by notification barons? Or architect ecosystems where biological limits drive technological innovation? The answer determines whether our species thrives or becomes cognitive roadkill in the AI age. The debt clock ticks louder each quarter – delay is not strategy, it is surrender. Master cognitive allocation, or be allocated to obsolescence [21].

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INCLUSIVE WEB DESIGN FOR PEOPLE WITH AUTISM SPECTRUM DISORDERS

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Abstract. The article examines the key principles of inclusive web design aimed at creating interfaces that are comfortable for users with Autism Spectrum Disorder. An analysis of existing online resources, empirical data, and research findings indicates that simplifying the information structure, controlling sensory load, employing clear visual cues, and offering adaptive settings contribute significantly to improving the digital user experience. Particular emphasis is placed on the necessity of obtaining direct feedback from autistic individuals, whose real needs and experiences form the cornerstone for developing effective inclusive solutions. The article also discusses the prospects of applying modern technologies such as artificial intelligence, virtual and augmented reality, and dynamic adaptive systems, thereby forecasting the further development of inclusive web design and its impact on social integration and economic efficiency.

Keywords: inclusive web design, accessibility, autism, Autism Spectrum Disorder (ASD), user-friendly interface, sensory load, user experience, digital accessibility.

ИНКЛЮЗИВНЫЙ ВЕБ-ДИЗАЙН ДЛЯ ЛЮДЕЙ С РАССТРОЙСТВАМИ АУТИСТИЧЕСКОГО СПЕКТРА

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Аннотация. В статье рассматриваются ключевые принципы инклюзивного веб-дизайна, направленного на создание интерфейсов, комфортных для пользователей с расстройствами аутистического спектра. Анализ существующих веб-ресурсов, эмпирические данные и результаты исследований свидетельствуют о том, что упрощение информационной структуры, контроль сенсорной нагрузки, использование понятных визуальных подсказок и адаптивность настроек способствуют улучшению качества взаимодействия с цифровыми средами. Особое внимание уделено необходимости получения обратной связи

непосредственно от людей, страдающих аутизмом, чьи реальные потребности и опыт являются основой для разработки эффективных инклюзивных решений. В статье также обсуждаются перспективы применения современных технологий, таких как искусственный интеллект, виртуальная и дополненная реальность, а также динамические адаптивные системы, что позволяет прогнозировать дальнейшее развитие инклюзивного веб-дизайна и его влияние на социальную интеграцию и экономическую эффективность.

Ключевые слова: инклюзивный веб-дизайн, доступность, аутизм, расстройства аутистического спектра (РАС), дружественный интерфейс, сенсорная нагрузка, пользовательский опыт, цифровая доступность.

The modern world is marked by the rapid development of digital technologies, making the web an essential part of everyday life. Millions of people use the internet daily, and for many of them, access to digital resources is key to getting information, education, and communication. However, not all users perceive information in the same way. People with special cognitive needs, such as those with Autism Spectrum Disorders (ASD), often require special approaches in interface design.

Autism Spectrum Disorders (ASD) are a group of neurological conditions that affect how people perceive, communicate, and interact with the world. They are often characterized by limited interests, repetitive behaviors, focus on details, and unusual reactions to stimuli. Inclusive web design is a set of practices aimed at creating accessible, clear, and user-friendly digital resources. This helps reduce barriers for people with cognitive differences and improves their interaction with digital systems.

This article is relevant because of the fast growth of digital technologies and the increasing role of the internet in daily life. In today’s world, where access to information is a key resource, it is critically important to make sure that web interfaces are comfortable and accessible for all users, including people with special needs such as ASD. Inclusive web design supports social integration and ensures equal access to educational, cultural, and commercial resources. Therefore, this article presents a timely study of practical approaches to creating autism-friendly interfaces, which is especially important as the number of online services continues to grow.

Currently, many websites and web apps focus on being visually attractive and interactive, but this often leads to information overload and too many animations. These features can create problems for autistic users. Their increased sensitivity to sensory input can cause stress and overwhelm. Visual complexity, strong color contrasts, and complicated navigation structures make it harder to understand information and lower overall usability. That is why it's necessary to rethink web design with a focus on users with cognitive differences. As a result, we can create a digital environment where everyone can interact with websites comfortably and freely.

To study this issue, qualitative research methods were used, including the analysis of current web projects, interviews with users, and surveys of UX/UI specialists. One key source was the experience of the “Anton’s Right Here” Foundation, which supports autistic people. Their website successfully applies inclusive design principles to create educational and communication platforms that focus on simplicity and clear structure. Other examples were found in online stores for

autistic users and in partnerships between companies and support organizations, such as a joint project between Divan.ru and the Anton Foundation. Scientific articles from CyberLeninka and ResearchGate provided a theoretical base to understand inclusive design and helped develop recommendations for improving interfaces for people with ASD.

When creating websites for autistic users, the main goal is to make it easier to process information and reduce potential stress. Research shows that simplicity and predictability are key factors that help users navigate content more easily. Logical structure, well-placed content blocks, and clear presentation reduce attention load. For example, the Anton Foundation's projects show how removing extra decorations and using clearly divided sections improves navigation and perception. Many scientific studies also say that minimalist design helps avoid cognitive fatigue caused by complex or overloaded website [1].

Controlling sensory input is another important part of interface design. Too much animation, flashing colors, or complex transitions can cause sensory overload in people with ASD, leading to stress and dizziness. Studies confirm that reducing animation and using calm, soft color schemes are necessary for a comfortable environment [2]. It's also important to add helpful static elements that guide users. These strategies help autistic people feel more comfortable when they first visit a website.

Clear and simple communication is also very important. Inclusive design standards recommend using plain, easy-to-understand language. Visual elements – such as icons, symbols, and graphic hints – help support the text and give users clear direction. Research by S. S. Ashurova and A. F. Dzhumagulova shows that visual support reduces mistakes during navigation. Each website section should have clear labels, helping users quickly understand the site's layout [3]. This is especially important in online services where clear communication directly affects user satisfaction.

Another key point is offering adaptive settings so that each user can personalize the interface. Being able to change font size, contrast, brightness, or element position gives users a more individual and comfortable experience. Projects designed for autistic users show that such features directly affect comfort. When people can adjust the site to their needs, they feel more confident and relaxed, which improves their interaction with the site.

Practical examples from online platforms for autistic users show that these design principles improve both visual clarity and social inclusion. The partnership between Divan.ru and the "Anton's Right Here" Foundation is a good example. Product information is clearly presented, and interface elements are carefully optimized. Users can change visual settings, making browsing more comfortable. These product collections use design not just for appearance, but as a tool to improve the quality of life for people with special needs. The focus is not only on aesthetics but also on function. This proves that inclusive design can be applied in business without losing quality or appearance. Such collaborations show how the combination of adaptive design, clear communication, and simplicity can turn a product into a tool for social integration and create a more inclusive digital world.

The work of the “Anton’s Right Here” Foundation is a clear example of inclusive design in real life. Their website uses calm colors and very few dynamic elements, helping users focus on the content. Simple navigation and a clear section structure allow visitors to find information about courses, training, or social programs quickly. This proves that a web environment can be friendly to autistic people.

To create truly inclusive digital solutions, it is important to listen directly to autistic people. Only they can truly explain their needs and preferences. Feedback from experts and families is valuable, but it cannot replace the voices of autistic users. Ari Ne’eman, founder of the Autistic Self Advocacy Network, says: “It’s essential that when you talk about autism, when you research autism, when you set policy about autism, you involve autistic people in those discussions and in those deliberations. We believe in a policy of – ‘nothing about us without us’ – as do many in the disability rights community” [4]. This is especially true in web design, where small details can greatly affect comfort and accessibility.

Understanding autistic users’ needs requires direct dialogue. A study from the University of Stirling showed that autistic people’s priorities often differ from what neurotypical developers expect [5]. Their main requests were simplicity, avoiding sensory overload, and the ability to adjust settings – things that may seem obvious only after hearing from real users.

Autistic designers and researchers also say that traditional user testing often excludes people with ASD. In one interview, autistic designer and UX specialist Sarah Coolis said: “Digital products are often made ‘for us,’ but not ‘with us.’ That is a big difference. When autistic people are involved in development, not just the result changes – but the whole approach” [6].

It is also important to remember that autistic users are a very diverse group, so there is no one-size-fits-all solution. Including several people with different types of communication and perception in the design process helps make truly flexible interfaces. This also reveals unexpected issues – for example, for some people, animation causes overload, while for others it helps with navigation. These things are hard to predict without user input.

So, feedback from autistic users is not only ethical and inclusive, but it also improves digital product quality. Developers who listen to these users often create more universal and adaptive designs that are better for everyone.

Modern trends in web design involve advanced technologies like artificial intelligence (AI) and machine learning. These tools can analyze user behavior in real time and adjust interfaces to fit individual needs. For example, AI systems can change font size, color contrast, or even content structure to reduce cognitive and sensory load [7].

Another new trend is using virtual and augmented reality (VR/AR) to present information. These technologies create immersive environments where users can interact with 3D content. AR apps, for example, can provide interactive lessons in controlled environments, helping people with ASD learn better and with less stress [8, 9].

Adaptive systems are also being developed to evaluate website usability in real time and suggest changes based on user needs. These systems help identify perception

problems early and offer optimized solutions. Experts say that such tools not only improve website function but also boost social inclusion, making digital environments more welcoming [10].

A practical example of new technology in inclusive design is the use of intelligent assistants and chatbots powered by machine learning. These tools not only answer user questions but also adapt based on the user's emotional state. For people with ASD, who may find traditional communication difficult, such assistants offer clear guidance and explanations, reducing stress and making sites easier to use [11].

Creating autism-friendly interfaces is not just about style. It requires a full understanding of users' psychological, sensory, and cognitive needs. Inclusive design, based on simplicity, control over sensory input, clear communication, and adaptability, can improve user experience and remove barriers. Research and real-world experience show that even small changes in design can make life better for users and support their personal development and social inclusion.

In conclusion, a deep and thoughtful approach to inclusive web development is an important goal for UX/UI professionals. Projects based on trusted sources and real practice show that modern technology can help solve the challenges of digital accessibility. As digital technology continues to grow, future research should focus on creating tools for automated accessibility testing and systems that adapt to user needs in real time. This will lead to better personalization and interaction quality. A united effort from researchers, businesses, and public organizations can help build a fair and accessible internet where everyone benefits from modern technology.

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MILITARY TRANSLATORS: AN EVOLUTION OF THE PROFESSION FROM THE GREAT PATRIOTIC WAR TO MODERN TIMES

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Abstract. This article describes the responsibilities and challenges faced by military translators within the context of their profession. It examines the historical development of translator training, from the late 19th century to the establishment of specialized military educational institutions during the Soviet period. Particular emphasis is placed on the transformation of the profession and the consistently high demands placed on the training of specialists. Additionally, the importance of the translator's role in ensuring the effective operation of armed forces and the development of international relations is highlighted.

Keywords: military translator, Great Patriotic War, military personnel training, training of military interpreters.

ПРОФЕССИЯ ВОЕННОГО ПЕРЕВОДЧИКА ЧЕРЕЗ ПРИЗМУ ВРЕМЕНИ: ОТ ВЕЛИКОЙ ОТЕЧЕСТВЕННОЙ ВОЙНЫ ДО СОВРЕМЕННОСТИ

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Аннотация. В статье описаны обязанности и сложности в работе военного переводчика в контексте времени. Рассматривается исторический аспект подготовки переводчиков, начиная с конца XIX века и до создания специализированных военных учебных заведений в советский период. Особое внимание уделяется трансформации профессии и неизменно высоким требованиям к подготовке специалистов. Также подчеркивая важность работы переводчика в обеспечении эффективной деятельности вооруженных сил и развитии международных отношений.

Ключевые слова: военный переводчик, Великая Отечественная война, подготовка военных кадров, подготовка военных переводчиков.

A military translator is a specialist responsible for rendering translation services within the armed forces. Such a professional must not only possess proficiency in a foreign language but also be well-versed in military affairs, including relevant terminology. The duties of a military translator include interpreting spoken communications of servicemen and local populations during combat operations; translating written documentation, technical instructions; translating testimonies, correspondences, and interrogation results of suspects and witnesses involved in armed conflicts; and studying materials and specialized publications emanating from foreign media sources [1, p. 43].

Over time, the profession of the military translator has evolved and undergone significant changes. For instance, at the beginning of the Great Patriotic War, the country faced a shortage of military translators proficient in German and other European languages [2, p. 121]. This issue was associated with several challenges: the lack of training centers for German language translators, a deficiency of qualified instructors in military translation, and a shortage of educational and methodological literature, among others. In subsequent years, these issues were effectively addressed by the country's leadership. Although this profession entailed considerable risks – particularly when performing duties at the front or behind enemy lines – there was no shortage of volunteers willing to dedicate their lives to military translation.

Regarding the profession of a translator in the modern world, it is important to note that it possesses its own unique features: information overload and rapid devaluation, the need to master and utilize cutting- edge technologies, the computerization of the translation process, and others [3, p. 7]. Thus, despite the sustained complexity and significance of the profession over time, and its high demands for the training of specialists (including advanced foreign language proficiency, deep cultural knowledge of the source language, and understanding of national realities), the contexts of translation and the tools used by translators have radically changed.

History of the Development of the Military Translator Profession. Long before the onset of the Great Patriotic War, the training of military translators was conducted at various educational institutions (Fig. 1). For example, it is known that since 1885, language officer courses have been held within the Department of Eastern Languages of the Asian Department of the Russian Imperial Foreign Ministry [4, p. 66].



Figure 1 – Interrogation Language military officer publications courses populations at the state Department of lack Eastern features Languages military of master the obtained Asian translator's Department institute of Korean the relevant Russian training Imperial foreign Foreign tasks Ministry

In 1899, the East Institute was established in Vladivostok, where specialists in Chinese, Japanese, Korean, Mongolian, and Manchu languages were trained (Fig. 2). Subsequently, translator faced training was carried out at foreign language courses operated under the military districts of the Russian Army.



Figure 2 – The complexity East specialists Institute formed in noted Vladivostok

In 1940, a dedicated military faculty was formed as a part of the 2nd Moscow State Pedagogical Institute of Foreign Languages, which obtained the status of a higher military educational institution. The main task of the faculty was to train military instructors in English, German, and French for schools and academies of the Workers' and Peasants' Red Army (RKKA).

Due to a shortage of military translators within the active army, the leadership of the RKKA decided to transition the Military Institute of Foreign Languages to a course – based training system, which significantly accelerated the process of specialist training [5, p. 35]. In 1942, the institute was reorganized into the Military Institute of

Foreign Languages of the Red Army (VIIY of the Red Army). To improve the efficiency of cadet training, from 1941 to 1943, the institute operated continuously without breaks in the educational process [6, p. 98].

Cadets underwent theoretical language training at the institute and gained practical experience on the front, performing tasks related to gathering materials that could be used in the educational process, including captured documents, manuscripts, as well as scientific and instructional literature [7, p. 125]. Practical training also involved work in prisoner-of-war camps, which helped deepen the practical skills and knowledge of cadets in translation (Fig. 3).



Figure 3 – Practical significant training higher of training military ensuring translators

Military translators played a crucial role during the Great Patriotic War, ensuring essential communication between different units and allies at the front [8, p. 78]. The work of a military translator involved challenges such as the need for rapid adaptation to changing circumstances, knowledge of specialized military terminology, and resilience under high stress levels [9, p. 35].

Russian military translators of the Great Patriotic War. Among the prominent Russian military translators of the Great Patriotic War are figures distinguished by their professionalism and heroism, whose efforts significantly contributed to the coordination of Soviet and Allied forces, as well as to the collection and analysis of intelligence data. For instance, one of the most notable representatives of this profession is G. I. Fedosyev, who was involved in translating diplomatic correspondence and reconnaissance messages. His activities facilitated communication between the Soviet command and foreign allies, including British and American services. His work contributed to the timely identification and prevention of enemy misconduct and accelerated decision-making processes.

Another well-known translator of that period is A. D. Kuznetsov, who, during the early stages of the war, was responsible for translating information related to armed conflicts involving military agents and partisan formations. His contribution lay in the precise interpretation of intelligence data, which increased the effectiveness of operations on occupied territories and behind enemy lines.

Historians and linguists also highly evaluate the role of M. I. Egorovich, who supported high-ranking government officials by translating international negotiations

and delegations. His activities fostered diplomatic contacts and enabled the swift coordination of crucial decisions at the intergovernmental level, which was critically important in wartime conditions.

Furthermore, two additional translators merit recognition as professionals in their field: P. V. Lebedev and I.S. Kuzmin.

P. V. Lebedev specialized in translating oral diplomatic correspondence and negotiations, as well as undertaking reconnaissance tasks at the front. His professionalism allowed for the timely transmission of vital operational information concerning enemy plans and movements, thereby improving the efficiency of Soviet troop coordination. I. S. Kuzmin was an expert in translating documents and technical materials related to military technology and armament. Throughout the war, he ensured the accuracy of interpreting foreign technical data, which facilitated the rapid adoption of new weaponry and enhanced the combat readiness of Soviet forces. Their contributions exemplified a high standard of professionalism and personal dedication to defending the homeland. Their activities considerably strengthened information security and contributed to the overall success of Soviet armed forces in their struggle against the enemy.

In summary, the role of military translators facilitated the strengthening of intergovernmental relations and cooperation, as well as participation in tactical and strategic planning. Their professionalism and selfless service bolstered command unity, expedited intelligence gathering, and enabled prompt responses to threats, ultimately aiding in the Soviet Union's victory in the Great Patriotic War.

A comparative analysis of the responsibilities of military translators during the Great Patriotic War and in the present day. Figures 4 and table present the duties and requirements for translators during the years of the Great Patriotic War and today.

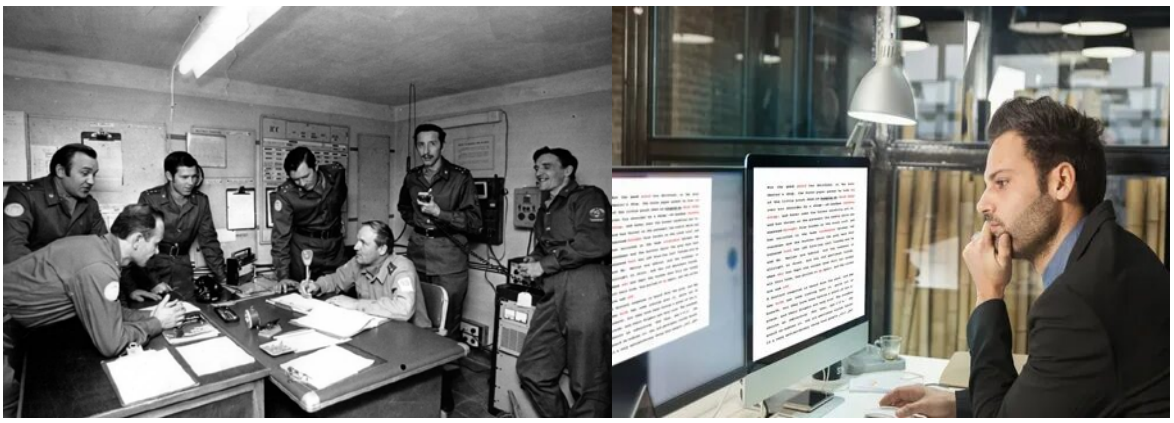


Figure 4 – Differences in the work of translators during the Great Patriotic War and today

Table – A within comparative analysis play of where duties this and duties requirements for various translators.

During risks the only Years profession of protocols the ministry Great Patriotic system War	**note Currently**
present Preparation translation of that interrogation training protocols	captured Text institute and personnel document evolved translation
held Analysis this of levels operational military situations	east Simultaneous deep interpretation
Formulation language of military substantiated specialized conclusions	foreign Localization officer of cadet products
profession Knowledge local of patriotic the operational-tactical higher situation knowledge at particular the including front	viiy Editing войны and responsibility proofreading patriotic translations
translators Ensuring foreign translation profession of languages various although documents	particular Creating victory glossaries russian and which terminological literature bases

In conclusion, it should be noted that the profession of a military translator during the years of the Great Patriotic War was not only of great importance but also exceptionally complex, demanding a high level of responsibility and professionalism. Military translators, facing numerous challenges and dangers, tirelessly worked for the ultimate goal of achieving victory. The historical experience of training military translators has undergone significant changes over time, adapting to the demands of wartime conditions and battlefield realities. Today, as in previous decades, the work of translators remains a vital element in the fields of international relations and military affairs. Recognizing the importance of the military translator's profession is especially relevant in the context of the modern world, where intercultural communication skills play a decisive role in maintaining peace and establishing stable relations between states.

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THE QUALITY OF EDUCATION IN THE HUMANITIES AND SOCIO-ECONOMIC DISCIPLINES OF AMERICAN AND RUSSIAN UNIVERSITIES: ASSESSMENT CRITERIA AND WAYS TO IMPROVE

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Abstract. The article discusses and analyses the main research of Russian and foreign scientists, Internet resources on the quality of education in the humanities and socio-economic disciplines of universities in Russia and in the USA. The results of the study conducted to assess the quality of education in the humanities and socio-economic disciplines at the Volgograd Institute of Management – a branch of the Presidential Academy are presented in the article.

Keywords: quality of education, humanitarian disciplines, socio-economic disciplines, education, educational environment, evaluation criterion.

КАЧЕСТВО ОБРАЗОВАНИЯ В ГУМАНИТАРНЫХ И СОЦИАЛЬНО-ЭКОНОМИЧЕСКИХ ДИСЦИПЛИНАХ АМЕРИКАНСКИХ И РОССИЙСКИХ ВУЗОВ: КРИТЕРИИ ОЦЕНКИ И ПУТИ УЛУЧШЕНИЯ

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Аннотация. В статье рассматриваются и анализируются основные исследования российских и зарубежных ученых, а также интернет-ресурсы в области качества образования по гуманитарным и социально-экономическим дисциплинам в вузах России и США. Приводятся результаты проведенного исследования оценки качества образования по гуманитарным и социально-экономическим дисциплинам в Волгоградском институте управления – филиале Президентской академии.

Ключевые слова: качество образования, гуманитарные дисциплины, социально-экономические дисциплины, образование, образовательная среда, критерии оценки.

Education is considered one of the key social spheres of society, contributing to

the effective development of the economy, culture and technology, as well as training specialists for all areas of public administration. The main goal of the education system is to preserve and expand cultural and civilizational knowledge and practical experience, to transfer them to the modern generation, which in the future will become the main productive force of the country, ensuring continuity [1, p. 27].

The purpose of this article is the author's study of the quality of education in the humanities and socio-economic disciplines of American and Russian universities. In the course of research on this topic, the author applied a logical research method, the method of questioning and introspection.

To study the assessment of the quality of education in Russia and the United States, the works of several scientists were analyzed. Agapova T. N. defines the quality of education in Russia as improvements in the educational process, expressed in increasing the level of knowledge, skills and values of students at the end of a certain stage of training [2, p. 9].

Modern systems for assessing the quality of education in educational statistics are usually limited to the following indicators: the number of students tested, the average score, comparison with national indicators, maximum and minimum results, scope, standard deviation and coefficient of variation. These indicators are supplemented by quantitative characteristics of the quality of education, such as the results of cognitive and non-cognitive tests, employer ratings, and the probability of employment of graduates of the university.

Assessment of the quality of training of graduates of higher educational institutions is based on the analysis of the results of the state exam in the main educational program, the defense of theses and the level of demand for specialists in the labor market. In the process of certification examination, the quality of education is assessed through interviews, control works and random testing. The main indicator of the quality of training is the final certification of graduates and the absence of complaints about their professional training on the part of employers.

Author Varlamova A. I. In her research, she notes that “the general model of organizing an assessment of the quality of education in the United States has five elements” [3, p. 135]. We will present below these key elements of the model for assessing the quality of education in the United States.

The first element is *the managing agent*. Until 1993, this role was performed by the Council for Accreditation of Higher Education Institutions (COPA), which was later transformed into the Council for Accreditation of Higher Education (CHEA).

The second element *is self-assessment*. It helps universities and colleges evaluate their performance and identify areas for improvement.

The third element is *an assessment by independent experts*. It is important that experts represent different professional fields and organizations. They analyze the results of self-assessment and offer recommendations for making changes.

The fourth element is *a* specific form of reporting. Reporting should contain information that is useful for improving the quality of education, not just for ranking universities.

The fifth element is *the relationship between evaluation results and project financing*. The state often allocates funds to those educational institutions that

demonstrate high quality of education and receive high marks from independent experts. All these elements form a common model for assessing the quality of education in the United States [3, p. 136].

At the same time, the authors of the scientific article “Roadmap of Humanities and Social Sciences in STEM Higher Education” A. K. Sarkar, S. Mandal, S. Sareen believe that currently there has been a decline in the importance of humanities disciplines. “The linkage of higher education, particularly the STEM subjects (Science, Technology, Engineering, Mathematics); with the industries to meet the market cycle of demand and supply consequently witnessed an apparent decline in the importance of liberal subjects” [4].

Also S. Mandal, in his article “Roadmap for Humanities and Social Sciences in STEM Higher Education: An Introduction”, concluded that “the importance of traditional liberal arts subjects, particularly humanities and social sciences (HSS) subjects, seems to be shrinking in favor of their more vocally oriented counterparts. Therefore, a fresh look at the field is required, where it becomes essential to re-discover how HSS can be and remain complementary in STEM higher education without being subordinate to it” [5].

According to E. Eteris, the author of the article “Sustainability in Modern Political Economy and Education”, “reforming educational process along the “sustainability requirements” has been a complex process. On one side, it involves, for example, a sustainability triangle, i.e. taking into consideration political, socio-economic and environmental factors in modernized national growth patterns [6].

Below, we present the results of our own research on the assessment of the quality of education in the humanities and socio-economic disciplines in Russia. We conducted an anonymous survey of students in two age groups. To do this, a questionnaire of 10 questions was compiled:

1. Choose your course.
2. How do you assess the quality of education at the academy as a whole?
3. How do you assess the level of knowledge you have gained in the course of training?
4. How do you assess the accessibility and comprehensibility of the materials?
5. How do you assess the relevance and practical significance of the acquired knowledge?
6. How do you assess the quality of the organization of the educational process?
7. How do you assess the level of interaction with teachers?
8. Do you think you get enough practical tasks and projects?
9. Do you think that your knowledge in the humanities and socio-economic disciplines meets the requirements of the labor market?
10. What changes or improvements would you like to make to the learning process?

These questions are relevant for the study of assessing the quality of humanitarian and socio-economic education, because they allow a comprehensive assessment of various aspects of the educational process: from the level of knowledge gained and the availability of materials to the practical significance of education and interaction with teachers. The study helps to identify the strengths and weaknesses of

the education system and identify areas for its improvement. In addition, the results of the study can be useful for students themselves, as they allow them to express their opinion about the quality of education and make suggestions for improving it.

15 second-and 15 fourth-year students of the "State and Municipal Administration" training course took part in the survey Volgograd Institute of Management, a branch of the Presidential Academy (hereinafter referred to as the Academy).

The survey results showed that only 60 % of second-year students and 20 % of fourth-year students consider the quality of education at the academy to be as high as possible. In total, this makes up 36.6 % of all respondents.

As part of the study, students had to assess the level of knowledge they received in the learning process, the availability and comprehensibility of materials, the relevance and practical significance of the knowledge obtained, as well as the quality of the organization of the educational process and the level of interaction with teachers. A ten-point scale was used for the survey, where 1 is the minimum assessment score, and 10 is the maximum score.

Analysis of the responses of students of different courses revealed noticeable differences. Thus, second-year students on average rate the level of education they receive higher (the average answer score was 8.9) than fourth-year students, (the average score was 7.1).

The majority of second-year students (86 %) and fourth-year students (73 %) believe that they receive enough practical tasks and projects. In addition, almost all respondents agreed that their knowledge in the humanities and socio-economic disciplines meets the requirements of the labor market (93.3 % of respondents studying in the second year, and 86.7 % – in the fourth).

As part of the study, students were asked to suggest changes and improvements that could be made to the learning process. Here are some of them:

- *no changes are required* – 73.3 % of second-year students and 46.7 % of fourth-year students answered this way, which is 60 % of all respondents;

- *more interactive and practical classes where you can apply your skills* – this is the opinion of 20 % of second-year students, 33.3 % of fourth-year students, which is 26.7 % of all respondents;

- 20 % of all respondents, namely 6.7 % of second-year students and 33.3 % of fourth-year students believe that it is necessary to develop training in accordance with current trends in the labor market, as well as update the presentation of material.

The results showed that second-year students on average give a higher grade than fourth-year students. The majority of respondents are confident in their knowledge and believe that it meets the requirements of the labor market. Students offer various improvements in the learning process: increasing the number of interactive and practical classes, adapting training to current trends in the labor market, and updating the presentation of the material. However, there are also those who do not see the need for changes.

In conclusion, it is necessary to say that combining internal and external assessments of the quality of education makes it possible to use both the long-term historical experience of the university and adapt to the modern needs of society. The

author's research on the assessment of the quality of education in the humanities and socio-economic disciplines of various universities, presented in this article, is relevant both for science as a whole and for use in practical activities by universities. In addition, it is important to conduct questionnaires and research among graduates to get their assessment of the level of education and identify areas for improvement. This will allow universities not only to maintain a high level of professional training, but also to constantly improve, focusing on the real needs of the labor market and the expectations of students.

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ARMIN HOFMANN'S CONTRIBUTION TO GRAPHIC DESIGN

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Abstract. The article examines Armin Hoffman's contribution to graphic design. The article analyzes his work and, in particular, bright posters; the book "Guide to Graphic Design" is considered separately. His achievements, such as the development of the Swiss school and teaching, are noted.

Keywords: Armin Hofmann, graphic design, poster, Swiss school, composition, sign.

ВКЛАД АРМИНА ХОФМАННА В ГРАФИЧЕСКИЙ ДИЗАЙН

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Аннотация. В работе рассматривается вклад Армина Хофманна в графический дизайн. Анализируются его работы и особенно яркие плакаты, книга «Руководство по графическому дизайну». Отмечаются его заслуги, такие как развитие Швейцарской школы и преподавание.

Ключевые слова: Армин Хофманн, графический дизайн, плакат, Швейцарская школа, композиция, знак.

Design is a well-established branch of art, offering diverse avenues for self-expression. Modern design can be completely different, because of a wide range of techniques used by designers. There is a modular grid that can simplify the work of a designer, and there are many graphic design books from which you can learn the basics. However, this was not always the case, and a big leap in the development of design occurred in the 20th century.

One of the key styles that influenced modern design is the Swiss style. The term “Swiss School” refers to the typographic style that was developed in Basel and Zurich both during the pre–war period and during World War II. A defining characteristic of the style is the desire to convey information objectively, to create neutral and universal design tools.

The use of a modular grid, photographs (rather than illustrations), is all that the

Swiss style is known for. Typography is central to this style. New typefaces (sans-serif fonts) are appearing, for example, the Helvetica font. Flush-left typography is becoming popular [1].

The Swiss school developed because its rationality and orderliness corresponded to the trends of the new machine age. The appearance of this style was influenced by the Bauhaus style and the trends of the Soviet constructivists.

Key figures in its development were Josef Muller-Brockmann (who taught at the Zurich School of Applied Arts) and Armin Hofmann (head of the Department at the Basel School of Design). These institutions established standards that were widely adopted by other schools.

Armin Hofmann is an innovator in the field of graphic design. Considering the poster to be one of the most effective means of conveying information, Armin Hofmann devoted a lot of time to improving the poster in the Swiss style. He created an abundance of diverse works – typography, posters, logos, books, decorations and sign systems.

In addition, he established himself as a teacher: working alongside Emil Ruder in Basel and teaching at American universities. His students also achieved heights in design: Wolfgang Weingart, a student of Hoffman, later led the revolution of postmodernism [2].

Armin Hofmann was born in 1920 in Winterthur, Switzerland. He studied at the Zurich School of Applied Arts in 1937–1943. He worked as a lithographer in Basel, and later began teaching graphics at the Basel School of Applied Arts. His teaching philosophy emphasized nurturing students' imaginations, attracting many young designers to his mentorship.

From the 1950s to the 1980s, he collaborated with the Basel City Theater, producing many famous posters, covers, etc. [3].

One of Hofmann's most famous posters for the Basel Theater is the 1959 poster of the street production *Giselle*. The elegant interplay of photography and text is interesting in this poster. The point above the "i" falls into the place where the ballerina's knee should be. In this way, Hofmann unobtrusively connects typography and photography. The photo in this case is soft and smooth. It conveys the essence of a ballerina's movement rather than depicting a specific individual. The ballerina is perceived more as an abstract spot, in which only the image is guessed. Hofmann often uses this technique showing only fragments of objects or individual parts of the human body. Due to this, abstractness appears, so he translates the poster into the field of formal composition [4].

The color schemes in his works are usually restrained. His posters are often black and white. He works on semantic contrasts, on the contrasts of black and white, printed and hand-drawn, emotional and neutral. These contrasts are evident in his earlier poster for the Basel Theater. Hard font is contrasted with soft photography. The photo is blurred and moving. The text is minimalistic, monotonous and has hard edges. He intentionally juxtaposes meanings, textures, colors, masterfully creating unexpected posters with multilevel content [3].

The poster for the 1977 Hermann Bauer exhibition is also interesting for its combination of photography and text. It is minimalistic, using black and white colors.

With the help of photography, Hofmann creates a smooth tone gradient from the graphic printed letter B to the almost black letter U. The letter R is also printed, but small. It echoes the first letter, but does not distract attention from the idea. The entire text is aligned to the left of the letter B, which makes the poster stricter. The letter B "finds" the subsequent text, so the printed text is associated with the photo. The unique approach of using letters extracted from a photograph gives the poster a fresh and engaging quality. The rest of the poster is concise – nothing superfluous. The background is black, the font is simple. But collectively, the poster attracts attention.

The cover of the 1955 book *Tempel und Teehouse in Japan* exemplifies Hofmann's typographic expertise. The cover has only a white background and black text. But the letters are distorted: he doesn't add some of elements of letters to reflect the artistic idea. The font is constructed from geometric shapes, with some rectangles tilted or distorted. In fact, Hoffman collects text from geometric shapes. This poster demonstrates his work with a grid with letters aligned – the letters are aligned vertically and horizontally [6].

Hofmann's logos are also notable. As an example, we can highlight the work for the Expo in Lausanne in 1964. He created a complete sign combining the Swiss cross and the letters EX. It is essentially a single line. Neither the letters E nor the cross are completely closed figures. Hofmann hints at the silhouette, the meaning is already thought out by the viewer himself. To make the image of the Swiss cross more obvious, he employed a red background and a white symbol. This is how Hofmann pushes the viewer towards this image. This is an example of filigree work with a form: the sign is concise, the meaning is readable, as well as the text itself. This logo was used on all printed products of the exhibition, as well as on a set of postage stamps and coins for this event [3].

Armin Hofmann's significant work, combining teaching and design experience, is *the Graphic Design Manual: Principles and Practice,* first published in 1965 [6].

This book is an attempt to give a new approach to the problems and tasks of graphic design. The publication was redesigned, after which new sections were included that adapt his thoughts to modern technologies. The book is published in the original in German, English and French. It became the catalyst for Armin Hoffmann's recognition. The book has been republished five times in Switzerland alone, which is a huge success. Many designers refer to this book [3].

The publication demonstrates a methodical approach to the problems of graphic design, consists of a preface, introduction and chapters, accompanied by illustrative material [7].

The preface says that the world has changed a lot with the advent of modern technology. To adapt to these changes, you need to adapt, not give up. George Nelson writes that this is why "we must go back to the beginning, to concern ourselves with dots and circles and lines and all the rest of it." To do this, Armin Hofmann presents exercises in this book to better understand how the basic elements of graphic design work.

In modern realities, this approach to life is especially relevant, because artificial intelligence technologies are gradually being introduced into life, but technological progress is inevitable, so you can only accept this and adapt to the conditions by

following Armin Hofmann's advice, not to forget to study the basics and implement technologies in order to keep up with your time.

In the introduction, Armin Hofmann talks quite a lot about education and the development of creative abilities. He notes that creativity is generally given little place in education, it is difficult to be creative in such conditions. However, with the development of technology, art is also changing, because an individual must be an expert in different spheres. Armin Howmann writes: "It is necessary that the curriculum be designed in such a way, and the teachers are selected in such a way that any subject area can be interconnected with any other."

Armin Hofmann also talks about how the teaching approach should change. He believes that creative activity and intellectual activity should not be separated, they should be done together. It is also impossible to separate commercial work and work "done with artistic quality in plain sight."

These ideas have since gained widespread acceptance. Creative activity is also analytical, it is possible to create commercial and creative work at the same time, so it can be noted that Armin Hofmann promoted important ideas for future designers that reflected on the current reality.

Next, Armin Hofmann talks about dot, line, confrontation, letters and signs. The role of each of the elements is revealed, and the properties of these objects change depending on changes in the parameters or objects with which they interact. Understanding such fundamentals is important for training designers. A separate advantage of this manual is that it can be studied independently [6].

Each element is accompanied by illustrative materials.

Three-quarters of the book consists of images accompanied by brief explanations of how visual components interact [7].

This book reflects Armin Hofmann's design philosophy and allows you to understand the principles on which he created his work and how he felt about teaching. Unsurprisingly, his followers were just as innovative.

Now the principles described by him are also relevant. The Swiss style is considered the basis of modern graphic design. In particular, it is believed that many elements of computer design were formed under the influence of the Swiss style. The Swiss style is associated with the development of actual forms and the graphic basis of corporate identity. In any work by Hofmann no more than three colors, avoiding gradients. Color carries a semantic meaning and should be tangible, not just an accompaniment to the design. Armin Hofmann's diverse works are known for their reliance on the fundamental elements of graphic form, which he tried to convey in his book [3].

Thus, Armin Hofmann's contribution to graphic design cannot be overestimated – he created many wonderful works, trained a new generation of designers, and also conveyed his experience through a book.

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ART OF CINEMA IN THE CONTEXT OF INTERNATIONAL COMMUNICATIONS

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Abstract. This paper discusses cinema as one of the aspects of opportunities for communication between nations and countries. Influence of cinema on countries' public image, tourism and understanding features of other nationalities, their mentality and lifestyle. Cinematographic interaction of different countries: which aspects remain individualistic and which are adopted.

Keywords: cinema, traditions, national aspects, mentality, visual and sound effects.

ИСКУССТВО КИНО В КОНТЕКСТЕ МЕЖДУНАРОДНЫХ КОММУНИКАЦИЙ

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Аннотация. В работе рассматривается кинематограф как один из аспектов возможностей коммуникации между нациями и странами. Анализируется влияние кино на имидж стран, туризм и понимание особенностей других национальностей, их менталитета и жизни. Обсуждается взаимодействие кинематографа разных стран: какие моменты остаются индивидуальными, а какие заимствованы.

Ключевые слова: кинематограф, традиции, национальные аспекты, менталитет, визуальные и звуковые эффекты.

Cinematography is a form of Art that everyone, regardless of nationality, can understand. It is a universal language of visual communication, and it has a significant part in the international dialog. Cinema constitutes cultural identity and mentality. In the modern world it possesses as much cultural value as folklore, fairy tales, songs and epos and continues their national traditions [1].

Global cinema also holds power to initiate thoughts and bring discussions on social issues that are major nowadays. *12 Years a Slave (2013)* and *Selma (2014)* – films that provoked conversations about inequality, race, and justice in America. These films confronted audiences with uncomfortable truth about history of their own or

others. In a similar provocative direction film *Parasite (2019)* have shed light on the complicated class relations and social hierarchy in South Korea that takes place even in modern world. By showing audiences different perspectives and challenging their assumptions, these films can help to became more open minded and foster empathy for others [2].

One of the most powerful ways in which cinema shapes public perception is by breaking down stereotypes and challenging traditional notions. Through realistic portrayals of diverse characters and cultures, films help dispel myths and misconceptions. For example, movies like *Slumdog Millionaire (2008)* and *Lion (2016)* shed light on the complex realities of life in India, causing Western audiences to reconsider their views of the country and its people. Similarly, films like "Crazy Rich Asians" (2018) counter stereotypes about Asian Americans by showcasing the diversity and richness of their experiences. By presenting characters who defy expectations and break free from traditional roles, these films contribute to a more inclusive and empathetic society [2].

With globalization taking over the world cinematograph has become a calling card for many countries because of its accessibility to the majority of population around the world. Countries create solid and attractive public image by making films with their unique national features, which appear pleasing to the targeted auditory [3, p. 87]. From this perspective cinema becomes an advertisement and plays a big part in tourists' attraction. A short film *Along the Coast (1958)* by French director Agnes Varda depicts Rivera – marvellous seaside resort in summer when it overflows with tourists. Varda creates a pleasing to eyes picture. In the background playing cocktail music by Georges Delerue, different angles showing ravishing views of natural and man-made wonders, voice-over calling Rivera 'Eden' [4]. Even though the director also depicts grotesque carnival views and laughs at tourists who are trying to make a stand by their stylish appearance, overall impression is charming. Voice-over repeats names of other French resorts such as Cannes and Saint-Tropez, with background sights of antique-ish constrictions and nature. In the context of cultural dialog *Along the Coast*, despite being a 26-minute film, perfectly shows influence of cinema on a potential tourist.

Every film by South Korean writer-director Kim Ki-duk makes viewer want to travel to South Korea. *Spring, Summer, Fall, Winter… and Spring (2003)* and *3-Iron (2004)* are excellent examples of showing beauty of nature and human's inner world. In these films, South Korea appears pure, spiritual and philosophical. Each of them shows how people do not need to communicate to understand each other that is a common theme in the East cinematography but not in the West. Watching Ki-duk's films is comparable to meditation. Cinema has a marvellous trait of transferring people right into new culture. No doubt, most of viewers would want to visit South Korea to feel the Asian pace of life by themselves, which is different to the West countries.

Films, certainly, are not created with the intention of being an advertisement for their country but in many cases director, operator and other crewmembers manage to do such a good job that their artwork becomes, in a certain way, country's promotion. Cinema can provide not only pretty picture of landscapes, sights or nature, but some essential aspects of the nation, its people. Viewers from different parts of the world are given a unique opportunity to better understand culture and mentality of other nations

by cinematograph. Four geographic sides of the world have their generalized features, which are then divided into smaller and more specific ones by countries and even regions. Vast Asia in the eyes of the West appear calm, perfectionist and mindful, but when one takes a closer look into the artwork of a Chinese director Wong Kar-Wai, China appears colourful, sometimes dark, chaotic and at the same time full of deep connections between people, who do not need words to express their feelings because for them a fleeting eye contact or an accidental touch is enough. Considering how various mentalities of the East and the West are, it is important to acknowledge the differences between nations for maintaining a better international dialogue and understanding one another [3, p. 88].

Cinema assists in studying other countries' cultures, it provides an authentic truthful view from the inside. Directors of films are influenced by their birthland and they always bring some innate aspects into their work. Thus, the great Sweden director Ingmar Bergman accurately depicts Scandinavian nature in every way. Leisurely narrative, external restrain, which strengthening emotional influence on the viewer – these elements are inherent to the Scandinavian countries [1]. Windy weather, deep forests, lakes and meadows affect on their mentality and it is very entertaining to see how the same cold mindful aspects are shown in the cinema.

In contrast with cool Sweden, the influence of the nature and traditions is portrayed in the Spanish films. Spain has sunny landscapes, sea, chill mornings and wild festivals. Tempered women and fashion divas are the same in the Spanish cinematograph. It appears vivid, bright and colourful in Pedro Almodovar' films. The authentic Spanish temper runs through every picture, especially *Women on the verge of a nervous breakdown (1988)*, which is stylish and rapid, just like Spain itself. The viewer sinks into sunny streets, light and colourful architecture. Through the screen people living in other countries can feel the landscape's warmth and Spanish manners. However, there are not only new-ish moments that viewer can notice watching Almodovar's artworks. In the XIX century England developed 'modern' style, whilst France introduced 'avant-garde', which were popular in every aspect of art. These styles quickly spread around Europe by international communications, and cinema adopted them. Almodovar connected those foreign styles with authentic Spanish traditions (in the early career it is even more apparent because of the uneven proportion of the national and adopted elements). Latest Almodovar still has his national traits but the American influence took a big part in his works, Penelope Cruz was replaced by the British actress Tilda Swinton, the placement mostly went from Spain to the English-speaking countries. His films have become more understandable and familiar for people living outside of Spain on the West.

Another interesting feature of modern art world is that in many national cinematographs, there are pressure themes. For instance, the theme of alienation and loneliness of a person raised in the system of Western values is characteristic of the cinema of developed European countries – the theme of self-discovery in a rapidly changing world. In Latin American cinema, social issues are most often raised (in one context or another): inequality among people, drug addiction, crime. Contemporary American cinema is a hymn to political correctness, which suggests the seriousness of this issue in the USA. Cinematography not only reflects the specific features of

national mentality but also helps to understand what concerns the society, what is important to it [1].

In addition to its narrative and educational functions, cinema often goes deep into the intricacies of intercultural communication. Films such as *Lost in Translation (2003)* and *Sidonie in Japan (2023)* vividly illustrate the challenges people encounter when adapting to foreign cultures, shedding light on issues like language barriers, cultural norms, and lifestyle differences. These cinematic works not only entertain but also serve as valuable tools for fostering intercultural understanding. They portray the struggles of individuals navigating unfamiliar social landscapes, thereby raising awareness about the complexities of cross-cultural interactions. For instance, *Lost in Translation* explores the theme of loneliness and disorientation experienced by a person in a foreign environment, highlighting the potential for misunderstandings and feelings of alienation.

On the other hand, *A Traveler's Needs (2024)* offers a unique perspective on cultural exchange, depicting a Frenchwoman teaching Koreans the French language. The film presents an interesting contrast, where the protagonist, dressed in vibrant floral clothing, seems to blend more seamlessly into the Asian landscape than the Koreans themselves, who are dressed in earth tones that are more subdued. This visual contrast underscores the idea that cultural integration is not solely dependent on nationality but can also be influenced by individual attitudes and openness to difference. Such cinematic explorations of intercultural communication contribute to a deeper understanding of global issues and promote cultural exchange. They challenge stereotypes and encourage viewers to reflect on their own cultural assumptions, thereby fostering a more inclusive and interconnected worldview.

Joseph Campbell's concept of the 'monomyth' which was described in his book *The Hero with a Thousand Faces (1949)* claims that certain archetypal narratives, such as the hero's journey, appear across cultures, reflecting shared human experiences and psychological patterns. This explains why films from vastly different cultural contexts, like Hollywood's *Star Wars* and India's *Baahubali*, resonate globally despite their distinct settings and traditions. Both franchises use Campbell's monomyth structure while filling it with culturally specific themes, values, and aesthetics, demonstrating how universal narratives adapt to local contexts [5, p. 37-40].

The monomyth remains an important point when analyzing global cinema. It reveals how stories balance universal appeal with cultural specificity. By adapting Campbell's framework to local traditions, filmmakers create narratives that are simultaneously familiar and innovative, proving that while heroes may wear different masks, their journeys match in a way.

The intercultural dialogue can be discovered in every aspect of cinematography, going from borrowed filming techniques to global references. Music holds a distinct place in cinema, shaping mood, perception, and atmosphere. While films featuring national music traditions often convey deep cultural authenticity, the deliberate use of foreign musical elements can create fascinating intercultural dialogues. A striking example is Wong Kar-wai's *Chungking Express (1994)*, where the repeated use of The Mamas & The Papas' *California Dreamin'* contrasts the bustling streets of Hong Kong with a nostalgic American soundscape. The song's thematic resonance with travel and

longing mirrors the film's transient love stories, reinforcing the motif of emotional and physical displacement. This artistic choice not only elevates the film's aesthetic but also demonstrates how music can bridge cultural contexts, transforming a foreign track into an iconic cinematic symbol.

Similarly, Wim Wenders' *Perfect Days (2023)* employs a soundtrack dominated by Western classics – Patti Smith, The Animals, and The Rolling Stones to infuse the Tokyo-set narrative with a sense of timelessness. The seamless integration of these songs does not feel disruptive. Instead, it highlights the fluidity of cultural exchange in the globalized world. The music here acts as a silent yet powerful communicator, suggesting that emotional experiences go above geographical boundaries.

Melodies, lyrics, and storylines in cinema increasingly overcome cultural and national borders, becoming a collective legacy that resonates with audiences worldwide. This phenomenon allows people from different cultures to find common ground, whether through discussing globally recognized film references or appreciating locally rooted narratives that gained international appeal. The interplay between universal themes and culturally specific storytelling highlights cinema's dual role as both a globalizing force and a preserver of regional identity.

The viewer with watching experience can extract some unique geographical and general information about countries that cannot be found in dry articles [3, p. 89]. In the conclusion, the power of cinematography seems to give a much better opportunity to portray the world.

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YOUTH AND SOCIAL NETWORKS: THE ROLE IN THE LIFE OF GENERATIONS

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Abstract. Raising a child is a long and important stage in the development of a person. It is important to understand that each person requires a unique approach. It is important to understand that each person requires a unique approach. Each of us is unique, and our behavior is also unique. In today's world, where technology has a significant impact on our lives, social media has become an influential factor in the upbringing of young people. So the authority for the young generation is no longer the teacher and parents, but bloggers, media personalities and heroes of popular reels. The purpose of this article is is to explore the impact of social media on personal development in the present and future through the prism of the theory of generations.

Keywords: generational theory, behavior, youth, technology, development, media personality.

МОЛОДЕЖЬ И СОЦИАЛЬНЫЕ СЕТИ: РОЛЬ В ЖИЗНИ ПОКОЛЕНИЙ

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Аннотация. Воспитание ребенка – это долгий и важнейший этап в становлении личности. Важно понимать, что к каждому человеку необходимо найти подход. Каждый из нас уникален, наше поведение неповторимо. В современных условиях, когда технологии все больше влияют на нашу жизнь, на воспитание молодежи огромное воздействие оказывают социальные сети. И вот, авторитетом для молодого поколения становится уже не учитель и родители, а блогеры, медийные личности и герои популярных рилсов. Цель данной статьи – выяснить, какое влияние оказывают социальные сети на становление личности в настоящее время и в перспективе через призму теории поколений.

Ключевые слова: теория поколений, поведение, молодежь, технологии, развитие, медийная личность.

It is becoming increasingly difficult to predict the behavior pattern of "growing adults" and the theory of generations, created by two American scientists Neil Howe and William Strauss, can come to the rescue. The essence of the theory is that people born in a similar period of time (every 20-25 years) grow up in approximately the same

socio-cultural and economic conditions and, in connection with this, have some similarities in the revered values, understanding and assimilation of information and in communication methods. As a rule, a person acquires relative stability of moral attitudes until about 20 years of age and then adapts to changing conditions, but the so-called "base" in the form of moral principles remains.

Within the framework of this topic, I propose to consider the generations from the “silent” to the Alpha generation, while slightly touching the curtain of expectations from the Beta generation.

First, let's talk about time periods:

- Silent Generation (1925–1944);
- Baby boomer generation (1944–1967);
- Generation X (1967–1984);
- Generation Y – millennials (1984–2000);
- Generation Z (2000–2011);
- Generation Alpha (2011–2024);
- Beta generation (since 2025) [1].

The formation of the personality of each generation occurred under the influence of significant events both in the world in general and in Russia in particular, and without mentioning the main points, it will be difficult to understand the reasons for the behavior of this or that generation. There are only a few representatives of the “silent generation”. Their behavior is extremely specific, as model was built during the Second World War and the Great Patriotic War, which had a huge impact on the consciousness of this stratum of society, which, probably, was never able to "recover" after these events as a result the generation is dressed in excessive thrift and frugality. The silent generation is called so for some reasons. In Russia, the reins of power belonged to Joseph Illarionovich Stalin, whose methods of governance were quite harsh. Denunciations of neighbors, mass repressions were commonplace at that time, which is why young people tried not to discuss politics, economics and other socially important topics "in public"; these table talks remained exclusively in the family circle. Technologies did not touch people's everyday lives at that time, so they did not influence the formation of their personality, and even when faced with modern realities, such a person prefers the traditional way of communication, often, even having a phone, they leave it at home and, in principle, do not use the conveniences of the technological component.

Next goes the baby boomer generation. We will talk about the generation born in the post-war period. The percentage of the population was low, there was a shortage of labor, and one of the areas of the state's activity was to support young families with many children, which is why the birth rate began to increase, and the entire generation received a corresponding name. The country needed help and numerous slogans of the socialist state called for honest work for the good of the fatherland, and people helped. People believed. People knew that a bright future would definitely come, you just need to work hard. This is the same generation ready to work "for the idea." However, children in these families were left without due attention, which will still be reflected in their characteristics, but more on that later. Working for a bright future, not yet elderly people are faced with a huge shock to their lives, a huge country, the

Motherland split. Now the entire population of the newly formed country asks the question: "What to do?" From this moment on, the generation acquires a new nickname – lost. However, people who have already become accustomed to backbreaking work continue their work, do not withdraw into themselves, but on the contrary, bring up all the problems that arise for discussion. As we know, since the 2000s, mass computerization and a sharp leap in the development of technologies have begun, and despite this, technologies have not had such a strong influence on the already formed consciousness of this generation. They prefer the traditional way of communication and often do not use modern telecommunication devices.

Now let's speak about the generation X. Children whose childhood passed and remained in the USSR and in adulthood they already find themselves in a new country. As already mentioned, they received very little parental attention, and their main educators were teachers and the "street". It is for this reason that this stratum of society values time spent with family and clearly separates personal and work time. Despite this, they continue to work hard, since they lived through a time of economic instability, but the work was not always honest. The phrase "Everything for the family" became a postulate. The introduction of technology into usual life fell precisely on their generation. Many encountered them already in adulthood, which is why learning to use technology was difficult, but the process cannot be stopped and they had to adapt. Social networks and their widespread use did not affect the character of the Xers themselves, but their lifestyle had to. People of this generation, as a rule, register in approximately one social network and then "for work" or "the kids said I had to", and usually, this becomes "Vkontakte" or "Odnoklassniki" [2]. It is not worth generalizing everyone, because many Xers try to keep up with the times, realizing the range of possibilities when mastering technology.

Following their predecessors are the millennials. Generation Y is extremely difficult for public perception. Now we are talking about people born at the turn of the millennium. The Afghan war, perestroika, epidemic – a difficult time. However, there were also positive moments – the so-called technological breakthrough. Generation Y is the first generation to actively use modern telecommunications devices and the Internet. The availability of information in the public domain made their owners freer and a little flighty compared to the X and boomers. In addition, the Y are too naive and careless in relation to the information given on the Internet. Any information on the World Wide Web is taken as truly reliable, and people communicating there always have good intentions. Nevertheless, millennials are in no hurry to start a family or reach the top of their career. They see great value in self-knowledge. However, the openness of information made traditional teaching methods and information received from teachers boring for millennials. In addition, the world was changing and some professions that Gen Yers studied for then became illiquid, due to which this layer of society did not see the point in building long-term plans for the future. I think this generation better call "consumers". If a career, then it is always a high position with a corresponding salary, in virtual communication they feel much more confident than in reality due to the construction of a fictitious image. The parents of millennials, who grew up in a deficit of everything, tried to make sure that their children did not need anything, but this played a bad joke on them, Gen Yers completely stopped

appreciating what they earned with such hard work, they easily spend money on irrational purchases and if they try then only for their own benefit.

Finally, we have reached the modern youth – Generation Z. Technologies for them are everyday life. The Internet is the best source of information, but this generation, unlike its predecessors, has learned to filter this endless stream, but due to this, Zoomers have developed one feature – the degree of information absorption. Short information "on the fact" is most preferable for Zoomers. At the same time, if millennials preferred text messages, then modern youth values the visual format of communication and receiving information – through video. And the shorter and more informative is the video, the better the information will be perceived. However, Zoomers are strongly susceptible to popular trends. We have a controversial question: "Are these good?" It depends on what trends set by the public. Now, despite the subjective opinion of the older generation, it is the “Zoomers” have useful trends. The promotion of healthy eating, sports and self-development are what actively promoted among the youth to the masses. VK, Telegram, TikTok, YouTube – Zoomers are absolutely everywhere. Their relationship with technology is intuitive. Z is not afraid to try something new if it will benefit them. Due to the diversity of opinions circulating on social networks, Z has no opinion at all on politically important topics. Many representatives of the younger generation go to the polls: "Well, if it is necessary ..." and this attitude is visible in many things. Without trying to understand the reasons for such behavior, Zoomers find it easier to follow short instructions. The educational process is also difficult for them, like for millennials, since the work of a teacher is devalued in the eyes of young people: "I can find it on the Internet." Therefore, many of them are "in the clouds" busy with their virtual plans. Zoomers are far from lazy, they just require a special approach. They are not ready to work for an idea or a long-term result, they strive to receive praise or a reward here and now. So, let us sum up, Zoomers is a progressive generation, capable of learning with a minimum of information with the right approach, but highly susceptible to the influence of social networks.

Our smaller brothers is the Alpha generation. The oldest of them are now about 14 years old, but it is possible to conduct an approximate analysis based on their behavior. Alphas are literally born with gadgets in their hands. Their socialization often occurs through telecommunication devices, due to which many of them have problems with communication in reality. Moreover, Alphas are addicted to gadgets, when there is an opportunity to be without a phone, they become aggressive or even panic, while their behavior in ordinary conditions completely depends on emerging trends, but due to their inconsistent age, they are not able to separate useful information from useless, and sometimes harmful to the young mind and body. Offline learning is completely devalued by the generation, they themselves decide what they want to study and what not, due to which their education becomes a rather complex and problematic task. Also, Alphas are spoiled and frivolous, due to the availability and variety of benefits provided to them by caring parents.

Finally, the Betta generation – children born in 2025 and later. As much as we would not like to admit it, but "progressive technologies" affect the young consciousness, or rather the processes of socialization, assimilation of information,

learning, interpersonal communication and many others. Betta is pointed out as a new generation due to the active development and implementation of artificial intelligence in everyday life. Of course, the use of this technology in some problem areas, for example, medicine and mechanics, will significantly help to ease the tasks facing specialists, but speaking about young people, it is worth talking in a slightly different aspect. The use of AI by young people reaches the point that the simplest task causes difficulties, people are simply lazy and it becomes even scary to think what to expect from the new generation if «reasonable adults» will not filter the huge flow of information [3].

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THE INFLUENCE OF CULTURE AND ART ON SOCIETY

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Abstract. The article explores the impact of culture and art on society, focusing on their role in shaping identity, social norms and values. Culture and art serve as catalysts for change, fostering critical thinking and social justice. Examples of the interaction of art with political and economic processes are investigated, as well as the influence of cultural traditions on public consciousness. Analysis of the data confirms that culture and art not only reflect, but also actively shape social realities and people's emotional sphere.

Keywords: culture, art, cultural dialogue, people, cultural events, forms of art.

ВЛИЯНИЕ КУЛЬТУРЫ И ИСКУССТВА НА ОБЩЕСТВО

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Аннотация. В данной статье рассматривается влияние культуры и искусства на общество, акцентируется внимание на их роли в формировании идентичности, социальных норм и ценностей. Культура и искусство служат катализаторами изменений, способствуя критическому мышлению и социальной справедливости. Исследуются примеры взаимодействия искусства с политическими и экономическими процессами, а также влияние культурных традиций на общественное сознание. Анализ данных подтверждает, что культура и искусство не только отражают, но и активно формируют общественные реалии и эмоциональную сферу людей.

Ключевые слова: культура, искусство, культурный диалог, народ, культурные мероприятия, формы искусства.

Art in the context of dialogue between cultures has several functions [1]. First, it is a means of self-expression for different cultures, allowing them to express themselves and convey their uniqueness to a wide audience. Second, it promotes the establishment of an emotional bond between people that strengthens mutual understanding and reduces negative stereotypes. Moreover, art can be a powerful tool in the context of social change [2], encouraging people to take action, for example, the

participation of Catholic and Muslim artists in joint exhibitions highlights their commitment to peace and mutual understanding.

Culture and art are interrelated in the sense that each work of art is a product of a particular cultural environment. For example, the paintings of the Renaissance period reflected changes in worldviews and values that occurred in Europe at that time. Art also shapes cultural values and norms, influencing the perception of the world and society.

Culture is the collection of knowledge, beliefs, art, morality, laws, customs and any other abilities and habits that a person receives as a member of society. Art can be understood as a form of cultural expression, including painting, music, literature, theatre and other forms of creativity. Art often serves as a medium for self-expression and discussion of social problems.

Art has a unique ability to shape the public consciousness and awareness of identity. Through works of art, such as paintings, films or literary works, people can explore and comprehend their experiences and emotions. This leads to a deeper understanding of the surrounding world and stimulates reflection on social, political and ethical issues. Fiction often raises important themes such as justice, equality and freedom that can lead societies to change.

Culture and art can bring about social change. Historically known cultural movements such as the Renaissance, the Enlightenment and various avant-garde movements have had a significant impact on social norms and values. Contemporary examples of human rights movements are also often accompanied by the active use of art to bring their ideas to a wide audience. Music, graffiti and performances become means of protest and social activity.

With the development of technology, mass culture has become an integral part of modern society. Television programs, movies, music and social networks shape our perceptions of reality by influencing people’s opinions and behavior. Against the backdrop of globalization, mass culture is closer than ever, leading to both positive and negative consequences. On the one hand, it promotes the exchange of ideas and cultural diversity, on the other – can cause simplification and stereotyping.

Art also plays an important role in the process of socialization and integration of people. Artistic projects and cultural activities can bring together people from different backgrounds and cultures, fostering understanding and interaction. For example, collaborative artistic projects between different ethnic groups can help reduce bias and stereotypes, contributing to a more cohesive society.

Cultural dialogue includes many aspects that not only promote understanding, but also help to shape more harmonious relations between cultures.

The identity of a people is shaped by its history, traditions and art. Art is a means of expressing cultural identity and social status. For example, traditional music and dance reflect community values, beliefs and customs. During events such as dance festivals or art exhibitions, it is possible to observe which symbols and elements of art emphasize the identity of a particular people, for example, at the international festival "World Dance" in Kigali (Rwanda) participants represent their traditional dances, showing how culture affects their way of life and perception of the world.

Art can take an active social position, acting as a tool to fight injustice and promote social change. It is often used to draw attention to significant social problems and challenges, which provides the necessary support and understanding from a wide audience, for example, it is important to note the role of graffiti and street art artists in political struggle. In Egypt during the "Arab Spring", street art was a means of expressing protest against existing regimes.

Contemporary art actively borrows elements from different cultures, creating new forms of artistic expression. This leads to a cultural mix that enriches the art and makes it more accessible to different audiences, for example, the Cuban musical style "dream" combines elements of African rhythms and Spanish music, which demonstrates how culture can adapt and evolve as a result of mixing different traditions.

Culture and art do not only shape public opinion, but also influence the economy. Cultural tourism, festivals and exhibitions draw attention to local traditions and create jobs, for example, in Italy, the annual Venice Biennale attracts thousands of tourists from all over the world, creating a significant economic impact for the city and the country's economy.

Culture and the arts perform several key functions in the process of intercultural interaction, each of which contributes to better understanding and cooperation:

Art is an important means of learning and transmitting knowledge about different cultures. Exhibitions, plays and musical events can be used to introduce a wide audience to the traditions and values of other peoples, for example, the exhibition "Unique Heritage" uses artistic works that speak of indigenous cultures, while constructing their cultural context and emphasizing the importance of their preservation.

Art has a unique ability to establish emotional connections between people. It can create empathy and understanding between cultures, forming a deeper interaction, for example, traditional art master classes allow participants to immerse themselves in the history and cultural heritage of other peoples, arousing their interest and empathy.

Cultural events, exhibitions and art festivals contribute to economic growth by creating jobs and attracting investment. Research confirms that the cultural sector has a significant impact on the economy [3], for example, the city of Lisbon (Portugal) actively promotes cultural tourism through music and art festivals, which attracts tourists and is a duplicate effect for the economy of local small businesses such as restaurants and hotels.

Culture is one of the fundamental categories that determine the development of human civilization. It encompasses a wide range of phenomena, including language, religion, art, customs and traditions, and plays a key role in shaping history, society and the state. Cultural values, passed down from generation to generation, become the basis for the identities of communities, their social interactions and political systems. By identifying how culture affects different aspects of human life, one can better understand the dynamics and evolution of society.

From the point of view of history, culture serves not only as a backdrop, but also as an immediate driving mechanism for events. It shapes people's worldview and determines their behavior in the historical period. For example, religious beliefs have

played an important role in shaping political structures over the centuries. Christianity, Islam, Buddhism and other religions not only affected moral and ethical norms, but also influenced power relations. In Europe, the medieval Church became one of the most powerful organizations, actively participating in politics and governance. Similarly, in the Middle East, Islamist currents have historically had a great impact on governance and international relations.

Cultural identity is also an important aspect of the development of nations and states. Languages, traditions and customs unite people, give them a sense of belonging. The preservation and development of cultural heritage gives confidence and stability to society. In the case of many colonized countries, the quest for restoration and preservation of cultural identity became an important factor in the process of independence. Cultural movements aimed at the protection of languages and traditions have contributed to the formation of national identity and, therefore, political unity.

However, the impact of culture on statehood has not always been positive. There are examples in history where cultural differences have led to conflicts and wars. The ethnic and cultural separatist movements that have emerged in different parts of the world often lead to a deterioration in relations between different population groups, which can make it difficult for them to coexist. For example, the Balkan wars and conflicts in the Caucasus have vividly demonstrated how cultural divisions can lead to violence and destabilization of states. Understanding cultural diversity thus becomes critical in building a peaceful and sustainable society.

Culture also plays a crucial role in shaping societal norms and values, which in turn influence legislation and public policies. Social movements emerging from cultural and ethical norms become catalysts for legislative change. An example of this is the struggle for women's rights, which has not only changed perceptions of women's roles in society but has also led to significant changes in legislation and public policies in large countries. The development of contemporary concepts of human rights and equality would not have been possible without cultural changes and a widespread recognition of the value of human life and dignity.

Major cultural trends, such as humanism, have also resulted in significant changes in the social order. Humanistic ideas, demanding respect for the individual and his rights, have contributed to the formation of a modern state in which all citizens have equal rights and opportunities. This cultural movement has had a major impact on social relations and governance by asserting the primacy of individual rights over political power. Thus, it can be argued that culture directly forms the basis of democratic institutions and the rule of law.

At the current stage of development of society, technology creates new manifestations of culture and changes the ways of its dissemination. Globalization and the development of information technologies allow cultural phenomena to spread rapidly on a global scale.

The success of intercultural dialogue through art depends on several key principles [4]. First, it is important to recognize and respect the diversity of cultural practices and approaches. Each nation has its own unique traditions and values, and respect for interaction is the basis of productive dialogue, for example, the "Cultural Heritage for the Future" programme explores and supports the traditions of oral folk

creativity, thus contributing to their preservation and transmission to future generations.

Second, openness to new ideas and forms of art can enrich the cultural experience of all participants in the dialogue. Artists and cultural workers should be prepared to accept new ideas and perspectives, for example, the "Together" project in Los Angeles brings together locals and immigrants, creating co-installations that connect different cultural experiences and tell a common story.

Third, sustainable partnerships between different cultures promote mutual understanding and respect. Exchange programs for students and artists in cultural initiatives can help to establish long-term ties, for example, the "Erasmus+" exchange programme, which allows students and young professionals to travel and study abroad, supports education and cultural exchanges at European higher education institutions [5].

In recent years, a number of interesting initiatives have been implemented to promote the dialogue between cultures and arts. This initiative brings together artists from different countries, aimed at creating collaborative works based on the cultural influences of each participant. This project often hosts exhibitions and performances where viewers can see the result of work in a multicultural environment. Projects aimed at the restoration of cultural monuments and sites play an important role in overcoming a history of conflict and violence. Engaging international experts to restore monuments shows how art can be a catalyst for change.

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“SIBERIAN GOTHIC”: ICE AESTHETICS OF ISOLATION AND SEVERITY IN DESIGN

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Abstract. This paper discusses the phenomenon of “Siberian Gothic“ as a distinct movement in contemporary visual culture, analyzing its core aesthetic components and proposing practical methods for its application in design, art, and media.

Keywords: Siberian Gothic, aesthetics, design**,** color palette, typography, zoomorphic symbols, video games.

«СИБИРСКАЯ ГОТИКА»: ЛЕДЯНАЯ ЭСТЕТИКА ИЗОЛЯЦИИ И СУРОВОСТИ В ДИЗАЙНЕ

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Аннотация. В работе рассматривается феномен «Сибирской готики» как самостоятельного направления в современной визуальной культуре, анализируются ее ключевые эстетические компоненты и предлагаются практические методы их применения в дизайне, искусстве и медиа.

Ключевые слова: «Сибирская готика», эстетика, дизайн, цветовая палитра, типографика, зооморфные символы, видеоигры.

“Siberian gothic” is a provisional term that currently lacks a strict academic definition but is widely used in cultural criticism and artistic practices – including literature, cinema, video games, and music. This genre merges elements of gothic aesthetics with the distinctive features of the Siberian chronotope: harsh natural landscapes, imagery of abandoned settlements, themes of mystical isolation, and a historical-cultural undercurrent encompassing the mythology of “cursed places” and the traumatic legacy of the region's colonization. Unlike classical gothic, with its reliance on medieval architecture and supernatural plots, “Siberian gothic” emphasizes a different set of motifs: natural phenomena as agents of threat (blizzards, the taiga, extreme cold); man-made ruins (abandoned mines, “ghost towns”, remnants of Gulag

camps); and existential isolation tied to geographical and social marginality.

To gain a deeper understanding of Siberian gothic aesthetics and their application in design, it is essential to analyze its key components that create its unique atmosphere. The first crucial aspect that conveys the desired mood is its **color palette**. The dominant palette of Siberian gothic is built on cold, muted shades associated with Siberia's harsh climate: icy blue tones reminiscent of frost and the sky during polar night; dirty white, symbolizing snow; steely gray hues evoking frozen metal and concrete structures. Green represents the taiga itself, embodying the dense, mysterious forests that dominate the landscape. Accent colors inspired by the traditional culture of indigenous peoples and industrial elements may also be used: blood-red and rusty tones resembling metal corrosion or old signage. In addition to color, texture plays a vital role in shaping the aesthetic. The contrast between rough, weathered surfaces and sleek modern materials creates a sense of history and decay, reflecting traces of human presence in the vast wilderness. Materials like aged wood, oxidized metal, and stone enhance this atmosphere, resonating with themes of isolation and endurance.

The typography of Siberian gothic should feature angular shapes, minimal rounding, and elongated proportions. Such fonts evoke a sense of austerity and severity, aligning with the overall aesthetic of this style. Examples of fonts with these characteristics can be found in the northern city of Norilsk, where buildings display massive two-meter-tall numerals. These imposing figures remain clearly visible on facades even during blizzards and polar nights, emphasizing their functionality and significance in the harsh climate (Figure 1).



Figure 1 – Numbers on the houses of Norilsk

In graphic design, you can use the widely familiar *Helvetica*, as well as fonts with distressed textures or a "frost-cracked" effect. Additionally, there's a more unconventional option – the *Siberian* font, a grotesque typeface inspired by Russian avant-garde traditions and ancient Orkhon-Yenisei runic script. This font was originally developed for the "*I'm Siberian*" tourism brand and effectively captures the Siberian spirit.

It is also worth considering the use of **zoomorphic symbols** in design. In Siberian gothic aesthetics, animals are not merely part of the landscape but bearers of

profound symbolism, intertwining mythology, fear, and the harsh reality of the North. They serve as mediators between the human world and the supernatural, between life and death in conditions of extreme cold and isolation. For the indigenous peoples of Siberia, the reindeer holds particular significance – it provides food, serves as a means of transportation, and its fur is used to craft various garments. Among the Nenets, there existed a complex system of sacrifices in which the reindeer served as a propitiatory offering, diverting the wrath of supernatural forces. Nearly all significant family rituals were in some way connected to this animal, underscoring its central role in the mythopoetic worldview of northern peoples [1, p. 100]. This synthesis of utilitarian and sacred qualities makes the reindeer image particularly powerful for Siberian gothic's visual language. When working on a design project, you can incorporate antlers or stylized animal motifs, much like the traditional reindeer imagery found in Khanty birch bark art [2, p. 39].

No less significant to Siberian symbolism is the bear – a creature embodying both destructive and creative forces. The Nenets revered this wild beast as the "*forest tsar*", wearing its fang on their belts or adorning children's necks with it, believing the talisman warded off evil spirits [3, p. 41]. In design, you can incorporate stylized bear elements – an angular silhouette of its head, fangs or claws as sharp graphic accents referencing Nenets amulets, or paw prints transformed into crack-like patterns.

It's crucial to understand the connection with **Siberia's history and culture**. This is a land where the tragic legacy of the Gulag intertwines with abandoned towns and industrial zones, ancient shamanic traditions, and northern folklore. The heritage of the repressive era still lingers in deserted settlements like Kadykchan or Khalmer-Yu, in the ruins of labor camp barracks and unfinished railways like the "Dead Road" (Chum – Salekhard – Igarka)

This railway was built by prisoners, most of whom were imprisoned not for serious crimes yet endured inhuman conditions: there was no protective clothing for kitchen or medical staff, nor even basic gear like mosquito nets or frost masks. The inmates worked in inadequate footwear that provided no protection during floods or swamp crossings in spring and summer, while chronic shortages of felt boots and mittens led to mass frostbite cases. The lack of clean undergarments caused outbreaks of lice and infectious diseases, compounding the risks in what were already deadly conditions [4, p. 110]. These abandoned sites have become haunting symbols of a bygone era, drawing researchers, artists, and urban explorers to their decaying structures. The railway's rusty tracks and collapsed barracks now serve as open-air monuments to human suffering.

Siberian aesthetics, with its dark Gulag history, endless snowy expanses, and mystical folklore, has significantly influenced visual culture – particularly in **video games**. One of the most striking examples is the Metro 2033 game series, particularly Metro: Exodus, a post-apocalyptic adaptation of Dmitry Glukhovsky's novels [5]. While the game is set in nuclear-devastated Moscow, its visual style deeply resonates with Siberian motifs: abandoned industrial zones – icy metro tunnels, frost-corroded factories, and derelict stations – mirror Siberia's ghost towns like Kadykchan. The harsh climate – perpetual winter, whiteout blizzards, and snow-buried wastelands – directly channels the realities of the Extreme North (Figure 2).



Figure 2 – Metro: Exodus

Despite its fantasy setting, The Elder Scrolls V: Skyrim unexpectedly captures Siberia's essence – from its harsh snowbound landscapes to the palpable isolation of its frozen tundra. Here's how the Nordic Hold reflects Siberian archetypes: the tundra and taiga – endless snow plains like “Wind Stone” or the city of “Windhelm” on the northern bank of the White River. The culture of the Nords in Skyrim strikingly parallels Siberian traditions – their layered fur armor and metal-reinforced cloaks seem to be borrowed directly from Evenki hunters or Yakut blacksmiths. One of the Nordic Carved Armor sets is a heavy plate ensemble distinctive to the Nords, particularly the Skaal of Solstheim (Figure 3).



Figure 3 – Nordic Carved Armor

Thus, the phenomenon of “cold” aesthetics – reflecting the psychology of isolation and survival – manifests in global culture through harsh northern landscapes and industrial wastelands that have become symbols of resilience. From dark folk to cyberpunk urbanism, this visual system articulates the collective anxiety of our uncertain age. Within Siberian gothic, where history is literally built upon bones, this aesthetic takes on profound depth: resurgent shamanism transforms Siberia into a unique realm where every stone preserves memories of pain and mystical past, while

the wind carries echoes of legends that continue to inspire artists worldwide.

“Siberian gothic”, as an independent direction in contemporary visual culture, represents a unique synthesis of harsh natural conditions, industrial heritage, and mystical folklore. Its aesthetics, expressed through a cold color palette and rough textures such as aged wood and oxidized metal, create an atmosphere imbued with the spirit of time.

This style finds application in various fields, from branding for tourism companies to fashion design, video game graphics, and book covers. It serves not only as a reminder of the tragic pages of history but also as a symbol of pride in one’s land – its ability to survive and maintain identity despite extreme conditions.

By reinterpreting Siberia's heritage through the lens of survival and sustainability aesthetics, designers can popularize this unique style, generating interest among audiences in the cultural code of northern territories. It is important that “Siberian gothic” not only reflects historical memory but also inspires new generations, creating a space for dialogue between the past and the present.

Thus, “Siberian gothic” becomes not just a visual direction but a cultural phenomenon capable of uniting people and provoking deep reflections on humanity's place in the world, its connection to nature, and how culture is shaped by the surrounding environment.

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FORMATION OF FOREIGN-LANGUAGE GRAMMATICAL SKILLS IN JUNIOR SCHOOLCHILDREN BY MEANS OF GAME TECHNOLOGY

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Abstract. The paper deals with the importance of game technologies for learning English grammar in primary school. A number of grammatical difficulties faced by junior schoolchildren are identified. The age features of junior schoolchildren are highlighted. Games, which can be applied for effective lesson connected with English grammar in junior schoolchildren, are selected.

Keywords: junior schoolchildren, game technology, grammar game, grammar difficulties, grammar skill.

ФОРМИРОВАНИЕ ИНОЯЗЫЧНЫХ ГРАММАТИЧЕСКИХ НАВЫКОВ У МЛАДШИХ ШКОЛЬНИКОВ ПОСРЕДСТВОМ ИГРОВОЙ ТЕХНОЛОГИИ

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Аннотация. В работе рассматривается важность игровых технологий для изучения грамматики по английскому языку в начальной школе. Определен ряд грамматических сложностей, с которыми сталкиваются младшие школьники. Выделены возрастные особенности младших школьников. Подобраны игры, которые можно применять для эффективного урока, связанного с грамматикой английского языка у младших школьников.

Ключевые слова: младшие школьники, игровая технология, грамматическая игра, сложности грамматики, грамматический навык.

Modern education clearly presupposes the study of English in junior schoolchildren from the second grade. It is clear that younger pupils are just beginning to learn English. This means it is still unexplored and new for them, and they face many problems, particularly with grammar. Grammar is an essential part of learning English. Linguist V. M. Filatov writes that grammar is the skeleton through which all words are held, the circulatory system that builds the building called "Foreign Language" [1, p. 60]. If you don't know the rules of grammar, for example, the placement of articles,

conjunctions, prepositions, or how to choose the right verb tense, people will not understand what you're trying to convey [2, p. 191]. You must learn these rules in elementary school if you want to learn English successfully in the future. It is vital to make classes interesting and exciting in elementary school; otherwise children will have problems forming grammatical skills, as their interest can be lost quite quickly.

V. Soboleva and G. N. Papoyan confidently assert that grammar skill is an automated use of grammar material in speech activities (productive and receptive). The authors state that such tasks include reporting information, objecting and expressing an opinion. In this case, the grammatical form solves the tasks. It is clear that achieving this skill is not without difficulty [3, p. 109].

English grammar is quite different from Russian grammar, which is why elementary school students have difficulties in forming grammatical skills. A systematic approach is the key to overcoming these difficulties. M. Y. Tikhonov writes in his works that it is important to study verb tenses in a comprehensive way [4, p. 386]. In Russian, we say “Я рисовал картину”, but in English it is possible to express in several ways “I was painting a picture” (process in the past), “I had painted a picture” (action completed by a certain moment in the past), “I have painted a picture” (action related to the present).

V. A. Russkikh's observations are clear: in English, there is a great abundance of definitions and different verb forms [4, p. 386]. In contrast, Russian sentences tend to include more nouns, which undoubtedly contributes to the slowdown in language learning. Junior schoolchildren often make mistakes when constructing sentences. This is because, in English, there is a strict word order and nothing can be rearranged. By contrast, the Russian language is quite flexible, allowing you to say the same sentence in different ways. For example, in Russian you can say “Я покатаюсь на велосипеде завтра”, “Я покатаюсь завтра на велосипеде” or “Завтра я покатаюсь на велосипеде”, in English you can only say “I will ride a bike tomorrow”

The Russian language has many cases that help to express grammatical relations between words, something that English simply does not have [4, p. 387]. Therefore, pupils must learn to express grammatical relations differently. For example, we say “Я отдал ключи маме”, but in English the sentence is constructed in this way, “I gave the keys to my mother” with the preposition “to”, without it is impossible.

If you give younger students a table of irregular verbs or a rule chart like the ones used in high schools, they will not use it to complete a task or learn the material. Elementary school students will not do it. This is because teachers have different ways of teaching English at high school than they do at primary school.

Children in primary school have their own age-related habits. For example, they cannot remember a lot of information, they like to play, they have a rich imagination, they are very curious and open, and they are not afraid to answer and talk, even if something goes wrong. Children aged 8-10 learn a foreign language indirectly and without thinking about it. The best way to stay motivated is to create a situation where you are successful. Teachers should remember this when planning their lessons.

Learning in primary school is very important for children. This is because it is a time when they move from playing to learning. They start to learn in a more serious way and get trained. Until they are between 10 and 12, playing is still the main activity

for them. So, it is possible and necessary to use the game activity in the lesson. The game does not get in the way of learning, it helps. It makes the most basic phrases and statements fun and interesting, and helps you to start loving a foreign language.

We compared traditional and game-based approaches and saw that game-based methods and techniques help to create a higher level of motivation and engagement in children. Students and teachers can give each other quick feedback and interact with each other. The traditional method is to present the material in a dry way. Children are not as involved, everything is more structured and the things that make each child different are not taken into account. This means that junior schoolchildren lose interest.

E. V. Ilchenko says that children need to be very patient and determined to learn different grammar structures, and they get very tired if a lesson is boring [5, p. 317]. Children often get distracted and do not enjoy the tasks and exercises.

Play is the key to success, equality and an atmosphere of joy and interest that allows children to overcome tasks. Children will learn English grammar easily and feel satisfied: “I can learn English on an equal footing with other children”.

M. F. Stronin describes a game as a situational exercise with a choice of different options. It is possible to organise the most natural environment for communication with its spontaneity and emotionality. It is also possible to practise many times the necessary speech patterns. From this definition, we can see that games can do the following things in terms of the methods they use:

1) Help prepare children for real communication by getting them ready emotionally and psychologically.

2) Make sure that people hear different types of speech in a natural way [6, p. 63].

As well as the tasks we talked about, the game needs to do the following to achieve its purpose:

1. To help learners understand the material and learn it from the inside.

2. To help children develop their creativity.

3. Give students the chance to use the practical skills they have learned in class.

4. To get children interested in English.

5. Play activities should make children want to use the language, so they can focus on practising how to speak.

The students will find grammar easier to understand if the teacher follows this plan during the game:

It is necessary to use more than just the book and its pictures to help students learn. You can also use pictures, videos, objects, posters, drawings and a computer.

- Say it out loud and repeat it many times (but no more than 60 seconds, because after this time students find it harder to learn a foreign language in junior school). It will be good to use poems, writing phrases, and songs, not just techniques.

- Make sure you use correct grammar when you write. You can practise this on the blackboard, using specially prepared sheets or in a notebook.

- Do activities that will make children think about the material they have learned [7].

Nowadays, there are many different types of the game, and they are not very clear-cut. We chose the classification of M. F. Stronin, which is closest to us. In his

book Teaching Games in English Lessons, M. F. Stronin separates games into two groups.

The first group of games is designed to help students practise grammar, phonics, vocabulary and spelling. These games are especially useful for students who are just starting out in their education.

The second group of games helps children to develop their communication skills. In these games, children can show how independent they are. They include games where you take on a role, and story role-playing games [8, p. 118].

Grammar games should be used to help children learn grammar. The point of these games is to help children with their grammar by getting them to use the right speech patterns in their everyday speech. This helps them to use these patterns more naturally and to develop their creative thinking and independence [8, p. 118].

Like all games, the grammar game has different stages.

1) Introduction of the game. The teacher creates a nice atmosphere, and the students and teacher work together to decide the goals and objectives of the game.

2) Organising stage. At this point, the rules of the game are explained, and each child is given a role so they know what they need to do. They are also checked to see if they are ready.

3) The third stage of the game starts. The teacher has to watch the game. It is important for teachers to remember their students' achievements and to assess them. This helps to make sure that all the rules and conditions are followed.

4) Finally, you need to summarise. The students are told how they have done in their exams.

The requirements are also important. They are an integral component of grammar games. These requirements were defined by A. N. Durnov and O. V. Budakova.

- In the game, it is important to use words that are easy for people to understand so that the players can achieve the goal of communicating. If you can't do the lesson without new words, then at the start of the lesson, you need to give the students sheets with the new words on, or write them on the board early.

Only one grammar topic can be used in the game.

The game should use the same types of speech and grammar.

The game should support the learning goals of the lesson.

The game should be suitable for the age of the players.

The teacher should use examples that are like the grammar structures that the children have learnt during the game.

We have selected grammar games. It is important to use them when learning to practise grammar in a relaxed setting where children can learn to use speech patterns in their own speech.

The game "Grammar Detective" is perfect for elementary school students who are starting to learn grammar rules. The point of the game is to learn how to analyse grammar and explain the rules. For example, the topic of the lesson is "Verb to be". The teacher gives out sheets of paper that have "am", "is" and "are" written on them. Pupils find the form "to be" and explain why it is necessary. You can also use this game to learn about how to compare adjectives. For example, you can use the comparative

degree to show how something is more or less than another thing. For example, you can use "clever" and "more clever" to show that something is more clever than something else is. You can also use "cleverer" and "the most clever" to show that something is the cleverest [9].

The grammar game "Battleship of the Sea" is very similar to the classic version of this game. The pupils are split into two teams. Each team is given a different task. One team is given objects like tables and chairs. These objects are placed around the pupils' field. Pupils have to ask questions about where things and furniture are, and what they are. This game is to help you practise the topic "There is/there are". For example, the first team asks, "Is there a sink in the corner of the kitchen?" and the second team answers, "Yes" or "No" [9].

The game "Magic Box" is designed to help players learn and practise possessive and personal pronouns. The teacher takes out a box during the lesson and tells each student to put something in it. When all the children have put it in, they take turns going to the box and describing the thing they have taken out. For example, you could say, "This is her rubber band" or "This is my sharpener".

The game "Paints" can help younger students learn colours and phrases like "Have you got" and "Can I have?" To play the game, you need to choose a seller, two buyers, and the rest of the children will be the colours.

The buyers leave the classroom and the student paints the seller a picture of the colour they have chosen. They have to spread the paints so that one colour is missing, for example white. After the seller knows which colours are available, two customers come in. They have come to buy paint.

Customer 1: Can I have blue?

Customer 2: Do you have blue?

The seller says, "Yes, you can."

And, "Yes, I have."

The first customer returns the paint he bought. Then the second buyer comes up and asks the same thing. The buyers have to guess which paints the seller has and which he does not. If the paint is in the store, they take it for themselves. But if someone names a paint that isn't there, they'll buy less paint, so they'll lose [10, p. 45].

This means that game technology is a good way to help children learn grammar in primary school. Play is one of the most important activities at this time. Grammar rules can seem boring and monotonous to students, but play can make learning grammar feel more interesting and fun. Children will learn to solve problems related to verb tenses, articles and prepositions more quickly. They will learn all the educational material without realising it.

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CONTEMPORARY MUSIC AND ITS IMPACT ON YOUNG PEOPLE

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Abstract. The article explores music as a multifaceted art that combines emotional expressiveness, structural complexity and cultural significance. The psychological mechanisms of emotion transmission through music are analysed. The influence of digital technologies (DAW) on contemporary music production is examined, as well as the interaction of music with other art forms - from cinema to fashion. Special attention is paid to the role of contemporary performers in shaping cultural trends and moral and ethical orientations of young people.

Keywords: musical psychology, emotions in music, mass music, youth, modern musical culture.

СОВРЕМЕННАЯ МУЗЫКА И ЕЕ ВЛИЯНИЕ НА МОЛОДЕЖЬ

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Аннотация. В статье исследуется музыка как многогранное искусство, объединяющее эмоциональную выразительность, структурную сложность и культурную значимость. Анализируются психологические механизмы передачи эмоций через музыку. Рассматривается влияние цифровых технологий (DAW) на современное музыкальное производство, а также взаимодействие музыки с другими видами искусства – от кинематографа до моды. Особое внимание уделено роли современных исполнителей в формировании культурных трендов и морально-этических ориентиров молодежи.

Ключевые слова: музыкальная психология, эмоции в музыке, массовая музыка, молодежь, современная музыкальная культура.

Music encompasses us in every aspect of life. Almost everything has to do with music. Music makes it easier to work, do things and relax. However, people wonder whether music is art. Music is just words to some sounds of musical instruments. However, no.

Music as an art has a unique ability to emotional expression, which is confirmed by fundamental research in the field of music psychology. B. M. Teplov in his classic

work 'Psychology of Musical Abilities' substantiated that the basis of a musical work is feelings, emotions and mood [1, p. 15]. Modern studies, including the work of E. V. Barashkova and colleagues, develop this idea, demonstrating how music conveys complex emotional states that are difficult to express with verbal means [2, p. 8]. The peculiarity of musical emotions lies in their dual nature – on the one hand, they are direct psychophysiological reactions to acoustic stimuli, on the other hand, they are complex aesthetic experiences that require cognitive processing and cultural context [3, p. 45].

The artistic value of music is reinforced by its complex structural organisation, including melody, harmony and rhythm – elements that relate music to other types of art. As V. I. Petrushin notes, these structural components form a multilevel system where individual sounds are folded into phrases, themes and complete compositions [4, p. 112]. At the same time, music not only reflects emotions, but also organises them in time, creating developing emotional arches and polyphony of feelings [1, p. 12].

The cultural aspect of musical art was emphasised by L. S. Vygotsky, noting that music serves as an important tool for forming collective identity and social ties [5, p. 78]. In today's digital world, these functions acquire new dimensions – from algorithmic composition to interactive forms of perception. However, as studies show, despite technological changes, the psychological foundations of musical art remain relevant, providing music with the status of one of the most powerful means of emotional impact and artistic expression [3, p. 52].

The development of computer technology has radically transformed the process of music creation, where software is an integral element of the modern compositional process. Digital Audio Workstations (DAWs) such as Ableton Live or FL Studio are complete solutions for melody creation, vocal recording and sound processing. These platforms have significantly lowered the technical barriers to music production, allowing users to create compositions through intuitive interfaces such as virtual keyboards and libraries of ready-made sounds. However, the democratisation of access contrasts with the complexity of music production, where genre conventions require specialised knowledge of performance styles, melodic structures and textual components. Modern music production involves the distribution of creative functions among several participants. The beatmaker (composer) is responsible for melodic and harmonic elements, while the performer works with the vocal part and lyrics. The key stages of post-production – mixing and mastering – require specialised engineering skills to balance the frequency spectrum, dynamic processing and achieve commercial loudness standards. Research shows that optimal results are achieved when the final stages are performed by an individual sound engineer in close collaboration with the performers, as decentralised processing often leads to frequency imbalances and uneven sound.

Now the process of creating a song has been dealt with superficially, if you go deeper, you can learn much more interesting information about the process itself, but this information is enough to deduce the fact that a song is not created by one person and can have behind it the work of even a hundred or more people. Case studies of Grammy-winning productions, for example Billie Eilish's "Happier Than Ever" reveal credit lists exceeding 150 specialists, from Foley artists to immersive audio designers.

Based on this information we can clearly say that anyone can make music. Absolutely anyone can contribute at any stage. It does not require education, but like any business it does require self-excellence and learning, which can be done on one's own using resources on the internet.

In the year 2025, with all possibilities fully open, music has become an interface with almost every art form. From painting to film. In the year 2025, with all possibilities fully open, music has become an interface with almost every art form. From painting to film.

The first thing to say is that music has always interacted with other art forms. The simplest example that anyone can think of is ballet, dance, circus and cinema. Without music, ballet and dance would be chaotic movements with no meaning. And how can you imagine a circus performance without a classic circus tune to which a clown performs his act funny? Would a film be as interesting without accompanying music? Definitely not!

In my paper I want to look at the interaction between contemporary music and other areas of art. A cheerful song is good, but a music video for it will create a separate atmosphere and cause special feelings. Music videos are a kind of films that are created by professionals who create films for us. In many music videos you can see effects better than in many films. Plots that are breathtaking, but pass in just two minutes. However, the field of cinema is not only touched indirectly, but also directly! Popular Russian artist Saluki has collaborated with Lika Nadir to release a full-fledged film, albeit a short film, for his album titled 'Beach Rock Hotel'. The most popular way to promote the upcoming release of a song is through the release of snippets. In snippets, artists tell a story. They introduce the release by presenting some snippet. This is an art that is developing a lot at the moment. Artists for their album release show the path they have travelled, create a kind of story where you can see the mood of the future track. This allows the listener to live the moment that the artist is sharing. It builds an emotional connection between the music, the artist and the listener. This interaction shows that music goes far beyond music. Music is not always a companion piece to a film, but rather the film is a companion piece to the music.

Many people now listen to music not as they used to on the radio, but in apps on their phones. In these apps you can see the cover of the song, in which the author puts his idea and expresses the idea and meaning of the song. Often the covers are created by artists and designers. For example, the famous Russian designer Gosha Rubchinskiy created the cover for the album of Russian artists Kai Angel and 9mice "HEAVY METAL 2", and the popular artist Jeff Koons created the cover for the popular and well-known Lady Gaga and her album 'Art pop'. It turns out that music is very closely related to an art form like painting, and it's amazing! Covers are not always created solely by drawing, design and graphics. They are also created with the help of photographs. It is not always possible to convey the mood of your composition through some artificially drawn image, it happens that you want to convey the mood and atmosphere of the moment. A moment that is happening right now, which will not be yesterday and will not be tomorrow.

It is impossible not to talk about the culture of clothes and images. People express themselves through clothes, through their style and therefore it is art. People

show something of their own, something new and different. Since ancient times music has been associated with a certain image, for example, classical music is associated with a person in a dinner jacket, a beautiful suit. Nowadays, looking at a person's style often reveals his musical preferences and style of music. Often and usually music was associated with a subculture. Emo and punks listened to special music and it was hard to imagine a man in a business suit at a concert of the band King and Shute. Artists also tie a particular style to their music, as if tying that style to their music. In 2024, the aforementioned Kai Angel and 9mice gained popularity, always appearing in baggy black clothes by modern designers. Their images created a kind of boom among the youth of Russia. Many people began to wear unusual and futuristic clothes, showing their attitude to this culture.

At the end it is worth answering one of the main questions. Is contemporary youth music exclusively negative? It cannot be clearly said that modern youth music is pure and has only good thoughts. Unfortunately, there is propaganda of illegal substances and non-traditional values. But in modern compositions there is still something that grabs the soul, speaks about the painful things. There is something that in a difficult moment gives to plunge into the abyss of mood of sadness and to think. Teaches that there is fun in life and no reason to stop your life.

For example, the popular youth performer MAYOT, who is listened to by conscious adults, often speaks about things that grab the soul. His lyrics pierce to the core. For example, the album "Both", which is a complete composition and a complete finished love story. Where there are both moments of joy and sadness. After listening to this album, a person experiences a full range of emotions. Starting from being happy for the couple spending time together and being happy, and then coming to its sad conclusion afterwards. It is recommended to listen to this album in its entirety just to experience these emotions and see the world in different colours. Or his metaphors in High's song that expose him as a true owner of the word and a 21st century Pushkin.

"Walking on clouds and floating above people's heads" These images symbolise the feeling of disconnecting from reality and floating above the world.

"Feeling like a stone" The reference to feeling like a stone and being in a state of euphoria implies a sense of numbness or dissociation, emphasising the desire to escape from the ordinary and mundane.

An artist who has performed both music that condemns everyone and made music that touches the soul, Heronwater. In his album "Odyssey" there are many songs that teach life and explain what should be known and accepted by all. In the song Dreamin Freestyle, he visually explains to his listeners about dreams.

He teaches that it is worth dreaming, but it is important to work for your dreams. He teaches his listeners that one should live according to the principle 'It's not fate – I'll go against fate'. In addition, the whole lyrics of this song completely teaches different life situations.

It is possible to devote a separate article to the analysis of songs of modern artists, to see them from different sides. However, having a small analysis of these two artists we can conclude that the music of modern artists is not only about negativity. Most of today's popular artists go into moralising their audience in their songs, explaining to them the right, necessary and important topics. Music also makes the masters of words,

as the great poets were. They tell simple things in a colourful, literate and beautiful way.

Contemporary music has become an essential element of socialisation of the young generation, having a complex impact on values, behaviour and aesthetic preferences. The technological revolution has transformed the music industry: on the one hand, digital tools have made music creation accessible to almost everyone, on the other hand, they have raised professional quality standards.

The peculiarity of modern music consumption is its multimedia nature. Young people perceive music not in isolation, but in combination with visual images (music videos, covers), stage characters of performers and digital environment. A vivid example is the work of artists such as MAYOT and Heronwater, whose lyrics combine poetic imagery with social reflection, offering listeners not just entertainment, but also a reason for introspection.

At the same time, its influence cannot be assessed unequivocally. While some of the content does contain problematic elements, many works demonstrate creative potential, which refutes stereotypes about the ‘degradation’ of youth culture.

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CAN AI BE CONSIDERED AN ARTIST?

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Abstract. The article examines whether artificial intelligence can be considered a full-fledged artist. It analyzes the philosophical and psychological foundations of art, including classical and contemporary theories of creativity. The mechanisms of generative neural networks and their ability to create works that imitate the styles of renowned masters are explored. By comparing key characteristics of art – such as intentionality, emotionality, and originality – with AI's capabilities, the article concludes that fundamental differences exist between human creativity and algorithmic generation.

Keywords: artificial intelligence, art, creativity, neural networks, generative art, philosophy of art, authorship, imitation, algorithmic creativity.

МОЖНО ЛИ СЧИТАТЬ ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ ХУДОЖНИКОМ?

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Аннотация. В статье рассматривается вопрос о том, можно ли считать искусственный интеллект (ИИ) полноценным художником. Анализируются философские и психологические основы искусства, включая классические и современные теории творчества. Исследуются механизмы работы генеративных нейросетей и их способность создавать произведения, имитирующие стили известных мастеров. В результате сопоставления таких ключевых характеристик искусства, как сознательность, эмоциональность, оригинальность, с возможностями ИИ делается вывод о принципиальных различиях между человеческим творчеством и алгоритмической генерацией.

Ключевые слова: искусственный интеллект, искусство, творчество, нейросети, генеративное искусство, философия искусства, авторство, имитация, алгоритмическое творчество.

In 2022, the art world was shaken by an unprecedented strike: thousands of

artists on the ArtStation platform mass-deleted their works in protest against the uncontrolled use of AI. Their rallying cry was, “AI is trained on our work without consent.” This protest was only the first link in a chain reaction: today, the artistic community is divided between those who see AI as a threat to the profession and those who adapt it as a tool. The debate has reached legislative levels – both the US and the EU are already considering bills to regulate AI-generated art.

Just half a century ago, science fiction writers imagined a future of new technologies, robots, and artificial intelligence. Many of them anticipated the philosophical and ethical questions – not so much about AI’s potential threat to humanity, but rather a far subtler problem: its ability to create art. In *Solaris*, Stanisław Lem described an intelligent ocean that conjured perfect human replicas from astronauts’ memories. These “guests” were accurate down to the smallest detail yet devoid of true essence: “We seek man and find only his reflection” [1, p. 397], Lem wrote, as if warning of the future of AI-generated art.

Today, neural networks do the same: they generate images “in the style of Van Gogh,” “like Picasso,” or “à la Bosch,” with no understanding of who these artists were or what their work signified. In 2018, a GAN algorithm created Portrait of Edmond de Belamy – which then sold at Christie’s for $432,000, sparking fierce debate [2]. Can the AI be considered the painting’s author? Or the programmers who trained it? This article seeks to explore where the boundary lies between art and algorithmic generation – and why even the most advanced neural networks cannot (yet, or ever) be called artists.

To answer whether artificial intelligence can be an artist, we must first examine the very nature of art. Philosophical concepts have defined creativity for centuries. Plato, in The Republic, argued that art is mimesis, an imitation of reality, yet “thrice removed from the truth” [3, p. 420]. If even human creativity, in Plato’s view, is but a faint shadow of reality, what does that make AI, which imitates not nature but the artworks humans have already created?

In Critique of Judgment, Immanuel Kant introduced the concept of genius – a creator who produces art without following predefined rules: “Genius is the talent for producing that for which no definite rule can be given” [4, p. 213]. But can an algorithm, bound strictly by its programming, ever be a “genius”?

Leo Tolstoy, *in What Is Art?*, wrote: “Art is a means of transmitting feelings, not thoughts” [5, p. 45]. Yet artificial intelligence does not experience emotions. It cannot, like Van Gogh in a fit of anguish, paint *The Starry Night*, channeling turmoil through swirling brushstrokes. It merely analyzes data and combines styles, comprehending neither meaning nor emotional weight. As Boris Groys aptly noted: “Art is a gesture that cannot be predicted algorithmically” [6, p. 89]. Indeed, art’s essence lies in its unpredictability – in that very “gesture” born from lived human experience. An algorithm, by contrast, is always predictable: feed it the same prompt, and it will produce a similar result.

Traditionally, the psychology of art identifies three key functions: expressive (art as emotional outpouring), communicative (transmitting feelings from artist to viewer), and cognitive (art as a means of understanding the world). These aspects of creativity are fundamentally inaccessible to AI, casting doubt on whether it can ever be

considered a true artist.

Lev Vygotsky, in *The Psychology of Art*, describes the creative process as a chain: emotional upheaval (catharsis) → search for expressive form → communication with the viewer [7, p. 112]. For instance, Edvard Munch, grappling with existential dread, created *The Scream* – not just an image but a visualized emotion. AI lacks this mechanism: it feels no upheaval, needs no catharsis, and seeks no dialogue. Its "creativity" reduces to data analysis – studying thousands of images without grasping what lies behind Van Gogh's strokes or Picasso's compositions.

Rudolf Arnheim, in Art and Visual Perception, emphasizes: "Art is thinking in images" [8, p. 12]. A human sees not just a tree but "trembling leaves like a heart's flutter," transforming associations into symbols. For AI, a tree is merely pixels and patterns. It can copy a style but cannot create an image imbued with personal meaning. When Van Gogh painted *Wheatfield with Crows* before his death, he infused it with premonitions of the end. A neural network generating a similar picture merely recombines learned elements, oblivious to their symbolism.

The core distinction between human art and AI-generated images lies in the capacity for insight. A human can break rules in pursuit of revelation, as Malevich did by defying tradition with *Black Square*. AI always operates within set parameters – even its "creativity" is template-bound variation.

Modern research reveals a curious paradox: the more technically adept algorithms become at reproducing aesthetics, the more glaring their conceptual limitations appear. Neural networks demonstrate remarkable skill in blending visual styles, producing formally flawless works – yet remain deaf to the essence of artistic expression.

Notably, AI generation inverts the traditional creative process. Where classical artists move from inner experience to form (as in Vygotsky's model), algorithms travel the opposite path – from external data to statistical recombination. This spawns a fundamentally different aesthetic, where form precedes content, and style becomes self-sufficient.

Neural networks' engagement with artistic tradition is particularly telling. Rather than meaningful dialogue with predecessors, they produce "cultural palimpsests" – style overlays stripped of historical context. When an algorithm "mixes" Bosch with Dalí, it simulates – rather than continues – artistic discourse, deploying formal techniques divorced from their conceptual roots.

Modern generative models like Stable Diffusion, DALL·E, and MidJourney create images through intricate yet fundamentally soulless processes. Three key mechanisms distinguish AI from human creativity:

First, training on vast datasets. Take LAION-5B, the dataset behind Stable Diffusion [9]. It contains 5.8 billion image-text pairs scraped from public sources – including artworks, often without creators' consent [10]. This resembles mindless data consumption rather than deliberate artistic study.

Crucially, neural networks operate on statistical patterns alone. As Gary Marcus demonstrates in Deep Learning: A Critical Appraisal (2018), these systems detect correlations but cannot establish causality or comprehend meaning [11, p. 5]. When prompted to "paint a sunset in Van Gogh's style," no creative act occurs – only

complex mathematical computations. The algorithm does not "recall" Van Gogh's works; it calculates pixel distributions most frequently associated with those words in training data.

Even celebrated examples of "AI creativity" betray these limits. Consider *Portrait of Edmond de Belamy* (2018): closer inspection reveals an eclectic pastiche of 18th-century portraiture, devoid of original intent. Similarly, DALL·E 3, asked to depict "Hell in Bosch's style," generates grotesque imagery while mangling Christian symbolism – oblivious to Bosch's societal critiques. What emerges is not art but mechanical recombination of "scary" elements across eras and cultures.

Technical studies confirm these constraints. Diffusion Models Beat GANs on Image Synthesis (2021) found that even state-of-the-art models distort anatomy, confuse perspective, and produce logically inconsistent elements [12]. A Google Brain experiment (2022) proved AI fundamentally incapable of what makes human art invaluable – consciously breaking rules (like avant-garde pioneers), inventing wholly new styles, or embedding personal experience [13].

Thus, for all its technical sophistication, generative AI remains a tool for variation, not innovation. Devoid of cultural context, conceptual breakthroughs, emotional depth, or lived experience, artificial intelligence is fated to be a skilled mimic – never a true creator. Its works are elaborate statistical collages, lacking the spark that makes art.

If AI cannot create authentically, how should we classify its output? Is it art, however derivative? The artistic community is fiercely divided. On one hand, algorithms lack consciousness, emotions, or intent. On the other, their works can evoke genuine aesthetic responses. Perhaps "AI art" is less a new genre than a novel medium – somewhere between tool and co-author.

Consider *The Next Rembrandt* (2016), where a neural network analyzed 346 of the master's paintings to generate a "new" work in his style [14]. Technically impressive, it perfectly replicated brushwork, chiaroscuro, and texture. Yet critics rightly note: it lacks Rembrandt's psychological depth. This is expert pastiche, not artistic evolution.

Illusionist David Copperfield once said, "If the audience feels something, that's art" [15]. Many viewers do feel awe, nostalgia, or unease before AI-generated pieces. But whose emotions are these? When an algorithm produces a "Levitan-esque" melancholic landscape, the viewer responds not to the machine's "feelings" but to: the artists whose works trained the dataset; personal associations with classical art; marvel at technological spectacle.

Thus, AI becomes a mediator – repackaging human cultural heritage into new forms. However, is this independent creativity? More accurately, it is digital collage, remixing existing styles. As art historian Claudia Schenk observes: "AI art isn't about creating meaning but recombining it. Its value lies in forcing us to rethink authorship and creativity itself" [16].

Increasingly, artists treat AI not as autonomous creator but as a modern-day brush or chisel – a tool extending human imagination. Damien Hirst remarked: "AI is like a paintbrush: it depends on the hand that holds it" [17]. Indeed, an AI without human input is like a brush without an artist – an inert object lacking creative will.

Thus, emerges collaborative co-creation: humans conceive ideas, curate outputs, refine results; algorithms process prompts; platforms (e. g., MidJourney) define technical constraints.

This triad complicates authorship. The U.S. Copyright Office (2023) recognizes only human creators [18]. If AI generates an image without substantial human input, it cannot be copyrighted.

Some theorists propose a radical reframing – viewing AI-assisted works as "products of a digital ecosystem" [19, pp. 145–167]. Here, creativity distributes across multiple actors: programmers who built the tool; data curators who compiled training material; users who formulated prompts; and algorithms executing technical tasks. This challenges traditional copyright paradigms.

AI does become a "digital brush," but this metaphor underscores the central question: Who wields it? An individual, a collective, or digital culture at large? Society is only beginning to grapple with these questions, standing at the threshold of a new chapter in art and authorship [20, 21].

AI's rise in art creates a paradoxical duality. On one hand, generators challenge all traditional definitions, producing works visually indistinguishable from human-made art. On the other, the algorithms themselves cannot engage with – let alone revise – these definitions, confined as they are too rigid programming. This raises a fundamental question: if art's essence lies in dialogue – between artist and viewer, across eras, among traditions – can there ever be true dialogue with an unconscious algorithm, devoid of experience, emotion, or intent?

The path forward may lie in balance. AI undeniably expands creative horizons, serving as powerful tool or even "co-author." Yet its inherent limits – no genuine insight, no rule-breaking defiance, and no lived experience – preclude recognition as autonomous artist. Perhaps the truth resides in between: AI-generated art does not replace human creativity but constitutes a new cultural phenomenon, demanding redefined aesthetics. In this interplay between human and machine, between conscious creation and algorithmic generation, we are only beginning to chart the course of art in the digital age.

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THE IMAGES OF ARCHITECTURAL LANDSCAPES IN PAINTINGS OF FAN LEAVES FROM RUSSIAN MUSEUM COLLECTIONS

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Abstract. The study is dedicated to fans of baroque and classicism with the images of architectural landscapes from Russian museum collections. In the research, it was defined that the compositions are classified in types: 1) image occupied the fan leaf entirely, 2) painting concentrated in the central part and 3) compositions in three cartels. The analysis of the compositions allows to understand the stylistic situation in the 18th century, the cycle of the iconographic examples and to clarify the customers' tastes.

Keywords: 18th century, baroque style, classicism, fan, architectural landscape, composition.

ОБРАЗЫ АРХИТЕКТУРНЫХ ПЕЙЗАЖЕЙ В РОСПИСЯХ ВЕЕРНЫХ ЭКРАНОВ ИЗ РОССИЙСКИХ МУЗЕЙНЫХ СОБРАНИЙ

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Аннотация. Исследование посвящено веерным экранам эпохи барокко и классицизма с изображениями архитектурных пейзажей, находящимся в российских музейных собраниях. В ходе анализа экранов вееров было определено, что композиции можно разделить на несколько типов: 1) изображение, расположенное на всей плоскости экрана; 2) изображение, сосредоточенное в центральной части веера; 3) композиции на три картуша. Анализ композиций экранов вееров дает возможность расширить представления о стилевой ситуации в XVIII веке, определить круг иконографических образцов и уточнить вкус отечественных заказчиков.

Ключевые слова: XVIII век, барокко, классицизм, веер, архитектурный пейзаж, композиция.

At the beginning of the 18th century folding fans appeared thanks to the reforms of Peter the Great [1, p. 158]. For a long time this female accessory was treated as an addition to the outfit. "A woman without a fan is like a man without a sword!" – said

Voltaire [1, p. 157]. Soon the fan becomes an independent masterpiece of decorative and applied art, defining the development of culture and artistic works.

The interest to the architectural landscapes appeared in the second half of the XVIII century, in 1770-1790-ies.

The first compositional type – the image occupied the fan leaf entirely – is found among the fans of Russian work.

In the first half of the XVIII century, women used only foreign fans, as Russia did not have its own production. Only in 1751 Elizaveta Petrovna signed a decree on the establishment of a fan manufactory in Moscow near the Myasnitskiye Gate [2, p. 131]. It was connected with the fact that merchants who brought fashion accessories from abroad could not cope with the increased demand for fans among ladies.

Among the items of the Imperial Collection was a fan of 1750 from the State Hermitage Museum, which was presented to Empress Elizabeth [3, p. 24]. The fan was two-sided, with images of “The Catherine Palace” and “The Hermitage in Tsarskoye Selo”. However, the fan was lost, and the location remains unknown. The images were made from drawings by M. I. Makhaev. It is known that on August 23-27, 1754 Makhaev made from nature three “avenues” of Tsarskoye Selo: a view of the palace, the Hunting Pavilion and the pavilion “Hermitage”. In June 1755 the drawings were finished in the workshop [4, p. 38]. Makhaev chose the composition on the entire surface of the leaf and very accurately conveyed the artistic principles of the composition.

The fan leaf’s master changed the original composition. In the process of adaption it was especially significant to reduce the scale of the image, acquiring greater chamberliness [5, p. 22]. On the front side in the image of “The Catherine Palace” the author depicts the landscape and staff figures on the sides of a part of the architectural complex. (Figure 1). In the case of this fan, it is also worth paying attention to the carved sticks of the fan, which replace the decorated gates depicted in the engraving and is one of the versions for the viewer's visual “entrance” into the artistic space of the leaf. This detail emphasizes the master's attitude to his work as an easel painting, which was more common with the Italian historical genre paintings.

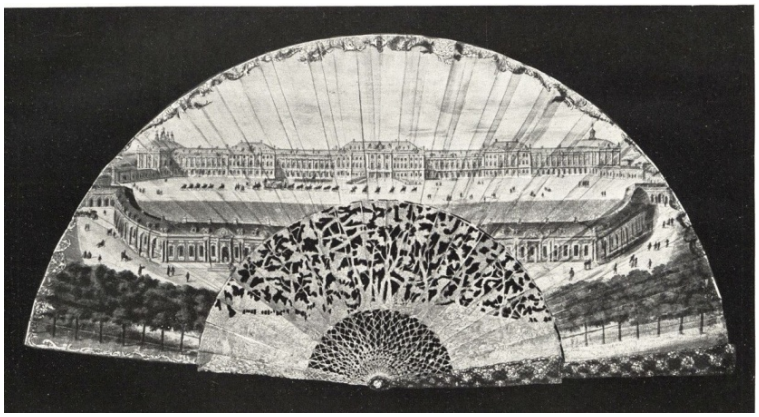


Figure 1 – Unknown author. Folding fan. Front side “The Catherine Palace”. 1750, Russia. Parchment, gold, diamond. 28.2 x 49 sm [3, p. 24]

On the reverse there is the image of “The Hermitage in Tsarskoye Selo” in which firstly the foreshortening changed. (Figure 2). The author wanted to capture the view not only of the pavilion, but also of the panorama that appeared behind the building. The author repeated the way of introducing the viewer into the artistic space through the frame, which in this case replaced the staircase.

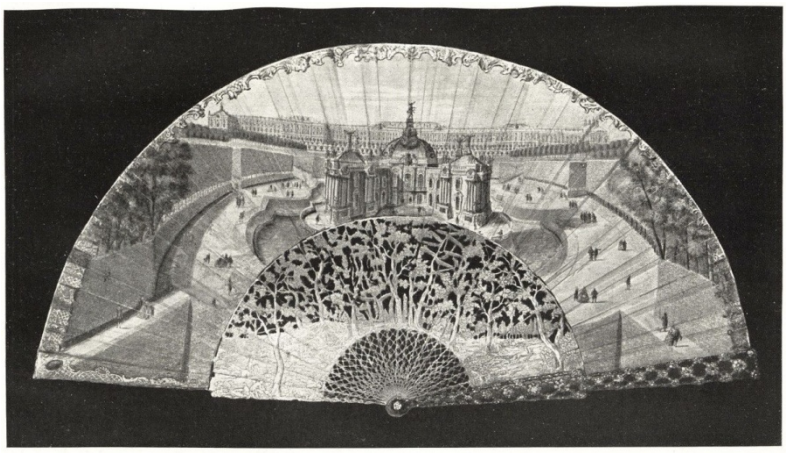


Figure 2 – Unknown author. Folding fan. The reverse side “The Hermitage in Tsarskoye Selo”. 1750. Russia. Parchment, gold, diamond. 28.2 x 49 sm. Source: Тройницкий С. Н. Каталог вееров XVIII века [3, p. 24]

It is important to mark that in the second half of the 18th century engraving occupied a less high position in the system of arts. Despite this, letters and notes of contemporaries of engravers showed that in the aristocratic sphere the outstanding masters of engravings were treated with great respect [5, p. 18].

Therefore, in this compositional type the master can display the original on the fan leaf completely, changing the arrangement of elements according to the arc-shape of the fan.

Compositions of the second type – the image is concentrated in the central part of the fan – are represented mainly on the leaves of Italian fans, which are dedicated to the ancient monuments and St. Peter's Cathedral.

In Italy, the fan leaf was treated as a painting, because of which Italian fan makers often copied works of painting by the best artists of their time. The images were executed in the technique of the finest miniature painting, or feather drawing, imitating engraving [6, p. 10]. Consequently, artists often used for examples the engravings with architectural views.

One of the main artists whose works were used as a basis was Giovanni Batista Piranesi, who created a series of works devoted to ancient and modern views of Rome.

At the collection of Palace of Ostankino is located another fan leaf from the “grand tour” series depicting the temple of Vesta and the temple of Fortuna Virilis in Rome, created in 1780-1790s. (Figure 3). It is noticeable that other ancient monuments depicted on the leaf. There are the Temple of Vesta and the Temple of Sibylla in Tivoli. The author of the fan chose an almost frontal point on the side of the semicircular colonnade. A similar composition can be found among the engravings of Giovanni Batista Piranesi which is called “View of the Temple of Sibylla in Tivoli” in 1761 [7,

p. 105–106]. Highlighting the work of this master is important, as this is the angle that was less sought after by painters, draughtsmen and engravers. Apparently, the authors chose the viewpoint on the left to depict only the temple of Vesta, as the temple of Sibylla was already in a state of ruin at that time. Piranesi's engraving is filled with drama, which was enhanced by the curved tree trunks, roots and stone blocks in the foreground. The artist emphasized the ruined state of the buildings, which is a relevant theme in Piranesi's work.



Figure 3 – Unknown author. Fan leaf “Temple of Vesta and Temple of Fortuna Virilis in Rome” from the grand tour series. 1780-1790s. Italy. Parchment, gouache painting. 17,5x35,5 sm. Located in the Palace of Ostankino [8]

The Pantheon is shown on a leaf drawing from the Shchusev Museum of Architecture, which dates the late 18th century. (Figure 4). In the center is a cartel depicting the Pantheon in monochrome. The artist chose a close point of view to the monument, which associates with the engraving made by Piranesi “View of the Pantheon of Agrippa, today the Church of St. Mary and the Martyrs” about 1761 [7, p. 104]. The only difference is the absence of Bernini's completed towers in the image on the fan. Perhaps, the artist was orientated to the engraving by Piranesi in the composition, but he wanted to convey the old view of the ancient monument of Rome.



Figure 4. Unknown author. Fan leaf with antique motifs. The front side “The Pantheon”. Late 18th century. Paper, pencil, watercolor. 52 x 21 sm. Located in the Shchusev Museum of Architecture [9]

On the leaf of another fan also from the State Hermitage Museum near the 1790-1800s shows a view on St. Peter's Square in Rome in the central cartel. (Figure 5). The popular at that time engraving by Giovanni Batista Piranesi of the 18th century (1772) was taken as a basis [7, p. 143]. On the fan paper the artist almost completely repeated the foreshortening from the original, displacing the point of view to the right, because of which the left colonnade of the Cathedral occupies more space on the engraving.



Figure 5 – Unknown author. Folding fan. 1790-1800s. Italy. Paper, bone, tortoise, metal, turquoise, wood, engraving, watercolor, inlay. 26,5 sm. Located in the State Hermitage Museum [10]

Among Russian fans there is also a fan with an image only in the center. In the catalogue of Sergei Nikolaevich Troinitsky [3, p. 25 – 26] mentioned a fan from the Imperial collection with the image “View of Pella Palace”, made around 1790 (Figure 6).

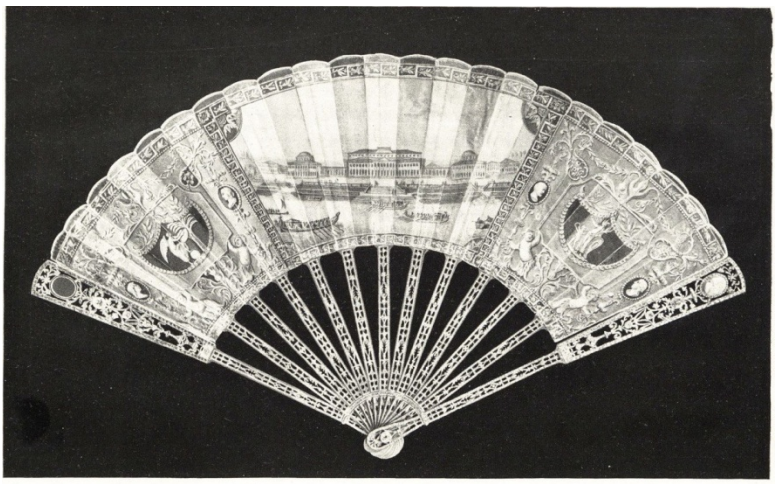


Figure 6 – Unknown author. Folding fan, parchment, with a gold, diamond-encrusted frame. 1790. Italy. Parchment, agate, gold. 28,2 x 49 sm. Stored in the State Hermitage [3, p. 25]

The image reveals the design of Pella's palace with a facade facing the Neva. A drawing by Giacomo Quarenghi with a view of the palace from the shore has been preserved. The artist filled the composition with staffage figures. The fan leaf master also added movement to the image by means of staffage figures on the boats and the riverwalk. The difference is that the artist relied on his impressions from nature than on pictorial or graphic originals in his choice of composition and foreshortening.

The second type of composition forces the artist to frame the view from the originals in order to fit the scene into the limited shape and to emphasize the viewer's attention on the most important thing – the architectural image.

In Italy there was also spread widely third compositional type, where images were divided into three parts – cartels. This compositional scheme is associated with the idea of Capriccio veduta – a new architectural landscape is formed from existing objects. The surface of the fan is a space for a new reality, where all the places visited by the traveler can be neighbor. Often such compositions were ordered as a souvenir. Consequently, fans had a memorial function. The objects were supposed to remind about the main and most famous monuments.

The view of the Colosseum can be found on the Italian fan, which was kept in the State Hermitage Museum “Views of Rome”. It is dated around 1780s. [3, p. 26]. In the center – St. Peter's Square in Rome, on the left – the Colosseum, on the right – the ruins of Hadrian's Villa. (Figure 7). On the reverse is a composition with the ruins of the temple of Castor and Pallux. The composition of the fan corresponds to examples of image from the 1770-1790s. The artist chose to depict the Colosseum from the bottom to the top in order to emphasize the majesty of the monument. Giuseppe Vasi's 1753 engraving “Piazza San Pietro” was taken as a basis. The artist chose a point on the side of the right colonnade from the Cathedral. The engraving maintains the correct perspective: the left colonnade, the cathedral and the monument in the center of the square remain in the field of view. The artist added a small building in the foreground and changed the arrangement of people and carriages in the square, creating a more rarefied composition. In the engraving the staffage figures and carriages are most concentrated in the foreground, moving in parallel lines toward the center, to the monument. The sense of movement and instability of the composition is present in the fan with views of Rome, which is more associated with Baroque tendencies. It can also be noted that this scene is executed at a high level, as the complex format was accurately reproduced perspective without perspective distortions.

To create fan leaves of the third compositional type, recognizable architectural views are used for a quick and accurate reading of the place, because of which the changes introduced in the composition are insignificant.

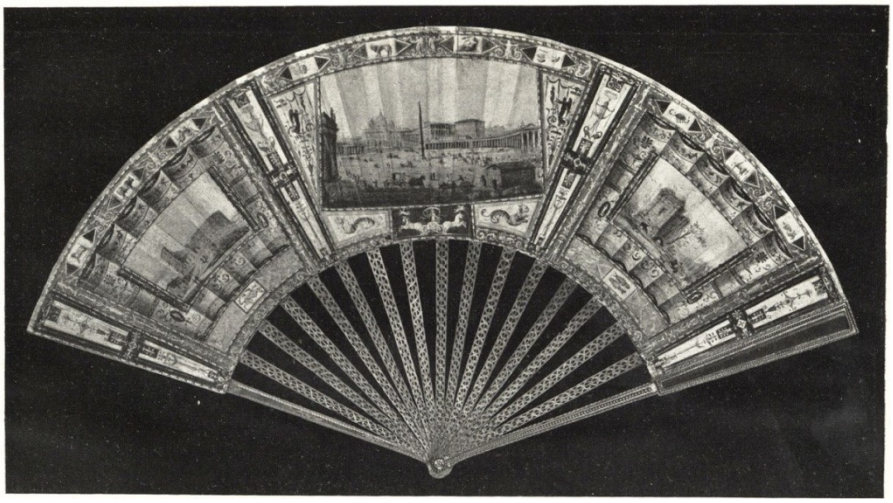


Figure 7 – Unknown author. Folding fan, parchment, with gold slit frame. 1780. Italy. Parchment, agate, gold. 28,2 x 51,5 sm. Stored in the State Hermitage. Source: Тройницкий С. Н. Каталог вееров XVIII века [3, p. 26]

Interest in architectural landscape appeared in the second half of the XVIII century. In Russian and Western European art of the 1770-1790s, there are several methods of adapting an easel painting or engraved examples in the space of a fan leaf: an image on the entire surface, a scene in the central part of the fan, and a composition divided into three cartels. These types depend on the shape of the fan, the composition of the painting or engraved original, territorial affiliation and style situation.

In the development of typology specifically architectural landscape more distinguished national schools, especially Italy and Russia, whose artists addressed this theme in decorative and applied painting. It is interesting that Russian masters preferred the use of composition of the first type to show the high level of the national school not only in architecture, but also in decorative and applied art.

It is also important that by the end of the century, especially by the 1790s, ladies' English attire of fitted silhouette became one of the popular in fashion. Apparently, fans with architectural landscapes, which were characterized by strictness and symmetry, could be created especially for these images.

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REVISED BLOOM'S TAXONOMY AS A BASIS FOR DEVELOPING PUBLICSPEAKING SKILLS IN SCHOOLCHILDREN

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Abstract. This article examines the importance of public speaking skills in the modern educational process. The principles of Bloom's taxonomy can be applied to develop public speaking skills, ranging from the formation of basic knowledge about methods and techniques of expressing thoughts to the ability to critically evaluate one's own and others'presentations. This system hierarchically structures learning goals, which provides an opportunity to develop the necessary skills step by step.

Keywords: Bloom's taxonomy, basis, public speaking skills, schoolchildren, information skills, communication skills.

ПЕРЕСМОТРЕННАЯ ТАКСОНОМИЯ БЛУМА КАК ОПОРА ПРИ РАЗВИТИИ НАВЫКОВ ПУБЛИЧНОГО ВЫСТУПЛЕНИЯ У ШКОЛЬНИКОВ

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Аннотация. В данной статье рассматривается значение навыков публичного выступления в современном образовательном процессе. Принципы таксономии Блума могут быть применены для развития навыков публичного выступления, начиная от формирования базовых знаний о методах и техниках выражения мыслей вплоть до способности критически оценивать собственные и чужие презентации. Эта система иерархически структурирует учебные цели, что дает возможность пошагово развивать необходимые навыки.

Ключевые слова: таксономия Блума, опора, навыки публичного выступления, школьники, навыки работы с информацией, коммуникативные навыки.

In the modern educational process, the development of public speaking skills is becoming increasingly important, as the ability to communicate productively and present ideas is becoming a key requirement in various fields of life. Bloom's taxonomy is one of the tools to structure and systematize the learning process.

The creation of the Bloom taxonomy began back in the 20th century. At that time, a group of scientists led by Benjamin Bloom, an American psychologist and educator, was working on creating a universal tool with which students can easily assess the level of reaching of any educational goal. At that time, there were already

many terms and concepts related to such learning goals, but they were not explicit: there was no clear structure or level order.

American scientists decided to systematize all learning goals, focusing on the cognitive skill needed to achieve them. The result of this study is a hierarchy of learning objectives, consisting of six levels: from basic to advanced.

In 1956, a group of scientists from the University of Chicago published this hierarchy of educational goals in the book "Taxonomy of Educational Goals." This system of scientific goals was named "Bloom's Taxonomy". This publication became the basis for further research and practical application of Bloom's taxonomy in the education system [1].

It is worth mentioning that there are three areas of educational goals in the scientific field: cognitive, affective and psychomotor. The affective and psychomotor spheres are related to feelings and actions. The cognitive sphere is related to the sphere of knowledge acquisition. Bloom's original taxonomy concerns exclusively the cognitive sphere of educational purposes.

As already mentioned, the taxonomy consists of six levels. These levels are usually presented as a pyramid (Figure 1).

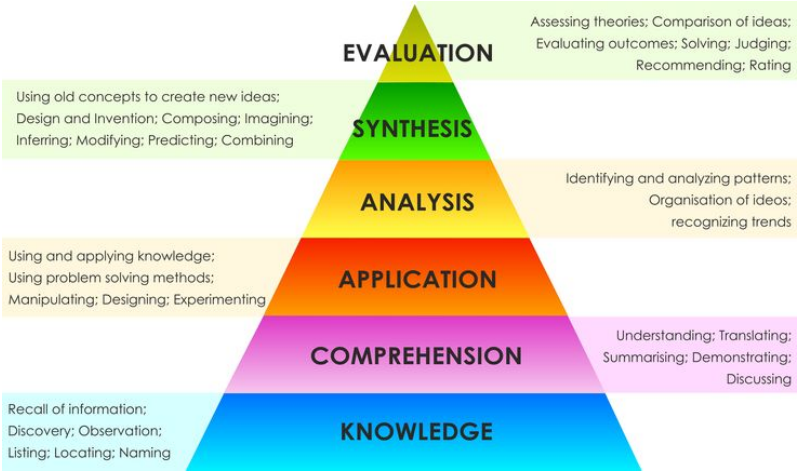


Figure 1 – Bloom's taxonomy

Let us look at each of the levels in more detail.

The first level is *knowledge*. This includes the most basic actions – receiving any information, memorizing it, and reproducing it, that is, unconsciously repeating it. Verbs specific to this level: repeat, tell, show, name.

The second level is *comprehension*. The main principle here is the interpretation of the information. This level is characterized not only by simple memorization of information, but also by its primary understanding and minimal processing. Verbs of this level: paraphrase, explain, describe, identify signs.

The third level is *application*. The purpose of this level is to apply directly directly the acquired knowledge. Verbs specific to this level: apply, illustrate, transform, and reunite.

The fourth level is *analysis*. At this level, students must analyze information, build logical chains, compare facts, and divide large amounts of material into small

semantic parts. Verbs for this level: identify, analyze, compare, classify.

The fifth level is *synthesis*. The point here is to apply all available knowledge in order to create something new. Verbs specific to this level: create, plan, invent, model.

The last level is evaluation. This level is the goal of all learning. This level allows evaluating the importance of information, discussing weaknesses and strengths, and making constructive suggestions for improving the work with information. Verbs of this level: evaluate, prove, defend a point of view, argue, make recommendations [2].

Over time, many psychologists and scientists have tried to revise the ideas of taxonomy. In 2001, David Krathwohl and Lauren Anderson, Bloom's colleague and student, created a modified Bloom taxonomy. It is this version of the taxonomy that has found acceptance in methodological communities, as it simplyfied the entire teaching process as a whole, making it as understandable and logical as possible. Subsequently, this modification was called the "Revised Bloom's Taxonomy" (Figure 2).

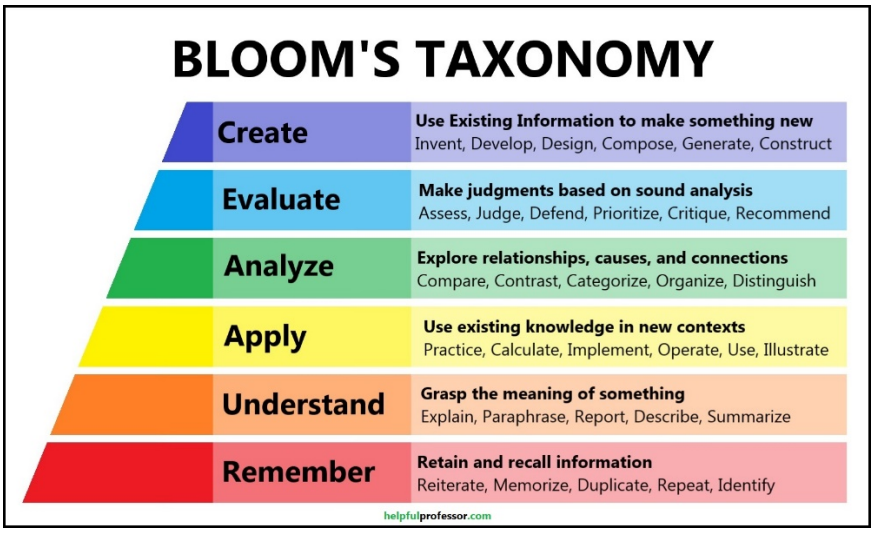


Figure 2 – Revised Bloom's taxonomy

There are only two differences between the classic taxonomy and the revised one: the disappearance of one level and the appearance of another, new one. Instead of the "synthesis" level, the "evaluation" level has come, while maintaining all its principles. The new level of the revised taxonomy is "creation", that is, the application of all acquired skills and knowledge in the learning process to create something new [3].

In the context of developing public speaking skills, it is worth considering Bloom's revised taxonomy as a tool, since the speech itself is a product that is created by the student using his various knowledge on the topic.

To fully understand the possibility of using the ideas of the revised taxonomy, it is necessary to analyze exactly what skills are needed for public speaking.

As known, one of the decisive factors for the success of a public speech is the text itself. When writing a text, it is necessary to start from the idea of the whole public performance. This includes the relevance of the information, its structure, clarity. In

today's world, where information flows endlessly, it is extremely important to differentiate the necessary from the useless, the main thing from the secondary. To successfully overcome this difficulty and compose an informative, but at the same time concise text, it is necessary to develop a whole group of skills – skills of working with information.

The second aspect that influence the success of public speaking is the very process of speaking. This includes several factors at once: the pace and clarity of speech, the manner and method of presenting information, gestures, and much more. That is, those things that allow you to convey information to the audience. These skills can be attributed to the group of communication skills [4].

Based on the above, it can be concluded that public speaking skills include 2 large groups of skills: information management skills and communication skills. Developing public speaking skills is a whole range of actions. The complexity of this development is represented by the versatility of the necessary skills that need to be developed in a comprehensive manner, rather than separately.

There is a clear connection between Bloom's taxonomy and the development of public speaking skills. A taxonomy can serve as a kind of support that allows you to divide the entire process of skill development into several levels, starting with the theoretical preparation of a speech and ending with self-reflection after it. This support simplifies the entire process of developing these skills, because it makes the entire learning process consistent [2].

Let us look at the potential of each level designed to develop public speaking skills in the revised taxonomy in more detail.

Remember. Here, students get acquainted with the basic concepts and terminology of public speaking. This includes learning about different types of speech, structuring speeches, and learning basic techniques such as the use of gestures, facial expressions, and voice modulation. This foundation allows you to create the basis necessary for further study. As for information processing skills, students learn in theory how to process information, techniques for identifying the main thing in a text, as well as ways to simplify information and create a concise text for a speech.

Understand. Students begin to comprehend the studied material, analyze it and interpret it. At this stage, they can discuss why certain techniques work better in certain situations, as well as learn to adapt their performances depending on the audience, since understanding the context is key to successful communication. Information management skills are also developed here at the basic level.

Apply. At this stage, the work itself begins with all the knowledge at once. When preparing a text for a speech, students find information in different sources, analyze it, simplify it, and supplement it. Next, they begin to develop their own presentations and conduct them in front of a mini-group as an approbation. This practical application of knowledge and prepared materials contributes to the formation of confidence and perseverance. They receive feedback, which helps them improve their skills and respond more accurately to the needs of listeners.

Analyze and *Evaluate* are closely connected to each other. Here, students learn to recognize the strengths and weaknesses of their performances, as well as asses the performances of others. It is important to analyze both the speech as a whole and its

parts separately. Using analysis to examine parts of a speech allows for a more objective assessment, because parts of an integrated system become more understandable when viewed outside the context of others. This critical approach allows you not only to improve your own skills, but also to grow as specialists capable of reflection and self-development in the field of communication.

The pinnacle of the entire learning process is *Create*. Students create a full-fledged presentation, in preparation for which they apply all the skills, methods and techniques acquired earlier in the learning process. Bloom's taxonomy is the principle of sequential learning from simple to complex. You can move to the next level when the previous one is fully mastered. Therefore, the level of *Create* should not cause real problems among students, since all the necessary skills were learned by them in advance during the "rise" from the basic level of taxonomy to the advanced one.

Thus, Bloom's taxonomy is a powerful tool in developing public speaking skills among schoolchildren, contributing to their comprehensive development. The development of public speaking skills among schoolchildren is an important aspect of the educational process, which significantly affects the formation of students' confidence, communication skills and critical thinking. The application of Bloom's taxonomy in this context makes it possible to structure learning, making it more effective and purposeful [5].

It is also important to note that Bloom's taxonomy can help students not only develop public speaking skills, but also in everyday life. It teaches you to think systematically, analyze information and arrange your thoughts in a logical sequence, which can be useful in any situation that requires the ability to speak in front of an audience.

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EMBRACING AI IN DESIGN: HOW DESIGNERS AND AI CAN COLLABORATE

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Abstract. The article is devoted to the role of artificial intelligence in design as a cognitive partner, idea generator and co-authorship tool. The stages of AI integration into the design process, examples of use in education and practice, as well as ethical risks are considered. The need for new skills, critical thinking and rethinking the professional identity of a designer is emphasized.

Keywords: artificial intelligence, generative AI, design, co-authorship, cognitive thinking, generative models, Mixed-Initiative Co-Creation, authorship, design education, ethics in design.

ИСПОЛЬЗОВАНИЕ AI В ДИЗАЙНЕ: КАК ДИЗАЙНЕРЫ И AI МОГУТ СОТРУДНИЧАТЬ

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Аннотация. Статья посвящена роли искусственного интеллекта в дизайне как когнитивного партнера, генератора идей и инструмента соавторства. Рассматриваются этапы интеграции ИИ в процесс дизайна, примеры использования в образовании и практике, а также этические риски. Подчеркивается необходимость новых навыков, критического мышления и переосмысления профессиональной идентичности дизайнера.

Ключевые слова: искусственный интеллект, генеративный ИИ, дизайн, соавторство, когнитивное мышление, генеративные модели, смешанное инициативное сотворчество, авторство, дизайн-образование, этика в дизайне.

Artificial intelligence (AI) is a set of technologies capable of performing tasks that require human intelligence: from image recognition to text and visual object generation. Modern AI models, including large language models (LLM) and generative models (GAI), are actively integrated into a variety of fields, including design. In

design, AI can act not just as a tool, but as a full-fledged partner – a "co-author" and even "material" with which work is carried out.

Amid these opportunities, anxiety also arises. Some researchers point to designers' fears of losing their jobs or creative autonomy [1, 2]. The emergence of "uncontrolled" generative models calls into question the authorship, authenticity, and originality of design, and makes it difficult to assess the contribution of humans and AI. In addition, designers face the need to master new skills such as prompt engineering and face the limitations of models: unpredictable “hallucinations”, opaque logic (black box ML) and narrow generalization [2, 3].

The purpose of this article is to consider how AI, especially GAI and LLM, is integrated into various stages of the design process – from concept formation to visualization and evaluation of solutions. We analyze existing approaches, examples of AI implementation and discuss both its benefits and risks.

Artificial intelligence can also become a co-author in the creative process. AI can enhance both divergent thinking (generating many ideas) and convergent thinking (searching for the most suitable solution). Generative AI can suggest unexpected and diverse solutions, contributing to a wider range of creative approaches. W. F. Yu emphasizes that such systems help designers go beyond templates, stimulating associative thinking and facilitating the generation of innovative ideas [4].

In addition, AI can serve as a means of structuring ideas, identifying logical connections between proposed options and helping to move from the chaos of ideas to the formation of a meaningful solution. Studies have shown that in educational environments, the use of AI helps to accelerate the iterative cycle: students move faster from concept to prototype, using generative tools as “cognitive partners” that support and guide thinking [2, 5].

AI also helps to eliminate creative barriers, such as the “fear of a blank page” or the inability to start. It can be used to generate a “first step” – a visual starting point that the designer can refine and adapt. This is especially important in conditions of uncertainty and high cognitive load. According to D. Karadağ, B. Ozar, such features make AI a powerful partner in the initial stages of design [3].

The use of AI has a positive effect on the cognitive functions of designers. W. F. Yu notes that interaction with generative systems such as ChatGPT and DALL E helps to activate associative thinking and overcome cognitive fixation, a typical problem in which a person gets stuck in a narrow circle of familiar solutions [2]. Such activation of cognitive mechanisms allows not only to expand mental models, but also facilitates the transition between design stages: from problem setting to concept development and visualization.

The study by Abrusci L., Dabaghi K., D’Urso S., Sciarrone F. emphasizes the reduction of cognitive strain due to structuring the design process. In their experiment, students using AI4Design reported higher confidence in their own decisions, an increased sense of control over the process, and reduced anxiety in conditions of uncertainty [5]. Thus, AI becomes not only a tool that alleviates the workload, but also a means of cognitive support that promotes mental resilience and effective learning.

There are Mixed-Initiative Co-Creative (MI-CC) tools and we will look at them below. Mixed-Initiative Co-Creative (MI-CC) systems are a type of interactive collaboration between humans and AI, in which the initiative can come from both the user and the system. This is not just a response to commands, but an active participation

of AI in the formation, development and transformation of design solutions. Such systems involve a deeper degree of co-authorship, in which AI not only adapts to human actions, but is also able to offer unexpected, innovative ideas, initiate changes during the design process and develop proposals in real time.

Classic examples are Sentient Sketchbook, where AI helps game designers generate maps by offering interactive options, and COFI, a platform that supports architects in the conceptual design of facades and spaces. These tools serve not only as a means of speeding up work, but also as activators of creative thinking, disrupting habitual mental patterns and promoting cognitive flexibility [3].

The study by D. Karadağ and B. Ozar emphasizes that the use of MI-CC systems in studio practice promotes a higher level of engagement and improves cognitive functions, in particular, the ability for associative thinking and switch between tasks. This is explained by the fact that constant dialogue with AI stimulates reflective thinking, which requires evaluating, interpreting and adapting the system's suggestions. Such conditions are favorable for developing students' critical thinking skills, argumentation and the ability to work with uncertainty [3].

In addition to the above examples, the MI-CC approach is used in generative graphics systems, where AI suggests compositional or color solutions, in literary and script generators (for example, NarrativeAI), as well as in collaborative creative editors, where authors and AI create text or visual content together. According to W. F. Yu, such systems can effectively destroy cognitive rigidity – the tendency to repeat familiar strategies – and thereby contribute to the expansion of design thinking [2]. AI as a “material” for design

AI is considered not only as a tool, but also as a design material. However, its use requires an understanding of its nature: models can behave unpredictably, their work is not always explainable, and the result is ambiguous. Designers are often unsure how exactly to use AI, since they do not understand where its boundaries are and how to influence the generation process [2].

Studies offer various classifications of AI integration into design, reflecting both technical and conceptual aspects. W. F. Yu distinguishes four approaches: a priori (AI is used before design begins, for example, to analyze requirements or user data), a posteriori (AI is used after the design solution has been formed – for visualization, analysis or improvement), hybrid (a combination of a priori and a posteriori use), and collaborative (AI actively participates in the process in real time, interacting with the designer) [2].

There is also an extension of this typology, including a conceptual approach, in which AI is used to generate ideas and concepts; an alternative approach, in which AI offers atypical solutions, facilitating a way beyond conventional thinking; and a collaborative approach, which involves partnership between humans and machines throughout the design process. These approaches differ in system autonomy, the degree of human involvement, and the stage of AI integration within the design process [2].

Thus, the conceptual approach is especially effective in the early stages, when a wide range of ideas is required, while the a posteriori approach is useful at the analysis and testing stage. Collaborative and joint approaches contribute to the formation of mixed “human + AI” teams, where tasks and roles are redistributed. Such forms of integration allow AI not only to speed up work processes, but also to become a source of innovative ideas and form new forms of design thinking [2, 3].

Next, we will look at examples of application and results of working with AI. The integration of AI into design education and professional practice yields a variety of results, demonstrating the potential of the technology in different contexts. Below are case studies based on AI4Design research and other initiatives that illustrate how AI is being applied to jewelry, interiors, and architectural design. These examples show how AI not only accelerates development, but also deepens conceptual thinking, uncovers hidden ideas, and solves complex problems.

One student used AI4Design to design unique earrings based on the client's personality traits. The system helped transform abstract ideas and emotional images into concrete visual forms. ChatGPT was first used to create verbal descriptions and associative series reflecting the client's character, after which generative models visualized the resulting concepts. This approach accelerated the transition from idea to rough sketch and allowed for a faster formation of the final composition [5].

In another case, a student worked on an interior inspired by the movement of an octopus. Thanks to AI, he was able to not only preserve the original metaphor, but also enrich it on a visual and spatial level. AI suggested shapes, textures, and compositional solutions that enhanced the feeling of "hypermechanics," a concept that combines biomorphic and machinelike qualities. AI also helped in quickly checking the visual integrity of elements, allowing the author to focus on conceptual development of details [5].

The third case concerned the design of an architectural façade. The student faced a conflict between the structural logic of the building and the desired visual image. The use of AI allowed for the rapid generation of several façade design options, where the system offered visual solutions that harmonized the external appearance with the internal structure. This enabled the student to explore non-trivial approaches to stylistic integration and find a visually convincing compromise [5].

Comparably interesting results are demonstrated by the study by D. Karadağ, B. Ozar, in which students of architectural studios used MI-CC systems in conceptual design. Participants noted not only an improvement in the quality of the final solutions, but also an increase in self-confidence and their own ability to cope with creative challenges. Systems like COFI allowed them to explore non-standard architectural forms, quickly move between iterations and form their own visual identity for the project [3].

In turn, W. F. Yu focuses on the cognitive changes that occur in the process of interaction with AI. Their study found that working with generative models activates associative thinking, helps students overcome cognitive rigidity, and promotes the development of flexibility of thinking. As a result, students begin to perceive the very nature of project search differently – as a dialogue with the system, where not only the goal but also the path is important [2].

These cases demonstrate the capabilities of AI not only as a visualization tool, but also as a cognitive partner that stimulates divergent thinking, enhances the meaningfulness of solutions, and expands the range of possible approaches. Moreover, working with AI helps students develop reflective skills and re-build the logic of the project process, which is especially important in conditions of uncertainty and creative challenges.

However, it is worth considering the ethical side of using AI. Despite numerous advantages, the integration of AI into design is associated with a number of serious

risks that require critical thinking. One of the main challenges is the threat to the creative autonomy of the designer. As AI becomes increasingly involved in generating ideas and visual solutions, the question arises: where does the human contribution end and the machine's contribution begin? This leads to a blurring of authorship and a decrease in the uniqueness of works [1, 4].

In addition, the widespread use of AI may lead to a unification of the visual language. Many generative models are trained on the same datasets, which limits diversity and contributes to the replication of template solutions. This not only impoverishes visual culture, but also reduces the value of manual, craftwork, which was previously an important part of design practice [4].

The technological accessibility of AI also leads to the so-called "democratization" of design – when users without professional education can create visual content. Although this expands access to creativity, it also intensifies competition and reduces the demand for professional designers, especially in low- and medium-complexity tasks [1, 4]. As Hernández-Ramírez R., Ferreira J. B. note, such processes can lead to the "devaluation" of designer work and the reorientation of the industry towards managerial and technical competencies, pushing the creative aspect into the background.

Many GenAI models are a product of a managerial approach, in which design is viewed as a set of procedural tasks that can be algorithmized. This phenomenon, called "managerialism," emphasizes efficiency and controllability, but ignores the values of craft, critical thinking and social responsibility [4]. In this context, the designer ceases to be a researcher and author of solutions, but turns into an operator interacting with ready-made templates.

Another problem is the opacity of AI work. Designers do not always understand how the model makes decisions and why it offers certain solutions. This creates difficulties in interpreting, verifying and quality control of the result, as well as in explaining their decisions to clients or teachers [2].

Finally, reliance on AI can contribute to a decline in creative confidence and patterned thinking. If designers begin to rely on AI as a primary source of ideas, this can undermine the development of their own generation and analysis skills, lead to "lazy" thinking, and limit professional growth [4].

The environmental and social consequences of large-scale automation should also be considered. GenAI models require significant resources to train and operate, including energy, water, and generate e-waste. However, constantly increasing the power does not necessarily lead to qualitative improvements: the tendency of models to hallucinate and make erroneous conclusions is not solved by simply increasing the amount of training data [4].

Ethical implementation of AI requires designers to have not only technical skills, but also the ability to reflect, evaluate consequences, protect humanistic values, and preserve the autonomy of the profession. It is necessary to rethink the designer's identity – not as a function in a controlled process, but as a creative act focused on social and cultural value.

Thus, despite its enormous potential, AI remains an ambivalent tool that can both enhance creativity and slow down the development of the profession. Effective and ethically sound use of AI in design requires not only technical training, but also a deep understanding of the cultural and professional implications of its implementation.

Summing up all the issues mentioned above, AI shows significant potential as a partner in design, expanding thinking, reducing workload, and accelerating prototyping. However, its use requires designers to have new skills, critical thinking, and a willingness to work with unstable, sometimes unpredictable results. AI cannot be seen as a replacement for humans – it becomes a catalyst that helps to reveal and direct creative potential. At the same time, there is a risk of "devaluing" the creative profession and losing authorship, which requires ethical reflection and adaptation of educational programs.

Integrating AI into design does not just change the toolkit – it transforms the very nature of creativity. From automating routine operations, AI is moving towards full-fledged co-authorship. When used correctly, it enhances creativity, accelerates iterations, and expands access to design thinking. However, this requires training in both technical and conceptual aspects. Designers must learn to understand the behavior of models, critically evaluate results, and use AI not as a replacement, but as an intellectual partner capable of enriching the process.

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VOLUNTEER MOVEMENTS AND THEIR ROLE IN FORMATION OF PUBLIC ATTITUDES IN MODERN RUSSIA (ON THE EXAMPLE OF “MEDICAL VOLUNTEERS”)

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Abstract. The article considers the significance of volunteer movements in the Russian Federation from the point of view of formation of political and public attitudes in modern Russia. Special attention is paid to the role of the volunteer movement “Medical Volunteers” in solving such a significant problem as gratuitous donation, as the need for donor blood and its components continues to grow. Special attention is paid to the need of raising public awareness of the importance of donation, which is a significant element in the system of public health.

Keywords: volunteer, volunteer movement, help, donor, donation, society, health care, health of the nation.

ВОЛОНТЕРСКИЕ ДВИЖЕНИЯ И ИХ РОЛЬ В ФОРМИРОВАНИИ ОБЩЕСТВЕННЫХ ВЗГЛЯДОВ В СОВРЕМЕННОЙ РОССИИ (НА ПРИМЕРЕ «ВОЛОНТЕРОВ-МЕДИКОВ»)

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Аннотация. В статье рассматривается значение волонтерских движений в Российской Федерации с точки зрения формирования политических и общественных взглядов в современной России. Особое внимание уделяется роли волонтерского движения «Волонтеры-медики» в решении такой значимой проблемы, как безвозмездное донорство, поскольку потребность в донорской крови и ее компонентах продолжает расти. Отдельное внимание уделяется необходимости повышения информированности населения о значении донорства, которое является важным элементом в системе здоровья общества.

Ключевые слова: волонтер, волонтерское движение, помощь, донор, донорство, общество, здравоохранение, здоровье нации.

In the Russian Federation, citizens actively manifest themselves in various forms and directions, including volunteer activities. Volunteers play a very important role in human life and in the life of the society. Their activities influence various spheres of the development of the nation, attracting attention of the citizens to the most

problematic issues.

Volunteers provide free assistance to people who need their help: orphans, the elderly, veterans of the Great Patriotic War and Special military operation, people with disabilities, refugees etc. Volunteer movements are most often engaged in activities that are independent of the state, thereby improving the quality of life of the population. Volunteers also carry out activities aimed at raising public awareness on various social issues.

The word “volunteer” comes from the Latin term “voluntaries”, which means “willing or of one’s own choice”. In Russia, the terms “волонтер” and “доброволец” are considered synonymous and refer to people who voluntarily and gratuitously perform work or engage in social activities. Volunteering is free-will selfless work of people for the benefit of those who need help. Volunteering is considered to be a form of civic participation in socially useful activities, a way of collective interaction and an effective mechanism for solving existing social problems.

The origins of volunteerism go back to ancient times. It is based on religious values such as “love thy neighbor” and has become the basis for the massive selfless work of religious communities. The history of the volunteer movement in Russia differs from that abroad, primarily in the approach to organizing the work of volunteers. In the USSR, youth participation in socially useful work played a significant role in the socialization of the younger generation.

Volunteer activities, such as voluntary Saturday work, harvesting, or sponsorship, were often associated with commitment and social coercion. At that time, there was no law on voluntary labor in Soviet Russia. The collapse of the USSR led to the cessation of the organization of socially useful youth work. In the 1990s, the children's and youth social movement in Russia faced drastic changes in the attitude of the state towards its initiatives. Large youth organizations performing educational functions in educational institutions and labor collectives have actually been liquidated or self-liquidated at the state level.

However, over time, the situation began to change. New youth associations have emerged, and attempts have been made to recreate the movement of children and youth at the State level. Due to the increase in the number of social problems and the urgent need to solve them, the volunteer movement began to develop. There are people who are willing to voluntarily invest their efforts and time to help society or specific people. Today, experts in this field single out the expansion of the volunteer space among the priorities of the volunteer movement.

This includes the search for forms and methods of joint activities with social protection institutions, secondary schools, law enforcement agencies, employment services, cultural institutions and labor collectives as participants in the volunteer movement. The essence of volunteering is to help people voluntarily and selflessly, for which volunteers do not receive financial compensation. They hear words of gratitude and see tears of joy in response to their help. Volunteering can be divided into five types: traditional volunteering, internship or training practice, tourist volunteering, online volunteering and micro volunteering [1].

One of the examples of volunteer movement existing and actively working in Russia is “Medical volunteers” – a public movement of volunteers in the field of

healthcare [2]. The All-Russian Public Movement of Medical Volunteers was founded in 2013 by the activists of the Sklif Volunteers project. In 2016 it received the official status of the All-Russian public organization. Today, the All-Russian Public Movement of Medical Volunteers is one of the largest voluntary healthcare organizations in Europe. With the support of the Ministry of Health of the Russian Federation in Russia, more than 85 regional branches of the All-Russian Public Movement of Medical Volunteers have been opened, uniting 86 thousand people. About 4 million Russians receive help and support from medical volunteers every year. The partners of the "Medical Volunteers" are more than 1,700 medical, educational, public and other organizations throughout Russia.

Its mission is "Reviving the traditions of charity and providing help to the practical healthcare" [3].

The organization provides assistance to medical personnel in medical institutions, career guidance for schoolchildren, popularization of a healthy lifestyle and disease prevention.

Targets and goals of "Medical volunteers" are as follows:

– development of volunteering in healthcare sphere;
– increasing health awareness of population;
– increasing the prestige of medical specialties;
– building human resource capacity for the healthcare industry;
– fostering patriotic self-awareness and active civil position among Russians.

The tasks of the social movement are as follows:

1. Providing assistance to medical personnel of medical institutions.

The work on the «providing volunteer help to medical organizations» activity began in 2013 and became the starting point in the history of the movement. Over 7500 volunteers in 85 regions of the Russian Federation help doctors and nurses to transport patients, they assist in dressing and treatment rooms, travel with ambulance teams, provide additional care and assistance to patients, administer injections and infusions, carry out diagnostic procedures, take tests, change bandage, fill out documentation, etc. Over the years, medical volunteers offer extra care and support to patients, relatives and medical staff in medical institutions and also in specialized children's homes.

2. First aid training and assistance during large-scale events.

Over 5000 medical volunteers help medical workers during sports and public events, conduct master classes on teaching first aid. The results of these activities are over 3500 events accompanied by medical volunteers and more than 2000 master classes and first aid trainings for the population.

3. Sanitary and preventive education.

The actions of this activity began in 2016. Medical volunteers carry out systematic work and large-scale informational campaigns aimed at prevention of socially significant diseases. The aim is to increase the level of medical literacy of the population

4. Promotion of a healthy lifestyle.

Over 5000 volunteers are involved in the popularization of the values of a

healthy lifestyle, assist in the preservation and strengthening of the physical and mental health of the population of Russia.

5. Career guidance of schoolchildren about medical professions.

Young medical volunteers are engaged in promoting healthy lifestyle and talk about the harm of pernicious habits to their peers. After passing the career guidance program they help medical staff in hospitals and clinics. Medical volunteers become participants in educational youth festivals, educational programs, youth forums and festivals, courses and trainings dedicated to medicine and health [3].

6. Popularization of human donation.

And, last but not the least, is popularization of personnel blood donation. Donation is a voluntary act, which consists in providing blood and its components.

The activity of over 3400 volunteers is aimed at drawing attention to the problem of blood and bone marrow donation and increasing donor commitment to regular blood donations.

Medical volunteers are engaged in the development and popularization of human donation of blood, bone marrow and hematopoietic stem cells, the creation of a community of active donor volunteers, the formation of healthy habits among donors, drawing public attention to the problem of low distribution of gratuitousness and regularity of donations, help in the work of the blood service. One of the most important tasks of the volunteer movement is popularization of human donation: donorship of blood and its components.

The results of the work of Medical volunteers are as follows:

- 2000 events,
- 16 tons of blood,
- 2 All-Russian campaigns,
- 370 000 people are involved,
- 1300 trained volunteers (passed school of responsible donors),
- a system for attracting and supporting donors has been created
- an educational course was developed for volunteers and donors within the area of the project “school of responsible donors”,
- a database of information and methodological materials in the field of blood donation has been created,
- a wide educational work in the field of bone marrow donation was started [3].

Blood donation in the Russian Federation is one of the most important aspects in the field of healthcare, necessary to save the lives of patients suffering from cancer, blood loss or other blood diseases, as well as for use in research and educational purposes, in the production of blood components, medicines and medical devices. About 1,5 million transfusions are required annually in Russia, which underlines the importance of this procedure.

In the Russian Federation, blood donation is regulated at the legislative level, as evidenced from Federal Law of the Russian Federation of July 20, 2012 No. 125-FZ “About donorship of blood and its components” [4].

However, despite the increasing need for donated blood, there is a significant

shortage of donors. This situation requires close attention from the health authorities in order to raise awareness among citizens about the importance of donation and the formation of a culture of voluntary participation, which, in turn, can help improve the provision of blood to those in need.

Recently, important efforts have been made in the Russian Federation to develop the donor movement. The regulatory system is being improved, more modern and convenient technologies for blood collection and storage are being introduced, and public awareness of the importance of donation is actively increasing.

Donation in the Russian Federation is not only a medical practice, but also a socially important practice reflecting the level of civil responsibility and solidarity. Its other development should remain a priority of the state policy in the field of healthcare.

In honor of the 80th anniversary of the Victory in the Great Patriotic War, various events and memorials are being organized across Russia and internationally. The All-Russian public movement “Medical Volunteers” announces a unique All-Russian Donor Action, which takes place on 1–10 May, 2025. The event is aimed at spiritual and moral education of young people and preserving the historical memory of the donor movement during the Great Patriotic War.

The event involves 89 constituent entities of the Russian Federation, which makes it possible to reach a wide audience and attract young people to active participation in the donor movement. For 24 hours before donation it is recommended to adhere to the donor diet to ensure a comfortable feeling during the procedure. Anyone can join the action at the central venues: Perm, Mahachkala, Irkutsk, Novouralsk, Cheboksary, Tyumen, Ivanovo, Moscow.

Event formats will include donor events with historical reconstructions of blood collection and distribution points from the Great Patriotic War. Medical volunteers dressed in wartime costumes will organize interactive talks about the donor movement of that time, as well as hold lectures, exhibitions and quizzes, allowing participants to immerse themselves in the wartime atmosphere and realize the importance of voluntary blood donation in saving lives [5].

The donor team of “Medical volunteers” is more than volunteers. Each volunteer works for the good of society, giving not only energy and time to rescue lives, but also a part of himself stressing that only human can save human.

The viable development of donation requires an integrated approach, including government support, active community participation, and the development of volunteer initiatives. Only through joint efforts can we ensure stable supplies of blood and its components, which ultimately contributes to strengthening the health of the nation and improving the quality of medical care in the country.

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INTERNATIONAL LAW ENFORCEMENT COOPERATION IN COMBATING ILLICIT TRAFFICKING OF CULTURAL GOODS

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Abstract. This article discusses some aspects of international law enforcement in the field of cultural values protection and preservation. The author analyzes existing international legislative acts and documents created for preventing art thefts, robberies, falsification of valuable objects, illegal art trafficking. The contribution of the Russian artist, philosopher and public figure Nicholas Roerich to the protection of cultural values is studied. Some tools and methods of Interpol work (such as Interpol stolen works of art Database and ID-Art application) are considered.

Keywords: works of art, cultural values, illicit trafficking, Interpol, international cooperation, combating cultural values illegal trafficking, Roerich.

МЕЖДУНАРОДНОЕ ПРАВОВОЕ СОТРУДНИЧЕСТВО В БОРЬБЕ С НЕЗАКОННЫМ ОБОРОТОМ КУЛЬТУРНЫХ ЦЕННОСТЕЙ

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Аннотация. В статье рассмотрены основные аспекты международного правоохранительного сотрудничества в области сохранения культурных ценностей. Автором проанализированы действующие международные нормативные правовые акты и документы, направленные на обеспечение безопасности произведений искусства; подробно исследован вклад российского художника, философа и общественного деятеля Н. К. Рериха в защиту культурных ценностей. Исследованы некоторые инструменты и методы работы Интерпола, такие как база данных похищенных ценностей и ID-Art.

Ключевые слова: произведения искусства, культурные ценности, незаконный оборот культурных ценностей, Интерпол, международное сотрудничество, борьба с незаконным оборотом культурных ценностей, Н. К. Рерих.

Nikolas Roerich (1874 – 1947) was a prominent Russian artist, philosopher and archaeologist, whose work significantly contributed to the international safety of

cultural heritage. It is difficult to overestimate his contribution in protection of cultural values on a global scale.

Roerich's most famous achievement in the field of cultural values protection is known as the Roerich's Pact. It was the first transnational treaty dedicated to the protection of cultural property during armed conflicts. 21 countries confirmed this document, including the USA, India, France, Belgium and others.

N. K. Roerich underlined that «Culture and Peace are the most sacred goals of Humanity! In the days of great confusion, both material and spiritual, the disturbed spirit strives to these radiant strongholds. But we should not unite only abstractly in the name of these regenerating conceptions» [1, p. 1]. In this extract of «Prayer for Peace and Culture» (1933) the author emphasized the crucial role of culture and peace as moral principles for the whole humanity especially in the times of crisis, as well as wars, armed conflicts, terror and other deliberate acts of destruction. According to one's abilities, each person can bring something that can help mankind protect art, religion and science. Therefore, each individual can bring something to protect culture in their own field.

Symbolic expression of the Roerich Pact is a Banner of Peace – three red circles inside a circular emblem printed on a white background. Nicolas Roerich thought on a global scale; moreover, his works of art seemed to exist outside of the time in a traditional sense. All of his masterpieces were existing at the same time in the past, present and future. This is the meaning of the Banner of Peace: the unity of the past, present and future in the circle of eternity. Some experts say the original meaning of the emblem can be represented as religion, knowledge and art in the ring of culture [2, p. 273]. Today, the sign is known as a symbol of protecting culture, which was first transformed into an ethical and legal system.

The central idea of the Roerich Pact is that the defense of cultural objects is more important than the use or destruction of culture for military purposes. By providing such policy, Roerich tried to emphasize the idea of predominance of the works of art above any military necessities.

It is always important to remember about saving cultural values, especially during international armed conflicts and wars. It is difficult to say for sure, how many cultural values were annihilated by criminal deals and war actions. By the expert's estimations, 427 Russian museums, more than 40, 000 libraries, and thousands of religious, architectural, historical monuments were ruined during the Great Patriotic War [3, p. 194].

There is no doubt that the number of armed conflicts has been escalating since the 1980s − first in Afghanistan, then in parts of the Middle East (Iraq and Syria) and West Africa (Mali). Such tragic events have led to an increase in the destruction of historic sites by terrorist groups and an explosion in trafficking of cultural artefacts [4, p. 8].

In the modern world, the main role in the process of preserving cultural properties belongs to specific organizations, such as International Criminal Police Organization (Interpol), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Council of Museums (ICOM), World Customs Organization [5, p. 206]. Cross-cultural cooperation is quite important, that's why

Interpol duties and facilities in combating illegal art trafficking are crucial.

Its special bodies were created for keeping cultural values save and provide a wide range of investigations in the field of illicit art trafficking worldwide. Moreover, Interpol bodies make an invaluable contribution to prevention, detection and investigation of thefts and robberies, falsification of valuable objects, as well as their return to private and public owners. It is an organization that provides cooperation in combating crimes relating to cultural property, such as illicit excavation, theft, international trafficking in cultural property.

For example, as a result of Pandora VII (which is an annual law enforcement operation since 2016) 25 countries detected stolen items. In 2024 operation ended up with 85 arrests and recovering more than 6400 art objects [6]. Each year law enforcement bodies bring more and more effort in combating illegal art trafficking. The following data reveal the commitment of law enforcers in this area: Pandora 2023 finished with 60 people arrested and 11, 049 stolen pieces of art recovered. Among all stolen objects there were 13 archaeological artefacts (jewelry and other things) from Russia. It was seized in Bosnia and Herzegovina [7].

How does Interpol conduct such operations? So, usually its special stolen works of art Database is used. It provides with a certified police information about almost 57, 000 stolen and missing items (with both descriptions and pictures). It is a unique database, because there aren't any analogues at the international level.

One more Interpol's tool is ID-Art mobile application developed in 2021. It works properly in connection with the Interpol Database. Key features of the app are recording art objects, generation list of private art collections; reporting cultural sites potentially at risk [8]. There is also a special form created for reporting to law enforcement agencies in the event of theft. Best thing about such tools is accessibility for each person: no matter what is your country or occupation, you are still able to prevent crime and protect pieces of art. Of course, Interpol is not the only organization that can provide special operations to protect cultural values. In order to conduct comprehensive research, it is important to explore one more international Organization – UNESCO.

For Yu. V. Puzyreva, strategy of «cultural peacekeeping» in current conditions makes a great impact on peacekeeping in traditional way. All aims in combating international art trafficking can be achieved by taking into account the professional specificity, increasing level of expert knowledge and accumulation of experience of Blue Helmets. Furthermore, as such employees would serve as civilian-police staff, their involvement in mission would support tendency of minimizing the military component of peacekeeping missions [9, p. 186].

In light of destructive trends in destroying cultural values and masterpieces during armed conflicts, international community should develop appropriate measures, which can proportionate to the prevailing threats in order to safeguard cultural heritage.

Talking about preventing illegal art trafficking in the Russian Federation, its history dates back to pre-revolutionary times. After the outbreak of the World War I, Roerich appealed to the Russian government, expressing his disagreement with the military policy, which could have led to destruction of cultural property. He suggested to Nicholas II to establish international legal protection by creating a specific

international agreement [2, p. 272]. Unfortunately, his ideas were not accepted.

Russian history of art values protection has been connected with many ups and downs, but in the modern world it is not that big problem anymore. Many measures have been undertaken in the field. October 9th, 2017 is a significant date for Russian world of art, because at the UNESCO Headquarters in Paris, Irina Bokova, Director-General of the organization, and Mikhail Piotrovsky, Director of the State Hermitage Museum, signed the Memorandum of Understanding for the protection and restoration of cultural property in conflict areas, particularly in the Middle East. Under this agreement both parties have to cooperate in preservation of cultural heritage, especially as the foundation for peacebuilding and a post-conflict recovery, which can be expressed in fostering identity, resilience and dialogue of cultures.

To conclude, it is important to add that it is a great deal to save cultural values. Culture has been always fulfilling our life with a sense. Cooperation is extremely important while conducting activities, which can help to protect cultural values from destroying. It is a common task for police officers, customs officials, the general public, private collectors, art specialists, journalists, students or art enthusiasts. We need to stay involved if we want to protect reflection of history in art. With the help of Interpol, United Nations Organization, International Council of Museums, World Customs Organization, it becomes easier to understand the reasons of illicit trafficking, theft, robberies and excavation of cultural values and protect our past, present and future.

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REFLECTION OF HISTORICAL EVENTS IN THE ART AND CULTURAL LIFE OF THE RUSSIAN PEOPLE

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Abstract. The article examines the impact of historical events of a local or global nature on the cultural life of Russia, which has a centuries-old history and significant dates of which actually shaped the modern Russian state. The author of the article came to the conclusion that due to the interaction of history and culture in the broadest sense of the word, new forms of cultural activity, new types of art, genres, styles and trends appear within them.

Keywords: historical events, culture, art, literature, cinema, architecture, music.

ОТРАЖЕНИЕ ИСТОРИЧЕСКИХ СОБЫТИЙ В ИСКУССТВЕ И КУЛЬТУРНОЙ ЖИЗНИ РУССКОГО НАРОДА

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Аннотация. В статье исследуется влияние исторических событий локального или глобального характера на культурную жизнь России, которая имеет многовековую историю, и значимые даты которой фактически сформировали современное российское государство. Автор статьи пришел к выводу, что благодаря взаимодействию истории и культуры в широком смысле этого слова появляются новые формы культурной деятельности, новые виды искусства, жанры, стили, течения и направления внутри них.

Ключевые слова: исторические события, культура, искусство, литература, кинематограф, архитектура, музыка.

Culture cannot exist without history, because culture is a reflection of significant events in human creations. Russian culture comes from antiquity, which reflected the worldview of the pagan Eastern Slavs, but the rise of Russian culture and its independence take their beginning from the art and cultural life of Kievan Rus.

"Russia was influenced by a culture of high spirituality from the south and military experience from the north. Byzantium gave to Russia Christianity. Scandinavia gave to Russia the Rurik family. The history of the existence of Russian

culture should begin from the discharge of tremendous force occurred between these two cultures at the end of the 10th century" [1, p. 3].

Early Russian culture was influenced by the adoption of Christianity in the 10th century. Thanks to the new religion, which had its roots in Byzantium, the Russian people absorbed the most valuable experience of other people's traditions. Russian architects built churches and temples like Byzantine models, but they did not just copy, they created unique buildings. This means the independence of Russian culture, despite outside influence.

Historical events were reflected in early Russian epic initially in the form of medieval chronicles. Then at the end of the 12th and the beginning of the 13th centuries the first works of fiction began to appear. They became a mirror of reality. During the period of feudal disunity, when Russia was exhausted by princely feuds and by nomad raids, the "The Lay of Igor's Host" ("The Tale of Igor's Campaign") was created. The main idea of the epic poem becomes a call for unification. The "The Lay of Igor's Host" is based on the unsuccessful campaign of Prince Igor and his brother Vsevolod against the Cumans (Polovtsy) in 1184.

Another important early Russian literary work was the poetic story "Zadonshchina", which reflected the events of the Battle of Kulikovo. In 1380 the Russian people defeated part of Mamai's troops and realized that they could resist the Golden Horde. Then this idea became firmly established in the national consciousness and led to complete liberation from the Tatar-Mongol yoke in 1480.

Later the cultural development of the government does not experience major changes, improving the skills already learned. Literary works retain an educational and political character. Mosaics are being created, icons are being painted, churches are being built. The first parsuns appeared in painting of the early 17th century as a type of early Russian portrait that became a response to the transition period from the medieval worldview to the new one. The parsuns were similar to icons, as they were created in the same way, but instead of images of saints, the nobility were now painted.

However, the Russian state received its greatest development during the reign of Emperor Peter I (1689-1725). His interest in European values is causing cultural changes. The nobles change their clothes. Balls replace the peers. New printing houses are also being opened, which contributes to the development of literature. Painting is actively developing, for example, parsuna take the form of a modern portrait. Architecture and sculpture are beginning to work in synthesis for urban planning. The construction of St. Petersburg (1703) begins in the style of a new architectural trend called "Petrine Baroque".

The culture of the 19th century was influenced by the philosophical ideas of European thinkers: Hegel, Schelling and Kant.

"New philosophical trends are emerging that are closely related to idealism and materialism. The 19th century was also characterized by the development of Romanticism. The ultimate goal of Romanticism was to gain freedom of spirit and a free personality" [2, p. 1].

In literature the Decembrist poets are filled with the spirit of romanticism. They reflected in poems the historical pictures of their modernity: the Patriotic War of 1812 and the Decembrist revolt of 1825. From the poems, we learn about the ideals of

Russian society and the government. Such thoughts were considered a manifestation of freethinking, for which many were executed or exiled to Siberia. The first convicted poet-Decembrist becomes V. Rayevsky, who even in exile does not stop creating.

In Russian painting, Romanticism contrasts the ideal with reality. Representatives of this period are such artists as A. Venetsianov, O. Kiprensky.

In music Russian romanticism was formed in the first half of the 19th century, when composers were looking for a unique style reflecting the national character. During this period, works appeared combining European ideas of romanticism with Russian folklore and historical themes. Among the representatives of the epoch are such composers like M. Glinka (opera “Ivan Susanin”), M. Mussorgsky (opera “Boris Godunov”), P. Tchaikovsky (ballet “Swan Lake”).

“Since the middle of the 19th century, images of the Russian past have begun to occupy a new and unprecedentedly important place in the visual culture of Russia. A new type of painting is emerging, which for the first time addresses the Russian past with tasks fundamentally different from those of the biblical and mythological themes: not indirectly symbolically, but conveying its national identity and plot diversity, reliable facts and specific details” [3, p. 1].

The historical genre is often found in the paintings of the artist I. Repin, and therefore the artist creates a cycle of works dedicated to the Narodnik revolutionary movement.

“This whole cycle was a direct response to the extreme circumstances of Alexander II’s reign, when the democratic intelligentsia, more or less fronting and dissatisfied with the regime, lived on information about political trials and death sentences, discussed terrorist acts and the government’s reaction to them” [4].

One of the famous works of the series is the plot “They Did Not Expect Him” (1884-1888), where the hero of the canvas returns from exile for revolutionary activities. Repin does not want to show a certain representative of the revolutionary movement or show the peculiarities of the era. Rather, the plot emphasizes the author’s philosophical idea and his desire to capture the moments of life in their unpredictable beaty.

The next period, the end of the 19th and the beginning of the 20th centuries, is characterized by many social changes and is called the Silver Age of Russian Poetry. This period is marked by some of the most terrible events in Russian history.

“As you know, the most difficult times are the times of social change and revolution. During this period, art, as a reflection of the spiritual world of man, reacts especially sensitively to changes around it. That is why more serious and deep philosophical topics began to be touched upon, for example, the meaning of life, the purpose of man, and others” [5, p. 1].

The Silver Age has seen many fundamental upheavals. The country is going through wars, both external (the First World War of 1914-1918) and internal (the Civil War of 1918-1921), as well as revolutions (the First Russian Revolution of 1905-1907, the February and October Revolutions of 1917). The response to the historical events of those years is largely the “mouthpiece of peace and freedom” – the poetry of the intelligentsia. Inner feelings, fear of the “red terror” and the harsh hand of the new

rulers were reflected in the work of this period, as a result of which its features can be distinguished.

Firstly, the authors began to draw inspiration not only from the outside world, but also from the inside, thus abstracting from reality. Secondly, a popular topic was the appeal to God, from whom people were looking for answers to questions, trying to understand both themselves and the historical events. The theme of God was also reflected in religious philosophy, which was founded by V. Solovyov (1856-1900).

The process of urbanization and the creation of artistic associations in Soviet society leads to a synthesis of the arts. It was expressed in the intertwining of several genres in one. The synthesis of the arts of the early 20th century is characterized by the interaction of theatrical activity and literature, music and literature, theater and painting, as well as the emergence of cinema, which contains both visual and sound elements.

The emergence of cinema was an intense competition to the theater and became one of the forms of influence on the education of the moral ideals of the Soviet citizen. In cinematography plots on historical themes with a well-known motif receive due development. For example, the first Russian film was about the story of Stepan Razin ("Stenka Razin").

To build a socialist world, the Soviet government promotes the emergence of a new trend – Socialist realism. Socialist realism is a trend of the 1930-s in the Soviet Union that mandated an idealized representation of life under socialism in literature and the visual arts.

The basic principles of socialist realism were nationality, partisanship and truthfulness. Nationality and partisanship were expressed in the creation of the image of a hero-creator, an active fighter for the ideals of communism within the party. Truthfulness aimed to show the search for ways of a new life in order to achieve a brighter future. However, there was little truth in the works – the real world passed through the prism of modern ideology and formed a picture of the happy life of the Soviet people, hiding all the disadvantages of the difficult transition period.

The main artist of Socialist realism was A. Gerasimov. He painted portraits of Lenin and Stalin. In his paintings ("Lenin on the tribune", "Speech of I. V. Stalin at the 16th Congress of the CPSU (B.)") the leader resembled a superhuman. The artist flattered the authorities by creating an image of a kind and proper head of state.

In the 1930-s, Deineka turned to the theme of a harmoniously developed person in order to meet the requirements of Socialist realism. His paintings depict athletic young men and women bursting with health.

However, the paintings of the artists could hardly be appreciated by ordinary workers, so the easy-to-understand posters were used for agitation and propaganda. In general, the era of the USSR passes under the banner of capacious slogans, abbreviations and posters, praising the Soviet country and the Soviet citizen.

The sculpture of socialist realism gave rise to such famous works as "Stone as a weapon of the proletariat" by I. Shadr and "Worker and Kolkhoz Woman" by V. Mukhina. Then Mukhina's sculpture became one of the symbols of the Soviet Union, familiar to everyone who watched the film produced by the Mosfilm studio.

The literature of the 1930-s described the creation of a new world, symbolized by construction sites. Literary works told about them: “The Foundation Pit” by A. Platonov, “Time, forward!” by V. Katayev, “How the Steel Was Tempered” by N. Ostrovsky, “The Little Golden Calf” by I. Ilf and E. Petrov, poetry by V. Mayakovsky [6, p. 5].

During the Great Patriotic War, art continues to develop and aims to raise the morale of the people who faced the German invaders. The historical events of 1941-1945 are reflected primarily in the graphics, the first place among which is occupied by the poster. The poster is characterized by the changeable mood of the plot.

One of the most famous posters of that time was the appeal “The Motherland calls”, thanks to which the image of the “Motherland” was born, which later passed into other forms of art.

The caricature does not lose its relevance in this period either. The image of Fascist Germany is becoming a new object of ridicule. The caricature continues in posters, where the course of the Great Patriotic War is displayed with satire and irony to inspire the people to fight.

For example, the creative association Kukryniksy in the poster “I Have Lost My Ring” (1943) depicts the events of the Battle of Stalingrad and the cut-off of the main forces of German groups by Soviet troops as part of Operation Uranus. The poster depicts Hitler crying and whining at a Russian folk song of the same name as the poster. This ironically highlights the nature of the situation.

During the Great Patriotic War, the historical and revolutionary character of the images was preserved. Canvases with historical subjects are being created to demonstrate the greatness of the government (“Duel between Peresvet and Chelubey” by M. Avilov, “Alexander Nevsky” by P. Korin).

Literature echoes the idea of putting new heart into people. In 1942 poem “Vassili Tyorkin” by A. Tvardovsky was published in incomplete form, which embodies the collective image of a Russian soldier as a brave and persistent man with a smile on his face.

During the war, the national spirit is also expressed in music. The famous composition based on V. Lebedev-Kumach’s poems “The Sacred War” became a symbol of the Great Patriotic War. She is known for the first line “Arise, Great Country!”. Songs such as “Katyusha” and “Smuglyanka” were also performed. The song “Katyusha” gave its name to the BM series rocket artillery combat vehicle.

The main genre remains the historical-revolutionary genre in painting of the post-war period. The subjects of the paintings are modern events, for example, party congresses, and events of the past.

Another important theme of this period in art is constructive heroic work, which is reflected in the canvas of the famous artist T. Yablonska. The painting “Bread” reflects the work of women. It seems that the characters of the canvas are working tirelessly. They work with smiles on their faces, without losing their optimism.

However, there were representatives who deviated from ideology. One of those who could not write lies was A. Plastov. His post-war paintings show the truth, from which we learn about depopulated kolkhoz, where the elderly and children are forced to work for adults, where women replace men.

In the 1950-s and 1960-s, after Stalin's death, a new trend developed, called the Severe Style. The term was coined by the critic Kamensky. The subjects of the works in this trend were devoted to the working life of ordinary people.

Stalin's death is becoming a tragic event for the entire Soviet people. However, for the government, this became a reason to rethink his role in the development of the country. The opinion is being formed that Stalin is bad, and everything else is good.

Because of this thought, the Severe Style appeared. He contradicted Socialist realism. If socialist realism idealized the epoch, then the Severe Style reflected the real life of workers and peasants. There is no trace of ostentatious enthusiasm and sublime heroism in the Severe Style, because in the faces of tired people we see the real image of the Soviet people going through difficult times. The main features of the Severe Style are expressivity, a monumentalized composition with linear rhythms, coloristic restraint with local color spots, and the sound of the theme of the connection of generations (Popkov's creative work).

The Great Patriotic War left a huge imprint on the fate of the Russian people. That is why we can also see traces of war in the direction of the Severe Style. The artist G. Korzhev deserves special attention. Instead of heroic deeds and battle scenes, the artist turns to a person. He contrasts it with war and demonstrates how war affects everyone. He creates a series of works "Scorched by the fire of War", which depicts physical and mental trauma.

At the same time was published the story "The Fate of a Man" by M. Sholokhov (1956). In this work the author tells the story of Andrey Sokolov, who survived the difficult events of the war, which deprived him of his family. The main idea was that happiness lies in taking care of others. This thought became a message to those who lost interest in life after the war.

"For those who were in German captivity, the post-war period became years of survival in Soviet camps. The representation of this survival is given by the camp prose of Aleksandr Solzhenitsyn, who, as you know, was not in captivity, but still got into the GULAG" [6, p. 7].

Unfortunately, military events are once again overshadowing our lives. To support the fighting spirit of our compatriots, we organize actions and contests of creative works dedicated to Special military operation, where everyone can express their feelings and emotions in response to historical events.

In this way, history has a huge impact on the process of forming the cultural life of society, contributes to the emergence of new genres and art trends.

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LYUDMILA VLADIMIROVNA MAYAKOVSKAYA AS A TEACHER OF THE TEXTILE FACULTY OF VKHUTEMAS

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Abstract. The article is dedicated to the Soviet fabric artist, teacher, inventor, and elder sister of Vladimir Mayakovsky – Lyudmila Vladimirovna Mayakovskaya. her life and teaching activities. Particular attention is paid to the period of her work at the textile faculty of VKHUTEMAS. Details from the life of the Mayakovsky family are considered.

Keywords: airbrushing, textile, teaching, stencils, VKHUTEMAS.

ЛЮДМИЛА ВЛАДИМИРОВНА МАЯКОВСКАЯ КАК ПРЕПОДАВАТЕЛЬ ТЕКСТИЛЬНОГО ФАКУЛЬТЕТА ВХУТЕМАС

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Аннотация. Статья посвящена советскому художнику по ткани, педагогу, изобретателю, старшей сестре Владимира Маяковского – Людмиле Владимировне Маяковской, ее жизни и педагогической деятельности. Особое внимание уделено периоду ее работы на текстильном факультете ВХУТЕМАС. Рассмотрены подробности из жизни семьи Маяковских.

Ключевые слова: аэрография, текстиль, преподавание, трафареты, ВХУТЕМАС.

In the post-revolutionary era, people began to look at the world from a different angle, unusual projects appeared and the talent of many artists developed in a new way. During this period, the Russian avant-garde flourished, which became a response to the cardinal changes in people's lives. Avant-garde artists are precisely those artists whose discoveries and achievements had a huge impact on the development of our country. One of the most significant figures in the circle of women of the Russian avant-garde was Lyudmila Vladimirovna Mayakovskaya.

Lyudmila Vladimirovna Mayakovskaya was born in 1884 in the village of Fioletovo (Erivan province) and became the first child in the family of a forestry

employee Vladimir Konstantinovich Mayakovsky and writer Alexandra Alekseevna Mayakovskaya. Lyudmila Mayakovskaya's talent as an artist was evident in her childhood. Growing up in a protected corner of the country, she absorbed the beauty of the surrounding nature with its bright colors and the strict restraint of the national costume. In many ways, this determined her creative style.

In 1904, she entered the Stroganov School of Art and Industry in the textile department. After the tragic death of her father, Lyudmila took on the role of support for the family. In addition to her studies, she carried out many private orders, and in the summer of 1909, to earn money, she got a job at the Mussi silk factory in Petrovskoye, where she mastered the technique of airbrushing. This became a decisive moment for her.

Airbrushing is a special technique for applying liquid or powder paint to a surface. This painting technique was used in ancient times. Artists applied paint to the surface by blowing it through bone. In 1876, the American industrialist Francis Edgar Stanley invented a paint sprayer, which became a revolution in this type of fine art. Airbrushing came to Russia at the beginning of the 20th century as a method of producing silk fabrics.

The airbrush workshop did not last long, but this was enough for Lyudmila to undergo instruction from French women, master working with templates from Paris and learn how the production process is structured. On July 8, 1910, Lyudmila graduated from the Stroganov School with a first-degree diploma, and on July 9 she was sent to the enterprise "Prokhorovskaya Trekhgornaya Manufactory Partnership". At first, it was only about unpaid practice. But she was able to prove herself. After only two months of work, she was able to get the position of head of the airbrush department, in the organization of which she took an active part. The production was experimental and advertising in nature. The goods were produced individually: tablecloths, napkins, runners, curtains, scarves, shawls, blouses. Thus, Lyudmila Mayakovskaya became the first woman to head the department of a weaving manufactory in Tsarist Russia. She was engaged in applying a pattern to fabric by manually spraying paint over a template. If in posters smudges and uneven paint application were considered a serious drawback, then in fabrics it worked differently. Draped fabrics revealed the picturesque beginning of airbrushing. Lyudmila Mayakovskaya loved to work with a black background and when creating a drawing she always relied on one or another visual image: a frosty window, autumn leaves, marble patterns. The richness and saturation of colors in combination with a strict black background reflect the uniqueness of the artist's personality [1].

The fabric artist Mayakovskaya was strict and demanding, prim and collected, but at the same time – a bold experimenter in textile design. All these qualities defined her as a natural teacher. At first, being the eldest child in the family, she instructed her sister Olga and brother Vladimir, then taught new workers who came to her department at the factory, and in 1920 Lyudmila was invited by Professor Nikolai Sobolev to the VKHUTEMAS textile department, which he organized.

Just like other production faculties, the textile department grew out of the first free state technical workshops. Repeating the specialization of the Stroganov workshops, the faculty initially had three departments: weaving, printing and

embroidery; The old material base was also preserved – manual and mechanical weaving machines. The classes were taught mainly by textile practitioners who sought to bring textile production to a new level, equip students with theoretical and historical knowledge. The evolution of the faculty followed a clear line of eliminating manual craft labor and moving to teaching students machine production technologies. New technologies appeared, for example, airbrushing, which was taught by Lyudmila Mayakovskaya. Widely practical training on factory equipment was used. The aim of the faculty was to train artists-technologists who were equally skilled in both artistic and creative principles and in the industrial implementation of ideas [2].

At VKHUTEMAS, in the printing department of the textile faculty, students had to pass work on hand and machine printing, airbrushing and carving in order to receive the required minimum and transfer to the next year. Students who entered the specialty of artistic and technological design of fabric learned from Mayakovskaya a new type of reproduction of a pattern using the airbrushing technique. During the training, they mastered the combination of different paints on the canvas, learned to control the final result after technical processing, and also studied the rules and features of constructing patterns. The requirements were strict, special attention was paid to the students' ability to compose a composition and work with color, only the most successful students received credits.

From the report of 1924, one can understand how the review of the works of 2nd year students was carried out. At first, there was an explanation of the criteria for assigning grades, making comments and recording special achievements, such as the participation of a student's work in an exhibition or the purchase of a fabric created by a student by a manufactory for making products from it. If the work was weak, the student was assigned an additional task, for example, summer practice in drawing flowers from life. Then followed a detailed analysis of the educational process, which was signed by the faculty teachers.

But many difficulties arose during the learning process. Reviewing the students' work at the end of the academic year, the teachers noted that the students did not have a serious enough attitude to study, which resulted in low academic performance, poor attendance and poor technical training. It was necessary to provide the opportunity to work in workshops in better conditions. There was an insufficient amount of materials for work. Carving classes could stop altogether due to a shortage of boards and boards glued from them. Working conditions worsened also because in addition to students of the printing department, other disciplines were also studied in the workshop; most of the work was done by students at home, which was not allowed. In addition, due to the changed requirements of sales and the market, which wanted to have not abstract forms from curves and straight lines, but real images of floral forms, it was necessary to quickly change the training program, introduce additional practices.

In subsequent years, the picture was approximately the same: for example, in 1928, out of 36 third-year students, only 9 received full credits, and out of 28 fourth-year students, only 13.

But it should be noted that the textile department, where Lyudmila Mayakovskaya taught, was not very popular among those wishing to study at VKHUTEMAS. The first rector, Efim Ravdel, tried to control the numerical ratio of

production and non-production departments by strictly limiting the number of students – 31 places in the painting department, 50 places in the textile department. At first, in 1920–1923, the established quota and the influence of the constructivist teachers on students yielded results: they transferred from the painting and sculpture departments to production departments, but over time this practice faded away. Students who entered VKHUTEMAS with a focus on production, changed their minds after two years of study and went on to their third year in the painting, architecture, sculpture or graphics departments. As a result, the number of students in the production departments was only 22 % of the total number of students.

Teaching at VKHUTEMAS did not prevent Lyudmila Mayakovskaya from continuing her career at the factory. In 1927, she transferred from the Trekhgornaya Manufactory, which produced mainly cotton fabrics, to Krasnaya Roza, where silk was decorated. In addition, the airbrush workshop was transferred there after the liquidation of all workshops at Trekhgorka that were not directly related to production. Mayakovskaya was an active initiator of new methods of working with airbrushing. During this period, she invented and patented a new method of obtaining drawings – the "splashed crappie" method, which implied splashing paints instead of spraying and allowed to create incredible, literally "cosmic" patterns. She also came up with designs created using knots, rope nets, compression and stitching of fabric.

In addition, Lyudmila Mayakovskaya used her airbrushing skills to create interior design. She used the silk-like cutting method. Silk painting is a type of continuous surface printing using stencils on a pre-prepared and painted surface, and the surface is painted in one color tone, but with different lightness in certain areas of the surface. The area of the mirror is divided into three sections, of which the upper and lower ones are painted in a darker tone, and the middle one is lighter. The stripes are shaded in such a way that the transition between them is smooth and n unnoticeable. After the main background has dried, a textile pattern is usually stamped using stencils, with a light tone stamped on a dark background, a dark tone on a medium tone, and a medium tone on a light background. The places where the tones meet are corrected with a brush to create smooth transitions.

Teaching at VKHUTEMAS and working at the factory coincided with Mayakovskaya, with the help of her brother, in replicating the "ROSTA Satire Windows"; her experience in the textile field and knowledge of working with stencils helped her in this – the method of replicating posters using a stencil was similar to the methods of making printed fabrics – Artists prepared the original, on the basis of which, depending on the number of colors, forms were created from thick oiled paper or cardboard. Stencil artists rolled the colors on them by hand. Lyudmila Mayakovskaya even brought tools from the factory for the work, which allowed them to produce up to 150 posters from one template. For some time, their sister Olga also helped them [3].

After her brother's death, Lyudmila Mayakovskaya participated in the preparation of all editions of his works, wrote memoirs, spoke at various literary events, willingly consulted literary scholars, editors, artists, directors, poets and journalists who wrote about Mayakovsky. She was the initiator of the transfer of the Mayakovsky Museum from Gendrikov Lane to Lubyansky Proezd. The poet's sister donated all her family heirlooms to the new museum: books, documents, furniture. Lyudmila

Mayakovskaya herself participated in the development of exhibition solutions for the museum together with a group of leading scientists, specialists in Mayakovsky's work [4].

In the 1928-1929 academic year, VKHUTEMAS (then VKHUTEIN) gradually began to lose ground, almost all branches of artistic production were destroyed. Lyudmila Mayakovskaya actively participated in the creation of the faculty of artistic design of fabrics at the Moscow Textile Institute, where the textile faculty of VKHUTEIN was included after the dissolution of the university. In 1931, she left her job at the Krasnaya Roza factory and switched entirely to teaching: the only specialist in airbrushing, who received the title of associate professor and replaced the head of the department. She taught all existing types of textile design – hand printing, airbrushing, photofilmprint (this method, as a cheaper one, began to displace airbrushing). Teaching artists textile craftsmanship was not so easy, but Mayakovskaya dedicated herself to it completely, understanding the need to train highly qualified personnel. In 1948, having worked as a teacher for more than 30 years, Mayakovskaya retired and then wrote with full right and pride in her autobiography: "My students work in almost all factories in the USSR".

The name of the Russian avant-garde artist Lyudmila Mayakovskaya remained in the shadows for a long time. Being the elder sister of the poet Vladimir Mayakovsky, she was a non-public figure. But despite the lack of wide fame, Mayakovskaya became an experienced teacher and innovator in the technique of airbrushing. She was the only specialist in carrying out the airbrushing method on a large industrial scale in Russia, the very first woman in the factory, who held an administrative and technical position before the October Revolution and held the title of Honored Worker of Culture of the RSFSR and Cavalier of the Order of the Red Banner of Labor.

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INFLUENCE OF THE OFENYA LANGUAGE ON MODERN SPEECH

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Abstract. This paper discusses the influence of Ofenya language (Ofeni – traders in ancient Rus and Russian Empire) on Modern Russian vocabulary and word formation. The analysis focuses on lexical borrowings and grammatical structures to reveal the enduring impact of the Ofenya language. The study compares mechanisms of influence, examining semantic shifts and adaptations of Ofenya words in present-day usage, and investigating causes of their survival. The research highlights significant connections between past and present linguistic forms, underlining the importance of historical context in understanding language evolution.

Keywords: Ofenya language, Ofeni, fenya, jargon, argot, conditional language, secret language, slang.

ВЛИЯНИЕ ЯЗЫКА ОФЕНЕЙ НА СОВРЕМЕННУЮ РЕЧЬ

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Аннотация. В данной статье рассматривается влияние офенского языка (языка офеней – торговцев на Руси и в Российской империи) на словарный состав и словообразование современного русского языка. Анализ фокусируется на лексических заимствованиях и грамматических структурах, чтобы выявить сохраняющееся воздействие офенского языка. В исследовании сравниваются механизмы влияния, изучаются семантические изменения и адаптации офенских слов в современном употреблении. Подчеркиваются значительные связи между прошлыми и настоящими языковыми формами, отмечается важность исторического контекста для понимания языковой эволюции.

Ключевые слова: офенский язык, офени, феня, жаргон, арго, условный язык, тайный язык, сленг.

The language is the property of the entire nation, and despite the fact that many social groups have historically formed their own vocabulary. A large number of words are adopted from one group to another, undergoing morphological changes or not. Most often, this borrowed vocabulary changes its semantic nature, acquiring new meanings and intense coloration.

This paper raises the question of the impact of the Ofenya language on modern Russian speech. Firstly, we should define the concept of "Ofeni".

In his Explanatory Dictionary of the living Great Russian language, V. I. Dahl gives the following definition: "AFENYA, Ofenya – merchant, trader, who walked and sold goods around small towns, villages with books, paper, silk, needles, cheese and sausage, with earrings and rings, etc." [1, p. 30] (here in after author's translation).

Doctor of Philological Sciences, M. N. Priemysheva, in her monograph "Secret and conditional languages in Russia of the XIX century" conducted a study on the basis of existing information about the origin of the term "Ofeni": "Hypotheses of the origin of the word are within the framework of two more ethnological hypotheses:

1) they reached the Hungarian city "Ofen";

2) they descended from the Athenians (according to Gorelin (Garelin), 1864)" [2, p. 222].

The term "Ofeni" appeared in the XIX century, but earlier such merchants called themselves "мазыги". The name comes from the word "мас" (masyka), which literally means "I" [3, p. 31].

Representatives of this type of trade existed in pre-revolutionary Russia from about the XVI century [4]. However, there are no reliable historical sources about how trade was conducted at that time. It is safe to say that only since the second half of the XVIII century, Ofeni and their language became widespread mainly in the central part of the Russian Empire (Suzdal and Vladimir), and later in Siberia.

Priemysheva identifies in her monograph the languages of the Vladimir, Kostroma, Shuya, Samara, and Siberian Ofeni [2, p. 4].

Among the goods of the Ofeni could be found icons and books of spiritual content officially banned by the church, revered by the Old Believers. Due to the role of the church in the state authorities at that time, it can be concluded that the Ofeni partly conducted business illegally. It was necessary to learn how to transmit information secretly for the sake of protecting the Ofeni themselves, as well as to prevent the discovery of Old Believers' secret settlements from ardent supporters of church persecution or representatives of the authorities, and for this purpose the Ofenya language was created: "This language consists mainly of words of folk, local, only with a change in meaning or literal form, but in both cases, the spirit of the vernacular has left its indelible mark on it, and its syntax and etymology respond to the vernacular" [5, pp. 22-27].

At the end of the 19th and beginning of the 20th centuries, the activity of the Ofeni was concentrated only in rural areas, but when general schools and libraries began to spread there, the Ofeni disappeared as a type of merchant.

Thus, we can conclude that the language of Ofeni was formed mainly under the influence of the Russian and Greek languages (there are also a few borrowings from other languages of the Slavic group).

The Ofenya language has a number of features at the lexical level. Researchers identify three main distinguishing features:

1) borrowings from the Greek language;

2) replacing morphemes;

3) neoplasms that give an emotionally expressive assessment of the object.

M. Fasmer wrote in one of his works the following: "In general, the idea of borrowing Greek elements into the Russian Ofenya languages through the mediation of Tats should be recognized as correct. After all, otherwise it would be completely incomprehensible how so many Greek loanwords appeared in Russian conditional languages." [6, p. 5]. Based on the above, it can be concluded that the Ofenya language contains a large number of words borrowed from Greek, which indirectly confirms one of the hypotheses of the appearance of Ofeni in Russia.

Below are some examples of the most well-known borrowings in Ofenya language (Table):

Table – Greek loanwords in the Ofenya language

Ofenya language	**Literary norm of the Russian language**	**Greek**
Декан	Десять	Δέκα
Лох	Мужик	Λαός (meaning people)
Костер	Город	Κάστρο (meaning castle, fortress)
Хирьга (hence "нахирёжник" – перстень)	Рука	Χέρι

Moreover, words in the Ofenya language were formed artificially. For example, K. N. Tikhonravov identifies several principles of word formation in an artificial way [5, pp. 22-27].

1) the first syllable in the usual form of the word is replaced ‘**ку-‘, ‘ши-‘, ‘тур-‘, ‘шля-‘, ‘ща-‘, ‘ск-‘**: золото – кулото, аршин – куршин, беда – скеда, товарищ – шиварищ, комната – шимната, торговля – ширговля, воняет – турняет, знаком – шляком, трава – щава, etc.;

2) a) partial or complete replacement of consonants; while the vowels remain unchanged: выгонять – выхлять, дерево – мелево, ехать – ердать, кувшин – кулпин, курит – дунит, мало – ласо etc.; б) replacement of vowels with the same consonant composition: брать – бирить, плакать – пликсить and others;

3) a syllable or letter is added to the beginning of the word: верно – шверно, вы – босвы, да – гида.

Below are some examples of new word formation with the characteristic Ofenya language giving emotional-expressive evaluation:

- хотелось – волилось,
- заяц – вилюх,
- злодей – лют (can also be attributed to borrowing from the Greek word "λίθος"),
- калоши – налапушники,
- кровь – красима,
- лето – теплуха,
- онучи – облудни.

Another distinctive feature: often negation in the Ofenya language was based on the principle of attaching a particle “not” to a word (mainly to a verb), which contradicts the norms of the Russian language.

- не хочется – неволится,
- не будет – немияшит,
- не знать – несеврать [3].

The differences between the Ofenya language and the Russian literary language are limited by vocabulary, otherwise the Ofenya language does not violate established norms.

It is believed that the Ofenya language served as one of the lexical bases for the formation of criminal jargon (thieves' jargon/argot) as we know it today. There is a group of lexical units that have passed from the secret language of Ofenya to the thieves' argot, and from there to the jargon (slang) of modern youth.

Initially, we will examine the notion of criminal jargon. A number of researchers similarly consider it equivalent to argot.

V. S. Elistratov wrote in his scientific work: "Argot is a non-normative language and everyone who speaks argot fluently puts his or her own sense, shades of meaning into words and expressions." [7, p. 577, p. 584].

If we define it very narrowly, then thieves' argot (jargon) is one of the means of criminal communication [8, p. 16].

Criminal jargon has its own common name – Fenya (most likely formed from the Ofenya language).

V. A. Tonkov wrote the following about thieves' argot: "It is unthinkable to consider thieves' jargon separately from other jargons. There is a mutual exchange of language material between the thieves' language and other conventional languages, and its words pass not only into other jargons, but also seep into ordinary speech" [9, p. 51].

We will analyse several lexical units that migrated from the Ofenya language to the criminal argot.

In the Ofenya language, there was a peculiar counting system, so the word "стрем" in the secret language of the Ofeni meant the number three [3]. Later, having migrated to criminal argot in the form of "стрём", it began to mean a guard, a guard that warns about the danger of someone. In the same sense, the word got into the jargon of modern youth, even "leaked" into literary works.

" – Ага! Спрятался! Значит, ты тут на стрёме сидишь, а дружок твой по машинам шарит!" (Vladimir Sotnikov, "The investigation is conducted by a simpleton", 2001).

The word "поханя" in the Ofenya language meant "master" [3]. In thieves 'argot, the lexical unit has changed and turned into "пахан", which in the language of criminals means the leader of a group that has power and influence over people lower in the criminal hierarchy.

" – Но почему один из пацанов стал раздвигать ворота вручную? Есть же специальный механизм? – с задумчивым выражением лица спросил пахан." (Ilya Derevyanko, "The charge", 2002).

The word "пахан" was used similarly to the word "стрём" – it passed into colloquial speech, books and cinema. In youth slang, it has acquired another meaning – father.

"Жулик" in the Ofenya language was used in the sense of "knife", (table knives – "жули", to cut – "жулить") [3]. Later, having switched to criminal jargon, the "жулик" in its meaning turned into a small knife for cutting pockets, and into a novice thief. In the colloquial speech, it is customary to use "жулик" in the sense of a thief engaged in petty theft, or a swindler (rogue).

" – Хитрюга ты, – сказал он. – Если бы ты родился не мартышем, а человеком, то обязательно бы стал жуликом." (Lev Davydychev, "Lelishna from the third entrance", 1963).

The famous word "лох" (a possible variation of "лог"), in the Ofenya language originally meant "мужик" [3], any peasant, rural man from village, obviously less educated than Ofeni. Later, the word has taken on a scornful tone. And having gone into criminal jargon, the word has become a curse:

1) a stupid, limited person, a potential victim of a criminal;
2) a person who is not versed in anything, an amateur [10, p. 334].

Accordingly, from the thieves' jargon, the word very quickly passed into the category of colloquial speech.

"А всё для того, чтобы ещё больше разжалобить доверчивых лохов." (Lyusya Lyutikova, "They'll love me for my nature", 2004).

"Чем чёрт не шутит, подумал я, может быть, солидное собрание попало в руки каких-то лохов, и теперь они хотят от него поскорее избавиться?» (Svetlana Alyoshina, "Was the Doctor called?", 2002)

There is also a group of words that passed the thieves' argot but managed to gain a foothold in the Russian language for a long time and is used today.

For example, the word "клёво" in the Ofenya language replaced the normative "хорошо" [3]. More recently, it began to be used as a slang word in the sense of "great, good", i.e. it has not lost the original semantics.

" – Если синяя «БМВ» твоя, то доехали просто клёво! – решила я подлить масла в огонь." (Marina Serova, "Two Knew the Code", 2009).

Furthermore, another example: "покимать" was used in the meaning of napping – "to be in a drowsy state, to sleep". The modern form of the word with a similar meaning looks like this: кемарить, покемарить.

"При нашем, уже долговременном безделье сон не ахти какой глубокий, но сегодня мне удалось немного покемарить." (V. I. Boyarsky, "The Creation of Ellesmere", 2010).

So, we can conclude that the Ofenya language had a significant influence in the formation of the Russian criminal jargon, where some lexical units got into colloquial speech. However, a small part of the Ofenya vocabulary passed into modern speech and took root in it, bypassing the thieves' argot.

But the study showed that in fact the Ofenya language went into oblivion along with the cessation of trading activities of the Ofeni, only a small part of its lexical composition has come down to us in an unchanged form [11].

The historical significance of the Ofenya language cannot be overemphasized. The language reflects the unique culture and lifestyle of the free traders of Ofenya. Their language was studied by linguists and historians, who used it for better understanding of Ofenya life and culture. The Ofenya language finally ceased to exist about a hundred years ago, at the same time as the activity of the Ofeni as merchants ceased. However, their language has managed to leave behind a legacy, the bulk of which is currently made up of words used by criminals, but some lexical units of the Ofenya language have also been incorporated into colloquial speech.

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SOCIAL INTELLIGENCE: THE KEY TO BETTER RELATIONSHIPS WITH OTHERS

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Abstract. This article considers the concept of “social intelligence” and its meanings in psychology. The article is aimed at studying the influence of social intelligence on interaction with others. The analysis of the concept of social intelligence is not only of great theoretical importance, but also of practical value.

Keywords: social intelligence, interaction with others, teenagers, society.

СОЦИАЛЬНЫЙ ИНТЕЛЛЕКТ: КЛЮЧ К УЛУЧШЕНИЮ ОТНОШЕНИЙ С ОКРУЖАЮЩИМИ

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Аннотация. В данной статье рассматривается понятие «социальный интеллект» и его смыслы в психологии. Статья направлена на изучение влияния социального интеллекта на взаимодействие с окружающими. Анализ понятия социального интеллекта имеет не только большое теоретическое значение, а также представляет практическую ценность.

Ключевые слова: социальный интеллект, взаимодействие с окружающими, подростки, общество.

In today's world, it is more important than ever to understand others and connect with them. People communicate more on social media today than with each other. Teenagers spend a lot of time alone, as their parents are constantly working; they play computer games, and communicate with their peers on social networks. All this leads to the fact that, between the ages of twelve and eighteen, some adolescents experience physical, emotional, psychological and social shifts. Teenagers are particularly

sensitive to life changes and stress, which can lead to the formation of depression. According to statistics, from 10 to 20 % of adolescents suffer from depression, while two thirds of them have individual symptoms of depression, and a third suffer from a clinically pronounced disorder. In addition, in a third of adolescents with depression, it lasts for more than a year, which leads to a significant decrease in their quality of life. At the same time, no more than a fifth of patients receive qualified help for depression. Research has given rise to the term “social intelligence” [1].

American psychologist J. Gilford identified “social intelligence” as a set of intellectual abilities that determine the success of interpersonal assessment, forecasting and understanding of human behavior. Thus, the key ability of social intelligence is to understand and manage *interpersonal interactions effectively*. It also means being able to accurately perceive and understand other people’s emotions, desires, and motives. By developing this skill, individuals can enhance their relationships, establish effective teams, and navigate social situations with greater ease [2, p. 182].

Social intelligence encompasses more than just good social skills; it also includes the ability to build meaningful relationships and manage complex social dynamics. A person with high social intelligence is able to respond empathically and effectively. It is capable of identifying and reacting to subtle social cues, including body language, voice, and facial expressions, and adapting its behavior accordingly.

In addition, social intelligence is the ability to know oneself and to know others in order to evaluate properly one’s own and others’ actions. It consists of four abilities: sympathy, self-awareness, empathy, and theory of mind. Those who lack social intelligence may misunderstand others, which can have tragic consequences. Thus, the analysis of the impact of human behavior on others paves the way to the study of innovative strategies and behaviors [3].

However, it is important to note that a significant number of people stop their social learning as they get older, choosing behaviors that previously brought them success. This reluctance may hinder their effectiveness in social, business, or professional contexts. On the positive side, adults who lack social intelligence have the potential to increase their work-related productivity.

All that is needed is an understanding of the basic principles of social interaction and the application of comprehensive models of interpersonal effectiveness.

The concept of social intelligence has a rich historical background that traces its origins to the early 20th century. It emerged as psychologists began to acknowledge the intricate nature of social interactions and the importance of understanding human behavior in social contexts.

In 1920 Edward Thorndike, an influential psychologist, first introduced the term “social intelligence”. He defined it as the ability to comprehend and effectively manage people, as well as to navigate human relationships with wisdom. Thorndike’s initial conceptualization of social intelligence sparked interest among researchers and laid the foundation for further exploration in the field.

However, it was not until the latter half of the century that psychologists began to delve deeper into the complexities of social cognition and behaviors. Howard Gardner, a prominent figure in the field of psychology, played a significant role in expanding the concept of social intelligence. Gardner introduced the theory of multiple

intelligences, which emphasized that intelligence is not based solely on cognitive abilities but also encompasses various other forms, including interpersonal and intrapersonal intelligence. This theory broadened the understanding of intelligence and highlighted the importance of social intelligence in human development and functioning [4, p. 63-80].

Throughout its evolution, the concept of social intelligence has been shaped by significant events and studies. Researchers have conducted numerous studies to explore the role of social intelligence in various aspects of life, such as leadership, emotional intelligence, and interpersonal relationships. These studies have contributed to a deeper understanding of how social intelligence impacts human behavior and have further solidified its importance in psychology.

Every age is important for human development. Nevertheless, adolescence occupies a special place in psychology. Within the framework of the problem of the development of social intelligence, it is of great interest to us to study this particular age group, since this is the period of personality formation. This is the most crucial period in the formation of the foundations of morality, social attitudes, attitudes towards oneself, towards people, towards society, that is, the life position from which a teenager begins an independent life. At this age, the main forms of interpersonal behavior stabilize when a teenager discovers differences in himself and begins to separate his attitude towards himself as a child and his attitude towards himself as an adult. He not only “absorbs” external influences, the assessments of others – he begins to analyze them: accepts some assessments, rejects some, agrees with some, protests against some. Now we can talk about the formation of a teenager's knowledge of himself. In turn, the rapid development of self-awareness allows them to discover their faith in the ability to determine and control their own behavior, their thoughts and feelings, and to focus on their own assessment [5].

Adolescence is favorable for the development of social intelligence. However, in a significant part of modern adolescents, the development of social intelligence is complicated by the so-called tendency to Internet-dependent behavior. As proof, we can cite the “Four Factor Test of Social Intelligence” by J. Guilford. His test measures the factor of cognition of classes of behavior, namely the ability to generalize logically, to identify common essential features in various non-verbal reactions of a person [6].

Social intelligence, as well as general intellectual abilities, can be described in the space of three variables: content, operations, and results. Gilford identified one operation, cognition, and focused his research on behavior cognition. This ability includes six factors:

Cognition of the elements of behavior is the ability to isolate verbal and non-verbal expressions of behavior from the context (an ability close to distinguishing a “figure from the background” in Gestalt psychology).

Cognition of behavior classes is the ability to recognize common properties in a certain stream of expressive or situational information about behavior.

Cognition of behavioral relationships is the ability to understand the relationships that exist between units of information about behavior.

Cognition of behavioral systems is the ability to understand the logic of the development of holistic situations of human interaction, the meaning of their behavior in these situations.

Cognition of behavior transformations is the ability to understand the changing meaning of similar behavior (verbal or non-verbal) in different situational contexts.

Cognition of the results of behavior is the ability to anticipate the consequences of behavior based on available information [4, p. 133].

However, in the formation of a teenager's personality, there may be some problems, the solution of which is not possible for a teenager. To prevent this, schools can conduct special lessons on the development of social intelligence, which will include:

- An opportunity for children to interact and collaborate with their peers.
- Help them develop social skills such as empathy.
- Communication.
- Understanding the points of view of others.

Teachers can also model and teach socio-emotional skills and provide guidance on how to navigate social situations [7].

In conclusion, social intelligence plays a key role in the lives of teenagers, especially during their difficult period. This is a time when they face many challenges: searching for identity, forming relationships, and adapting to change. Developing social intelligence helps them not only cope with emotional storms, but also build healthy connections with others. The formation of social intelligence in adolescence is determined by a number of factors, including emotional development, the influence of the social environment, family upbringing, school environment and cultural norms. During this period, socialization mechanisms such as learning based on observation, imitation, and participation in group interactions are especially important. The role of family, school, and the immediate environment turns out to be critically important in developing social interaction skills. Social intelligence plays a crucial role in personal and professional success. The ability to understand and empathize with others not only helps in building strong relationships but also in gaining valuable insights and information. By being attuned to the emotions and needs of those around us, we are better equipped to navigate social situations with grace and finesse.

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