

publisher.agency
Belgium

February, 2024

No 5



Brussels, Belgium
22-23.2.2024

International
Scientific
Conference

Progress
in Science

UDC 001.1

P 97

Publisher.agency: Proceedings of the 5th International Scientific Conference «Progress in Science» (February 22-23, 2024). Brussels, Belgium, 2024. 217p

ISBN 978-1-6920-5180-8



9 781692 051808 >

ISBN 978-1-6920-5180-8

DOI 10.5281/zenodo.10706991

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Chemical Sciences

ARSENIC POLLUTION STUDY OF THE RIVER LUKHUNI in 2021-2023 YEARS

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Abstract:

Chemical pollution of the environment is one of the most important ecological challenges of modern times. Arsenic is a particularly dangerous environmental pollutant, which has been mined and processed in Georgia, in particular, in Racha and Kvemo Svaneti for decades. Arsenic-containing waste, which is stored in the territory of former chemical factories and remains from the Soviet period, is a challenge today.

However, the past production waste can still enter in the river through the water coming out of an abandoned field and can cause significant contamination of soils and waters of adjacent areas. This poses a major risk of chronic environmental exposure and intoxication among the population living in these areas.

In this research water sampling and analysis were made in the accredited laboratory. The expedition was conducted in this region for sampling activities of waters to evaluate level of Arsenic pollution and subsequent risks of contamination with Arsenic. In the samples Arsenic concentration was measured by the ICP-OES equipment using ISO standards by the group of scientists with extensive experience in conducting similar works. In accordance with the obtained data a forecast of arsenic pollution of the Lukhuni River from 2023 to 2025 were implemented. Further laboratory investigations are needed to determine levels of arsenic exposure among inhabitants

Introduction

Arsenic is included in the list of toxic elements (Hg, Pb, Cd, As, Ni, etc.) that cause significant problems for human health. There are different ways for arsenic to enter the human body, but most of the time it enters the body from food and drinking water. Organic arsenic species are most commonly found in seafood and terrestrial food items [1]. 3-5 valent forms of arsenic are mainly found in terrestrial products. Arsenic enters the food chain mainly from soil and water

contaminated with this toxic element. Getting arsenic into the human body can cause serious diseases.

Controlling the content of arsenic in natural waters, soils and food products, studying the regularity of distribution and behavior is one of the most important and urgent issues in all countries of the world [2].

Arsenic is the most toxic element that people use in various fields of their activities. Arsenic and its compounds are included in various pesticides, also arsenic and its compounds are widely used in the production of various types of glass, anti-corrosion alloys, coatings, ammunition, and batteries. High-purity arsenic is an essential component in solar cells, light-emitting diodes, lasers, integrated circuits, semiconductors, etc. Until the 70s of the last century, inorganic arsenic compounds were also used in medicine[3-4].

The issue of environmental pollution with arsenic is also relevant in Georgia, where there are many natural or anthropogenic sources. Mining of arsenic ore, processing and production of arsenic-containing preparations were carried out in the territories of Svaneti and Racha. The object of our research is the arsenic deposit located in the valley of the Lukhun River in Racha, where this toxic ore has been mined and processed for decades. Ore processing at this deposit began in 1937. The main products of production were high purity metal arsenic, As_2O_5 , As_2S_5 and tin arsenate. In the countries of the former Soviet Union, these products were used for both military and civilian purposes (production of leather, chemicals, electronics). Arsenic ore was mined at the Lukhun deposit, and processed at a factory near the village of Uravi [6]. Heavy metals in ecosystems are associated with prolonged use of ore deposits, which poses serious problems for the environment. Arsenic tops the list of the 20 most dangerous compounds compiled jointly by The Agency for Toxic Substances and Disease Registry (ASTDR, 1999) and the US Environmental Protection Agency (EPA, 2001). Arsenic and its compounds are also considered by the World Health Organization (WHO) to be the most problematic substances for human health (Chirakadze, Buachidze et al., 2016), and the International Agency for Research on Cancer (IACR, 2012) ranks them as the first category of carcinogenic hazards. The Basel Convention of 22 March 1989, concerning the transboundary movement of hazardous waste and its disposal, classified arsenic as controlled waste. All the above indicates that Arsenic is included in the list of standardized substances (Hackett, 1989) [7].

In 1991, arsenic extraction and industrial processing at Lukhun deposit was stopped. Today, the Lukhun mine is no longer operational. The problem is the waste containing arsenic, which is stored in the territory of the former Samtochemical factory and is left over from the Soviet period. A large amount of toxic waste from arsenic production (more than 120,000 tons of waste, containing 4-9% white arsenic) that is not completely safely disposed of, creates a high risk of contamination of rivers, groundwater and soils. Under the conditions of natural events (floods, landslides, erosions, etc.), this danger can turn into an ecological disaster[8].

Nowadays, ecological security of water resources and soils has a vital importance for Georgia. The region of Racha-Lechkhumi and Kvemo Svaneti is the main source of Arsenic pollution in Georgia where there are several abandoned arsenic production factories operating in the Soviet period that have been discontinued since late 80s. However, the waste generated in the process is still stored in old, depreciated buildings and past production waste enters the river through the water coming out of an abandoned field and causes significant contamination of soils and waters of adjacent areas. (Bakradze, Vodyanitskii et al, 2018; Bagrationi, Gvakharia et al, 2015).

Prevention of natural water and soil pollution in regions potentially contaminated with arsenic and other toxic elements in the ecosystems of the mentioned region, assessment of pollution and health risks, ensuring the health of ecosystems and the safety of the population are highly relevant for the current reality of Georgia. This poses a major risk of chronic environmental exposure and chronic arsenic intoxication among the population living in these areas. Chronic Arsenic

Intoxication can affect functions of many organ systems and lead to increased risks of oncological, dermatological and vascular disorders. There is not enough data regarding the prevalence of the chronic arsenic intoxication among the population living in the above-mentioned areas in Georgia. (Gagoshidze, Antelava et al., 2005);

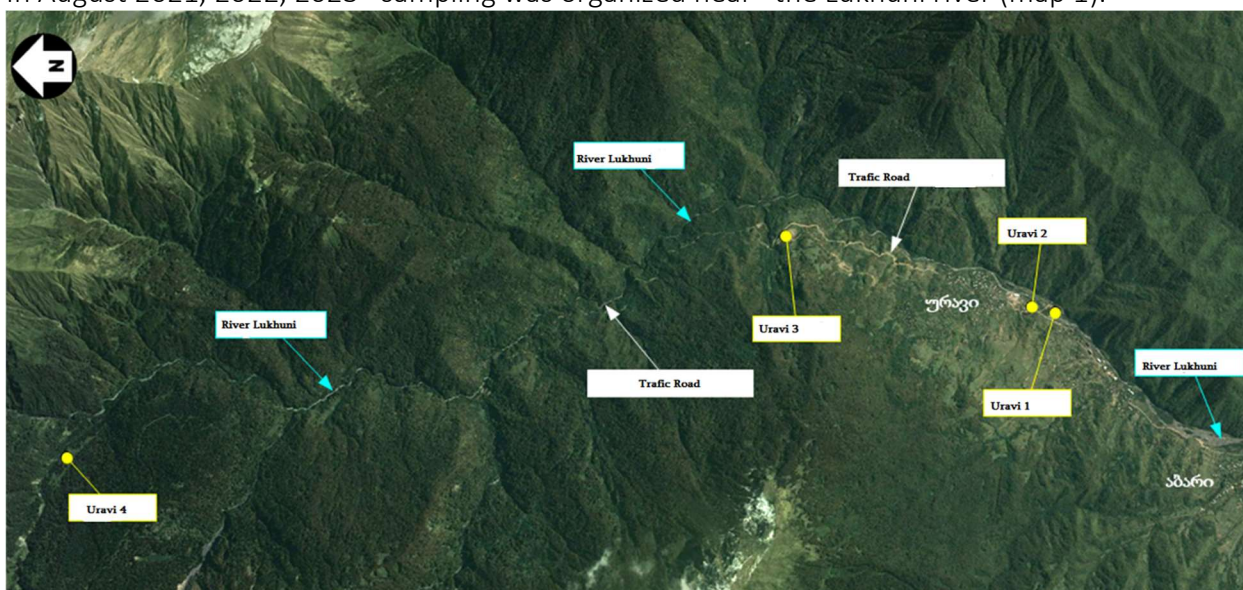
The object of the study is the area surrounding Racha, namely the village of Uravi. which is one of the main regions of Georgia. The research deals with chemical pollution of the environment, in particular, with the arsenic contamination of water and forecasting.

Methodology

The research may be considered as a scientific technological and innovative, it means that modern scientific technologies and innovative methodologies were used for in this scientific research. For quality assessment and quality control (QA/QC), The International Organization for Quality Assessment Standards/ISO/) and US Standards Agency (US Environmental Protection Agency/EPA) was used.

For the research goals an accredited Laboratory of atmospheric air, water and soil analyses of the National Environmental Agency were used, which is equipped with modern equipment and operates on the basis of standards and methodologies developed by the International Standards Organization ISO and EPA. The profile of the organization is fully compatible with the research specificity in solving task sets.

In August 2021, 2022, 2023 sampling was organized near the Lukhuni river (map 1).



Map 1 of sampling points

Research methodologies are as follows:

- Inventory-selection of observation points in natural waters in the research region, sampling and transportation in accordance with ISO-5667-3:2987 standards; River water observation points was selected from polluted and background areas.
- determination of total and forms of arsenic in ecosystems (water,) were done with ICP-OES-axial induction plasma spectrometer ISO 11885:2007 and ICP-MS-mass spectrometer based on Epa method 200.8 standards;

For water sample analysis, it was necessary to dilute the sample with nitric acid, which was diluted with distilled water in a ratio of 1:1. The sample were treated with nitric acid until the hydrogen ion indicator becomes equal to two.

Before starting the analysis, standard solutions were prepared from certified heavy metal standards. After the ICP-OES and ICP-MS equipment's were calibrated.

Results

From the eco-chemical viewpoint, according to contact duration with water, and physical-chemical conditions, arsenic oxide (As_2O_3) and sulfides can be conversed according to basic chemical reactions peculiar for them. Arsenic oxide dissolution in the water proceeds very slowly, but it becomes more intense in the presence of hydrogen and hydroxyl ions.



A formed arsenic acid is dissociated in the water as an acid and a base; acidic properties are prevalent: $\text{As}(\text{OH})_3 \rightleftharpoons 3\text{H}^+ + \text{AsO}_3^{3-}$. Proceeding from amphoteric nature of arsenic, As_2O_3 acts both on acid and alkali and salts are formed

It is known that Racha is one of the important agricultural regions of Georgia. Therefore, special attention should be paid to the ecological situation of this region. From this point of view, research was conducted in the area surrounding the river Lukhuni. arsenic deposit and processing plant is located in Ambrolauri municipality. Hydrochemical characterization of the surface waters surrounding the former enterprise is very important. According to the results of the analysis of the samples taken in the month of August 2021, 2022, 2023 and also used data from 2015 to 2022 which was taken from the LEPL National Environment Agency studies carried out on Lukhuni river (Table 1-7 shows the results of samples taken by the National Environment Agency at different locations of the Lukhuni River in 2015-2021, and Table 8-10 shows the results of samples taken at several locations of the Lukhun River in 2021-2023 years as part of research also Diagram 1 shows the dynamic of arsenic content in 2015-2023 years). [5], we made a forecast of arsenic pollution of the Lukhuni River from 2023 to 2025 years (Diagram 2, Diagram 2a). Also, using this data, a diagram that shows how the arsenic content of the Lukhuni River changed in the months of August and February from 2015 to 2021 years were created. Diagram 2 and Diagram 2a shows Forecast made from 2015 to 2023 arsenic content data. It should be noted that the coordinates of the samples taken on the Lukhuni River coincide with those taken by the LEPL National Environment Agency.

Data of the National Environment Agency

Table 1. As-arsenic in 2015 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
March	0.0206	0.0013	
May	0.0251		
August			0.0404
November	0.0714	0.0798	0.0600

Table 2. As-arsenic in 2016 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
February	0.0025	0.0032	0.0047
May	0.0065	0.0075	0.0089
August			0.0003
September	0.0101	0.0022	

Table 3. As-arsenic in 2017 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
January			0.0045
February			0.0118
March	0.0062	0.0066	
June	0.008	0.004	
August			0.0094
September	0.0174	0.038	
November			0.0034

Table 4. As-arsenic in 2018 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
February			0.0064

Table 5. As-arsenic in 2019 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
July	0.0051	0.0023	0.0058

Table 6. As-arsenic in 2020 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
February	0,0020	0,0072	0,0046

Table 7. As-arsenic in 2021year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
February	0,0015	0,0038	0,0061

Table 8. As-arsenic in 2021year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
August	0,0037	0,0003	0,0053

Table 9. As-arsenic in 2022 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
August	0.0087	0.0118	0.0044

Table 10. As-arsenic in 2023 year

	Lukhuni upper mg/l	Lukhuni lower mg/l	Lukhuni confluence mg/l
August	0.0074	0.00005	0.0105

Diagram 1. Dynamics of arsenic content from 2015 to 2023 in II and VIII months

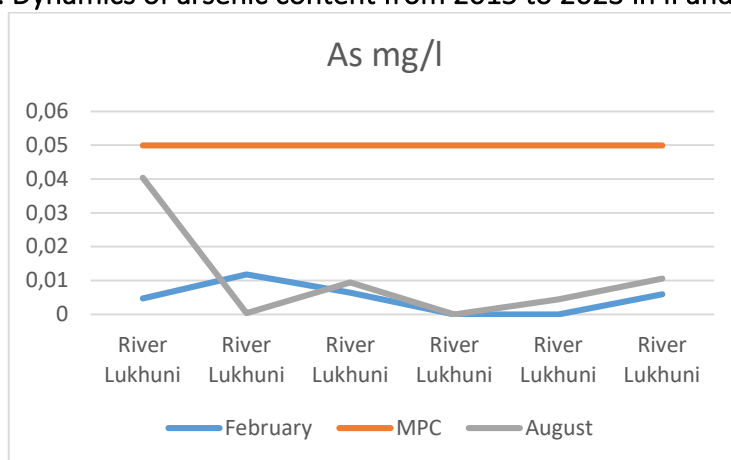
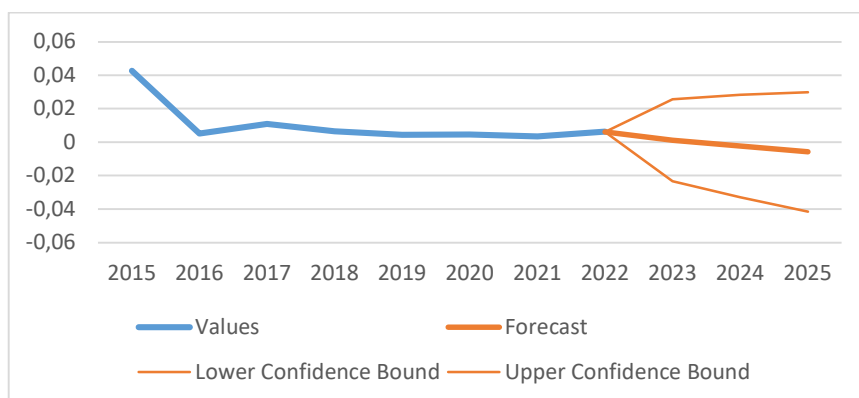


Diagram 2. Forecast of arsenic contamination for the River Lukhuni

Timeline	Values	Forecast	Lower Confidence Bound	Upper Confidence Bound
2015	0.042657			
2016	0.0051			
2017	0.01093			
2018	0.0064			
2019	0.0044			
2020	0.0046			
2021	0.00345			
2022	0.006267	0.0062667	0.01	0.01
2023		0.0011088	-0.02	0.03
2024		-	0.0022909	-0.03
2025		-	0.0056906	-0.04

Diagram 2a. Forecast of arsenic contamination for the River Lukhuni



Conclusion

In 2015-2016 we studied contaminated with arsenic industrial wastes soil (village Uravi-Ambrolauri municipality, village Tsana-Lentekhi Municipality) and surface water (riv. Tskhenistsqali and Lukhuni) ecochemical conditions; According to the survey conducted in 2015 maximum content of arsenic were indicated in Uravi near white arsenic treatment plant and its adjacent area and in the settling of the surrounding; Arsenic concentration in the river Lukhuni in 2016 did not exceed the MPC and in most cases it has been a declining trend.

In 2014-2016 years the project "Arsenic Containing Mining Waste Management in Georgia," was ongoing between the Ministry of the Environment and Natural Resources Protection of Georgia and the Ministry of Economic Affairs of the Netherlands. The project is carried out in bilateral financing, which aims first murgent works to be carried out near the territory of the former arsenic hazardous plants. According to the collected data, and obtained results, it can be concluded that the reduction of arsenic pollution of the Lukhuni River was observed from 2015 to 2022 years. Also, based on the obtained results, which can be clearly seen on the given graph, we can say that from 2022 to 2025 the river Lukhuni pollution limits will be from -0.04 mg/l to 0.03 mg/l (calculated). However, we must assume that we may get an unexpected result, which will be related to an unexpected disaster, such as the washing away of the sarcophagus and the spilling of the deposited material into the river etc.

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Electrochemical sensors based on cardiovascular biomarkers

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Key words: electrochemical sensor, biosensor, cardiovascular biomarker, monitoring cardiovascular diseases

Abstract

This article explores the use of electrochemical sensors for detecting cardiovascular biomarkers, highlighting their crucial role in early disease diagnosis and monitoring. Electrochemical sensors, versatile analytical devices, employ electrochemical reactions to identify and quantify specific compounds within samples, finding applications in diverse fields, including medical diagnostics. The article introduces various types of electrochemical sensors, such as potentiometric, amperometric, voltammetric, conductometric, impedimetric, and gas sensors, each operating on distinct principles to adapt to various applications. Moreover, the article introduces biosensors, specialized devices that combine biological elements with physicochemical detectors to identify specific biological molecules or compounds, playing a pivotal role in assessing health, including disease risk evaluation and substance abuse detection. The integration of electrochemical sensors and biosensors is emphasized as a potent tool for detecting cardiovascular biomarkers. These sensors play a vital role in evaluating cardiovascular health by accurately measuring biomarkers associated with heart conditions. Noteworthy biomarkers discussed include cardiac troponin I (cTnI), cardiac troponin T (cTnT), myoglobin (Mb), creatine kinase-MB (CK-MB), thrombin, and heart fatty acid binding protein (H-FABP). The article underscores the significance of electrochemical sensors in diagnosing and monitoring cardiovascular diseases due to their high sensitivity, selectivity, and rapid response times. These sensors are instrumental in the early detection of biomarkers linked to cardiovascular conditions, facilitating timely diagnosis and effective patient management. In conclusion, electrochemical sensors offer a valuable and versatile approach for detecting cardiovascular biomarkers, with their accuracy and real-time measurement capabilities making them essential tools for enhancing patient outcomes and healthcare management in the realm of cardiovascular diseases.

What is an electrochemical sensor?

A device known as an electrochemical sensor is designed to identify and quantify particular chemical compounds or analytes within a sample by employing an electrochemical reaction. The sensor is composed of an electrode system that is submerged in a solution containing electrolytes. When the desired analyte is present in the sample, it initiates an electrochemical reaction on the surface of the electrode, producing an electrical signal that can be measured. The intensity of this signal corresponds to the concentration of the analyte in the sample. Electrochemical sensors have broad applications, including environmental monitoring, medical diagnostics, the food and beverage industry, and safety and security purposes[1][2][3][4][5].

There are various types of electrochemical sensors available, depending on the method used. Examples include: Potentiometric sensors, amperometric sensors, voltammetric sensors, conductometric sensors, impedimetric sensors, quartz crystal microbalance sensors, gas sensors.

Potentiometric sensors measure the voltage or potential difference between electrodes to determine the concentration of a chemical species undergoing a redox reaction. Amperometric sensors measure the current generated when a potential is applied across working and counter electrodes. The current is proportional to the analyte concentration. Voltammetric sensors analyze redox reactions by measuring the current or potential response as a function of the applied potential. Techniques like cyclic voltammetry, square wave voltammetry, or differential pulse voltammetry are used. Conductometric sensors detect changes in the electrical conductivity of an electrolyte caused by the presence of an analyte. The conductivity change reflects the analyte concentration. Impedimetric sensors measure the change in impedance when an analyte interacts with the sensor surface. Altered impedance is related to the analyte concentration[6][7]. Quartz Crystal Microbalance sensors use a vibrating quartz crystal resonator at a specific frequency. Interaction with an analyte causes frequency shifts, which can be used to determine the analyte concentration[8]. Gas sensors are designed to detect and quantify gas concentrations in the environment. They can employ various electrochemical principles, such as potentiometric or amperometric approaches[9]. Overall, these electrochemical sensors employ different methodologies to detect and measure analytes, catering to diverse applications and specific requirements.

What is a bio sensor?

A biosensor is a specialized analytical device that combines a biological element (such as enzymes, antibodies, or living cells) with a physicochemical detector to detect and quantify the presence of specific biological molecules or chemical compounds in a sample. These biological elements, often referred to as bioreceptors, interact with the target analyte, causing a measurable signal that can be interpreted to determine the concentration or presence of the analyte. The concept of a biomarker, also known as a biological marker, was formally introduced in 1989 and categorized as a Medical Subject Heading (MeSH) term. It refers to measurable and quantifiable biological characteristics. These characteristics can include specific enzyme levels, particular hormone concentrations, the distribution of specific gene traits in a population, or the presence of certain biological substances. Biomarkers serve as indicators for assessments related to health and physiology. These assessments encompass various aspects, such as evaluating disease risk, diagnosing psychiatric disorders, studying the effects of environmental exposure, diagnosing diseases, understanding metabolic processes, detecting substance abuse, monitoring pregnancy, studying cell line development, and conducting epidemiological research, among other applications[10].

A standard biosensor comprises the following components:

1. **Analyte:** This refers to the substance you want to detect, such as glucose in the case of diabetes monitoring.
2. **Bioreceptor:** This is a molecule capable of identifying the analyte; for instance, enzymes can serve as bioreceptors.
3. **Transducer:** Typically, this component converts the biochemical recognition event into a measurable signal, known as signalization.
4. **Electronics:** This component is responsible for processing the transduced signal and presenting it in a readable format.
5. **Display:** Usually, this involves a liquid crystal display along with the necessary hardware and software to provide the biosensor's results in a user-friendly manner[11].

Usage of electrochemical bio sensors in cardiovascular disease detection

Modern methods for measuring biomolecules typically rely on technologies like mass spectrometry, ELISA, Western blot, and Northern blot. However, these approaches are costly, intricate, and time-intensive, making them unsuitable for the current requirements of rapid disease assessment at the point of care. Given the unmet medical need for a precise, straightforward, affordable, quick, and highly sensitive biomarker detection system, recent scientific efforts have given rise to numerous innovative biosensing systems[12][13]. These include field-effect transistors, surface plasmon resonance sensors, and electrochemical biosensors[14]. Electrochemical sensors play a crucial role in detecting and monitoring cardiovascular diseases. They have high sensitivity, selectivity, and fast response time. These sensors are used to measure biomarkers that indicate the presence or progression of cardiovascular diseases, providing valuable information for diagnosis, treatment, and patient management. In diabetes patients, electrochemical sensors are widely used in glucose monitoring devices. Continuous monitoring of glucose levels helps manage diabetes and reduce the risk of complications, including cardiovascular diseases. CRP, an inflammatory marker elevated in patients at high risk of cardiovascular diseases, can be quickly and accurately detected and quantified using electrochemical biosensors. This enables early detection and monitoring of cardiovascular conditions. Electrochemical sensors are also used to measure total cholesterol, Low-Density Lipoprotein (LDL), and High-Density Lipoprotein (HDL) in blood samples, providing crucial information for assessing cardiovascular health and the risk of heart disease. Troponin, a protein released during heart attacks and other cardiovascular events, can be detected and quantified using electrochemical immunosensors. This aids in the early diagnosis and management of cardiac conditions. Nitric oxide, a signalling molecule in the cardiovascular system, can be measured using electrochemical sensors. This provides insights into various cardiovascular diseases. Electrolyte imbalances can impact cardiovascular health. Electrochemical sensors are used to measure ions such as sodium, potassium, and calcium, aiding in the diagnosis and management of conditions like heart failure, arrhythmias, and electrolyte abnormalities. Electrochemical sensors are valuable tools for detecting and monitoring cardiovascular diseases. Their accuracy, ability to provide real-time measurements, and miniaturization capabilities make them essential for improving patient outcomes and healthcare management in this field[15][16][17][18][13].

Types of cardiovascular biomarkers to detect electrochemically

Cardiovascular biomarkers are molecules or substances that can be measured to assess the health and function of the cardiovascular system. Electrochemical methods are commonly used for the detection of these biomarkers due to their high sensitivity and specificity. Cardiac biomarkers are substances that are released into the bloodstream when the heart is damaged or injured. They are essential for diagnosing and evaluating acute myocardial infarction (AMI), commonly known as a heart attack. Some significant cardiac biomarkers used in the diagnosis of AMI include cardiac troponin I (cTnI), cardiac troponin T (cTnT), myoglobin (Mb), creatine kinase-MB (CK-MB), thrombin, and heart fatty acid binding protein (H-FABP)[19][20][13][21][22].

Cardiac Troponin I (cTnI) and Cardiac Troponin T (cTnT):

cTnI and cTnT are highly specific proteins found in the cells of the heart muscle. They are considered the benchmark biomarkers for diagnosing AMI because they are specific to the heart and are released into the bloodstream when heart muscle cells are damaged, as occurs during a heart attack[23].

Elevated levels of cTnI or cTnT in the blood are a strong indication of heart muscle injury and are used for both diagnosing AMI and assessing the risk level in AMI patients. Among the various subunits of troponin, cardiac troponin I (cTnI) stands out as a highly specific indicator of myocardial

injury. It can persist in myocardial tissue for approximately 10 days. Consequently, cTnI serves as a reliable and precise biomarker for the effective diagnosis of acute myocardial infarction (AMI)[24][25].

Myoglobin (Mb):

Myoglobin is a protein present in both cardiac and skeletal muscle cells. Myoglobin (Mb) is a particularly fascinating heme protein, primarily located in the heart and skeletal muscles, where it acts as an internal repository for oxygen. Elevated levels of Mb in both blood serum and urine can be attributed to various factors, including muscle cramps, intense physical exertion, injuries, the venom from sea snake bites, and myocardial infarction (heart attacks). Remarkably, Mb stands out as the most sensitive indicator of myocardial injury because it is the initial marker to be released following damage to the heart muscle cells. It is less specific compared to troponins because it can be released from both cardiac and skeletal muscles. Myoglobin is one of the earliest biomarkers to increase after heart muscle injury, making it useful for early detection of AMI when used in conjunction with other markers[26]. Myoglobin (Mb) is swiftly discharged into the bloodstream after muscle injury, owing to its presence in both heart and skeletal muscles. It is also excreted by the kidneys within 24 hours of symptom onset. Following the onset of acute myocardial infarction (AMI), Mb is released into the bloodstream within 30 minutes, with its concentration peaking at 900 ng mL⁻¹ within 6 to 12 hours. Subsequently, it gradually returns to its typical physiological range of 30 to 90 ng mL⁻¹ over a span of approximately 1.5 days[27][28].

Creatine Kinase-MB (CK-MB):

- CK-MB is an enzyme primarily found in cardiac muscle cells.
- It has historically been a biomarker for diagnosing AMI, although it has been largely replaced by troponins due to their higher sensitivity and specificity.
- CK-MB can still be utilized in specific clinical scenarios, particularly when troponin results are inconclusive .

Thrombin:

Thrombin is an enzyme involved in blood clotting. Elevated thrombin levels can be observed in AMI patients due to the formation of blood clots in coronary arteries during a heart attack. Although not as specific as troponins, measuring thrombin levels can provide additional diagnostic information, especially in cases of larger clot-related AMIs. Thrombin is a central player in several important biological functions and is associated with various health conditions, including anti-clotting treatments, inflammatory responses, thromboembolic disorders, and cardiovascular diseases. In the event of a blood vessel injury, thrombin is rapidly generated, and its concentration in the blood can shift from very low levels in the picomolar range to much higher levels in the millimolar range as the process of coagulation takes place[29].

Heart Fatty Acid Binding Protein (H-FABP):

H-FABP is a protein found in the cytoplasm of cardiac muscle cells. It is released into the bloodstream in response to ischemia (reduced blood flow) or injury to cardiac cells. H-FABP is valuable for the early diagnosis of AMI, particularly in cases where troponin levels do not immediately rise[30].

Collectively, these cardiac biomarkers, particularly cTnI and cTnT, are critical in swiftly and accurately diagnosing AMI. Their measurement, often using highly sensitive assays, enables healthcare professionals to promptly identify individuals experiencing a heart attack, leading to timely intervention and treatment that can significantly improve patient outcomes[22].

Conclusion

In conclusion, electrochemical sensors are valuable tools for detecting and measuring chemical compounds in various applications, including environmental monitoring and medical diagnostics. Biosensors, on the other hand, combine biological elements with detectors to identify specific molecules in samples and have a wide range of uses in health and disease assessment. The integration of electrochemical sensors and biosensors plays a crucial role in detecting cardiovascular biomarkers, which are essential for diagnosing and monitoring heart-related conditions. These sensors are highly sensitive and provide rapid results, making them vital for early disease detection and effective patient management. Key cardiovascular biomarkers like cardiac troponin I (cTnI), cardiac troponin T (cTnT), myoglobin (Mb), creatine kinase-MB (CK-MB), thrombin, and heart fatty acid binding protein (H-FABP) can be accurately measured using electrochemical sensors. These biomarkers are critical in diagnosing conditions like acute myocardial infarction (AMI) or heart attacks. Overall, electrochemical sensors are essential tools for improving patient outcomes in cardiovascular health by enabling early detection and monitoring of heart-related biomarkers. Their accuracy and real-time measurement capabilities make them indispensable in the field of cardiovascular disease management.

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IRREVERSIBLE PROCESSES AT THE BIFURCATION POINT

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**"Nonequilibrium thermodynamics, first of all,
thermodynamics of a chemical reaction"**

Nobel Prize Laureate

I. Prigogine

Irreversible processes are the driving force that creates order in the system. In chemical reactions far from equilibrium, ordered structures arise under the influence of nonlinear interactions at the bifurcation point and lead to the production of entropy. Nonequilibrium situations according to I. Prigogine [1] lead to space-time structures – dissipative structures. The production of entropy and its exchange with the environment can lead to the evolution of the system, moving into a self-organization mode [2].

To consider the transformation of components during chemical reactions in a region far from equilibrium, two approaches are used:

1. "The Gibbs function normalized to the total number of electrons" [3].
2. Triangulation of a multicomponent system according to Kurnakov [4].

"The Gibbs function normalized to the total number of electrons" ($\Delta\bar{G}_{298}^0$) is calculated by dividing the Gibbs energy of formation of a compound ($\Delta_f G_{298}^0$) by the total number of electrons in a given compound (n_e) and by Avogadro's number (N_A) and converted to electron-volts:

$$\Delta\bar{G}_{298}^0 = \frac{\Delta_f G_{298}^0}{n_e \cdot N_A}$$

This function determines the energy density of the formation of a compound per electron and, during the formation of bonds, adequately responds to all changes in the structure of the compound. We interpret "The Gibbs function normalized to the total number of electrons" as the chemical potential of a substance. During a phase transition, the chemical potential is an intensity factor, that is, the transition of a component can occur spontaneously only from a phase with a high potential to a phase with a lower potential.

Based on the principle of continuity and the principle of correspondence, Kurnakov [4] proposed a method for triangulation of multicomponent systems and the possibility of determining the mechanism of reactions. As an example, the CaO-SiO₂-H₂O system is considered. In this system, the formation of 86 compounds was established. For all compounds, the "The Gibbs function normalized to the total number of electrons", "average electronic heat capacity" and "average electronic entropy" were calculated based on the method of ion increments and Aldabergenov increments. The calculations show good agreement with the literature data; the relative error does not exceed 1%.

The CaO-SiO₂-H₂O system represents a diagram where all 86 compounds are plotted and divided into phase unit blocks (PUB) (Fig.). A feature of PUB is the formation in them only of compounds of eutectic composition. Compounds of the same PUB do not interact with each other and form only eutectic compositions, while compounds of different PUBs interact.

In the CaO-SiO₂-H₂O system, the interaction of calcium hydroxide Ca(OH)₂ (compound #19) with Ca₃Si₂O₆(OH)₂·2H₂O (compound #48) in exchange reactions is considered. In principle, it is possible to consider any other interactions. To determine the paths of interaction between the poles of these connections, a straight line 19-48 (red line) is drawn, which intersects 7 stable secants: 42-69; 18-69; 39-69; 69-78; 69-79; 69-17; 69-82. Therefore, you can write 7 reactions. The points of intersection of lines are bifurcation points. The line Ca(OH)₂-Ca₃Si₂O₆(OH)₂·2H₂O (19-48) shows that in the presence of a small displacement of the initial components, the system is capable of abrupt transitions between stable states.

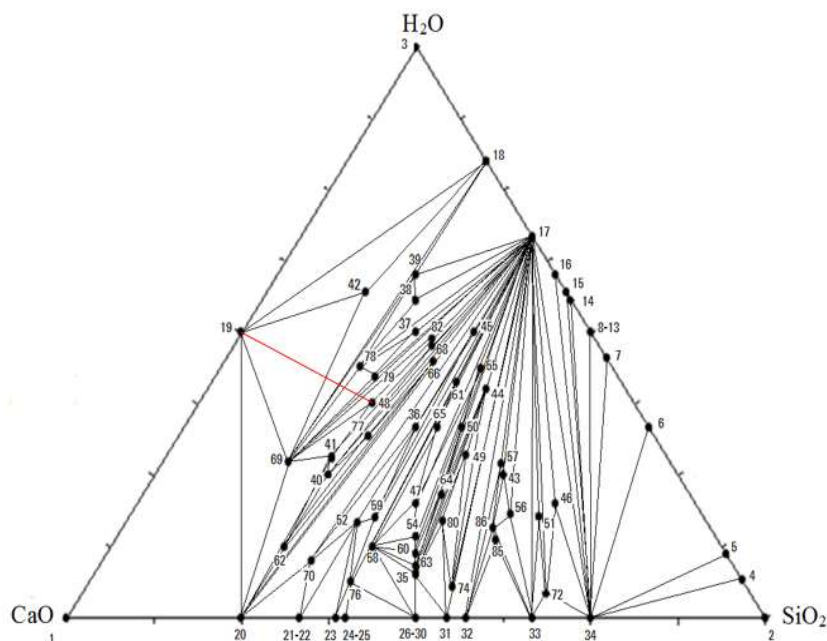
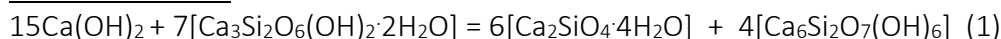
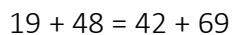
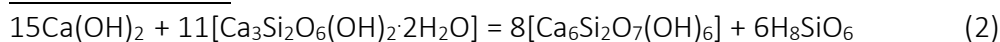
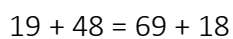


Figure – Triangulation of the CaO-SiO₂-H₂O system

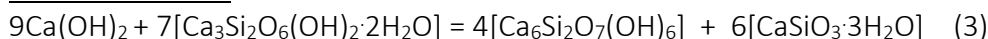
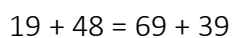
Reactions formed at the bifurcation point during the interaction of 19 and 48:



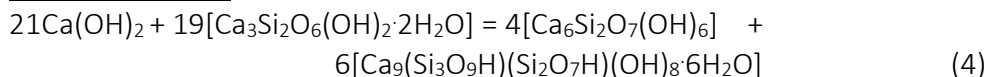
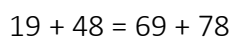
$$A_r = -0.005 \text{ eV.}$$



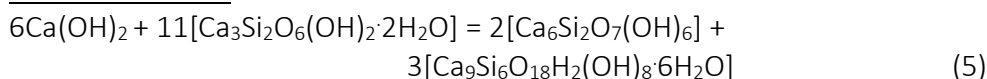
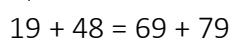
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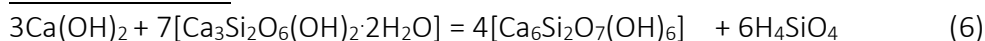
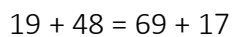
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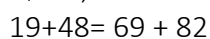
$$A_r = -0.001 \text{ eV.}$$

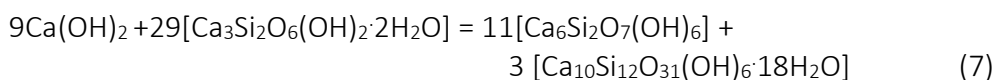


$$A_r = 0.001 \text{ eV.}$$



$$A_r = 0,083 \text{ eV.}$$



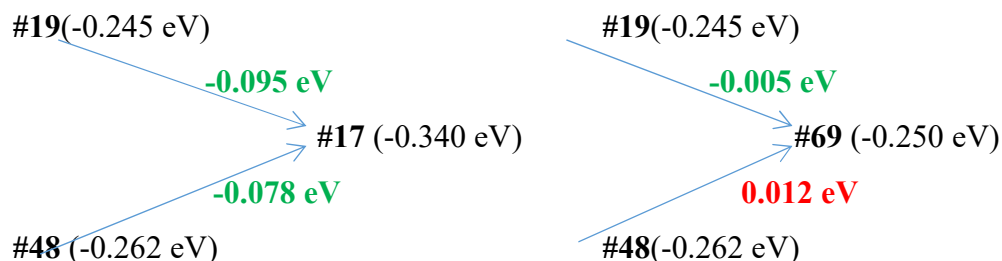


$A_r = 0,009 \text{ eV}$.

A_r is the chemical affinity of the reaction, it was calculated according to Théophile de Donde [5].

The reaction products are dissipative structures.

Let's consider reaction (6). Chemical reactions are accompanied by individual and conjugate transformations of components.



First, individual transformations of the components are considered. The chemical potentials of substances are given in parentheses. With individual transformations, transformations 19-17, 48-17, 19-69 are possible in the forward direction, and transformation 48-69 occurs not in the forward direction, but in the reverse direction 69-48. With all transformations, the system begins to produce entropy. The production of entropy of reverse transformation is negentropy [3]. According to the II law of thermodynamics, entropy production is a positive quantity. Therefore, the value of negentropy is also positive.

Entropy production and negentropy are considered together as a state of the system. The production of entropy begins under non-equilibrium conditions, it acts in the forward direction, and negentropy occurs immediately, but in the opposite direction. The production of entropy is the reason for the formation of new structures, and negentropy is a force that destroys the formation of new structures, limiting the random movement of elements, thereby counteracting the general tendency of increasing entropy, returning the system to its original state, which was characterized by strict order and direction. Negentropy is related to chemical potential, thermodynamic force, affinity and other parameters.

Individual transformations then transform into a conjugate transformation and then into a chemical reaction.

The difference between the entropy production of direct and reverse transformations (negentropy) is called useful entropy production. The useful production of entropy is spent on exchange with the external environment and on increasing the entropy of dissipative structures. Negentropy is a barrier to the growth of useful entropy production of a system, which not all reactions can overcome. The relationship between useful entropy production and negentropy determines the path of evolution of the system at the bifurcation point.

Due to bifurcation, the possibility of the formation of dissipative structures appears. A bifurcation sequence is formed. Taking negentropy into account, some of the products disappear from this sequence and a reaction cycle is formed. The transformation time of 19-69 is 10^{-8} s , while the transformation of 69-48 is 10^{-15} s . This is Prigogine's "internal" time [1]. Approximately the same ratio of transformations is maintained in all reverse transformations.

The dependence of the probability of the formation of dissipative structures on the production of entropy for direct conjugate transformations has a craterial form, where one wall of the crater shows a sharp decrease in the probability and characterizes the restructuring of the

structure. The second wall has a single-humped appearance. The first wall of the crater represents the compressive and the second wall represents the tensile part of the baker's transformation [1].

With the appearance of compressive and tensile forces due to negentropy and entropy production, a violation of the symmetry of unitary evolution and its transition to non-unitary evolution is observed.

At the bifurcation point, the system loses stability and goes into a nonequilibrium state, in which it is possible to acquire a new quality in the evolution of the dynamic system. There is a restructuring of the nature of movement and structure of the system. When a system moves far from equilibrium to a bifurcation point, the chemical potential and affinity of the system play a significant role. At the bifurcation point, the system begins to produce entropy caused by irreversible processes; the passage of the reaction is characterized by a certain rate constant. It is these factors that determine which evolutionary branch the system will follow after passing through the bifurcation point. When chemical reagents interact in a real system, it is possible to determine all paths of evolution of the system. After all, evolutionary processes between two bifurcation points obey deterministic laws [1].

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SYNTHESIS OF BIS-DICHLORODIAZADIENE FROM 2,3,5,6-TETRAFLUOROTHEREPHTHALALDEHYDE

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Development of effective synthesis methods of new polyfunctional compounds based on catalytic reactions in organic synthesis is one of the urgent issues. In these syntheses, the functionalization of any group in the substrate or the introduction of new functional groups, intramolecular and intermolecular heterocyclization as a result of the interaction of 2 or more groups, the formation of new C-C, C=C, C=N, C-N, C-Hal bonds, etc. such interesting transformations are used.

In addition, these compounds can be used as azo dyes. formed in the N=N double bond $E \leftrightarrow ZE \leftrightarrow Z$ isomerism gives characteristic properties to azo dyes, which once again shows how important synthons dichlorodiazabutadienes are.

Although many dichlorodiazadines have been synthesized, the synthesis of bis-dichlorodiazadines and studies based on them are few. In this regard, the synthesis of bis-dichlorodiazabutadines and the study of their synthetic possibilities are very relevant. Thus, bis-4,4-dichloro-1,2-diazabuta-1,3-diene, which are considered important synthons in terms of organic synthesis, based on the catalytic olefination reaction of the corresponding bis-phenylhydrazones obtained from the reaction of dialdehydes with various phenylhydrazines and at the same time bis-hydrazine with various aldehydes synthesizing structural compounds, studying their synthetic possibilities, and applying them as bis-azo dyes and physiologically active compounds are of great importance. Also, the comparative study of non-covalent bonds between halogen atoms in the design of this molecule is a very relevant issue.

In this regard, the investigation of the role of non-covalent bonds in synthesized dichlorodiazabutadienes by RQA studies is in the focus of attention of organic chemists due to its relevance.

Synthesis and analysis results

Taking into account the application of bis{4-[2,2-dichloro-1-(4-substituted phenyl)vinyl] diazenyl}phenyl} methane compounds synthesized on the basis of bishydrazine as dyes, using them as a model in the study of non-covalent bonds, the following studies were continued with bis aldehydes [1,2,3]. Thus, the synthesis of bis-polyhalogen compounds under the conditions of the catalytic olefination reaction of bis-phenylhydrazones synthesized on the basis of

tetrafluoroterephthalaldehyde, the investigation of the role of non-covalent bonds in crystal design, mainly Cl...Cl interaction, is of great importance from the point of view of refined organic synthesis and crystallography.

2,2'-[(Perfluoro-1,4-phenyl)bis(methanilidene)]bis(1-phenylhydrazine) **1** NMR ^1H ($\text{CD}_3)_2\text{CO}$; δ , m.h.) spectrum for NH is 10.09 m.h. singlet, =CH 7.95 m.h. singlet, at the same time hydrogens of aromatic nucleus 6.85-6.90 (t, 2H, Ar), 7.18 (d, $J=7.79$, 4H, Ar) and 7.26-7.31 (t, 4H) m.h. observed in the field (picture 1.).

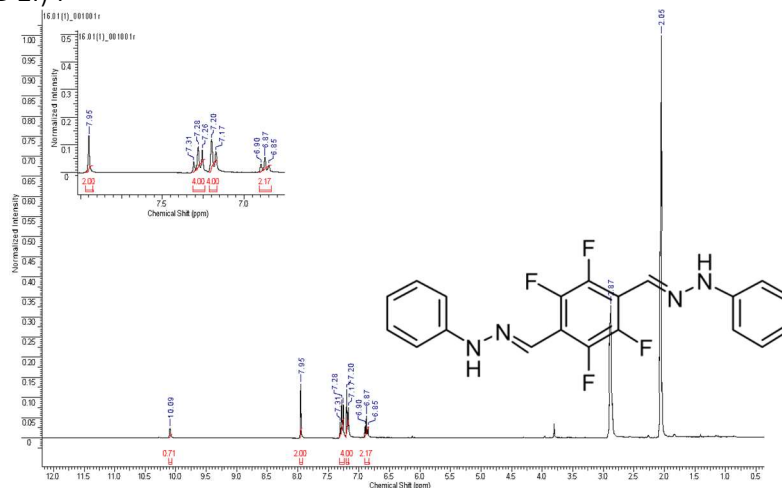
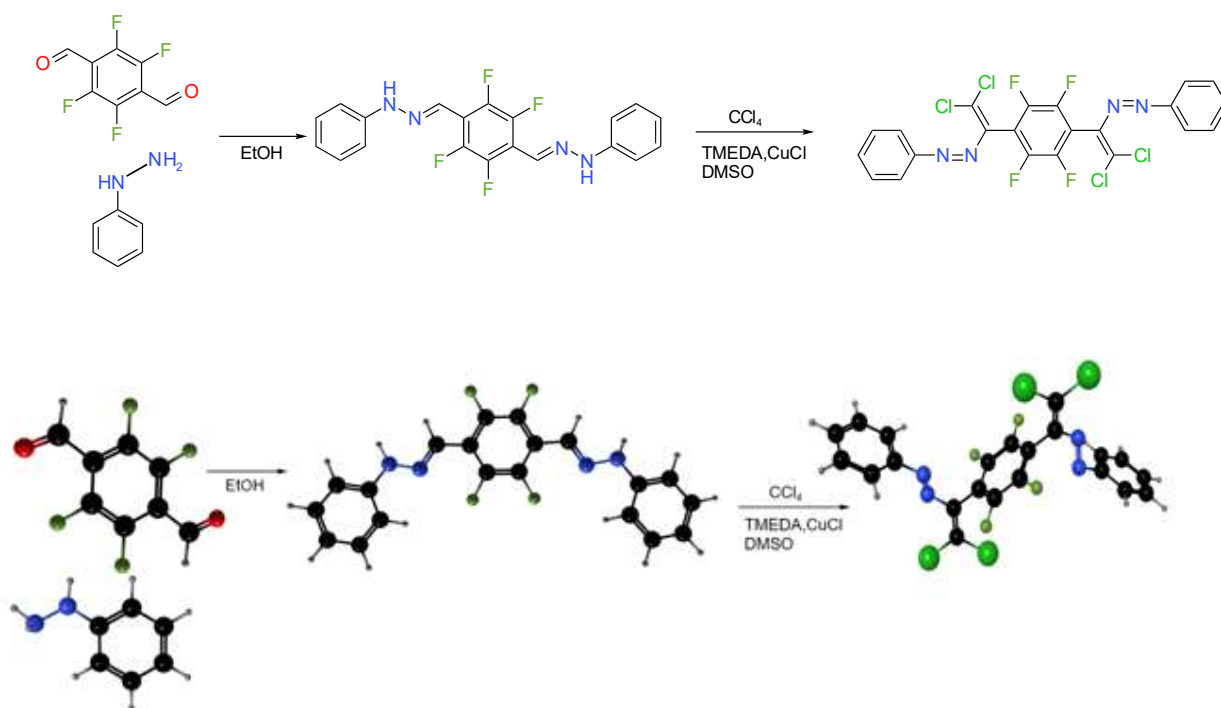


Figure 1. 2,2'-[(perfluoro-1,4-fenil)bis(metanilidene)]bis-(1-fenilhidrazine) in ^1H NMR spectrum

The reaction product is 2,2'-[(perfluoro-1,4-phenylene)bis(2,2-dichloroethene-1,1-diyl)]-bis-(1-phenyl-diazene) **2** ^1H (DMSO; δ , m.h.) in the spectrum, the absence of hydrogen signals belonging to NH and =CH groups indicates that hydrazone, which is the starting reagent, was completely consumed during the reaction. As can be seen from the reaction, the result of the reaction is C=C and =CCl₂ communications have been formed, which¹³In the C spectrum accordingly (=CCl_2) and (C=CCl_2) is proved by the presence of peaks in the area of 123.62, 129.18 m.h. (figure 2.1.2).



Catalytic olefination reaction of tetrafluoroterephthal bis-phenylhydrazones.

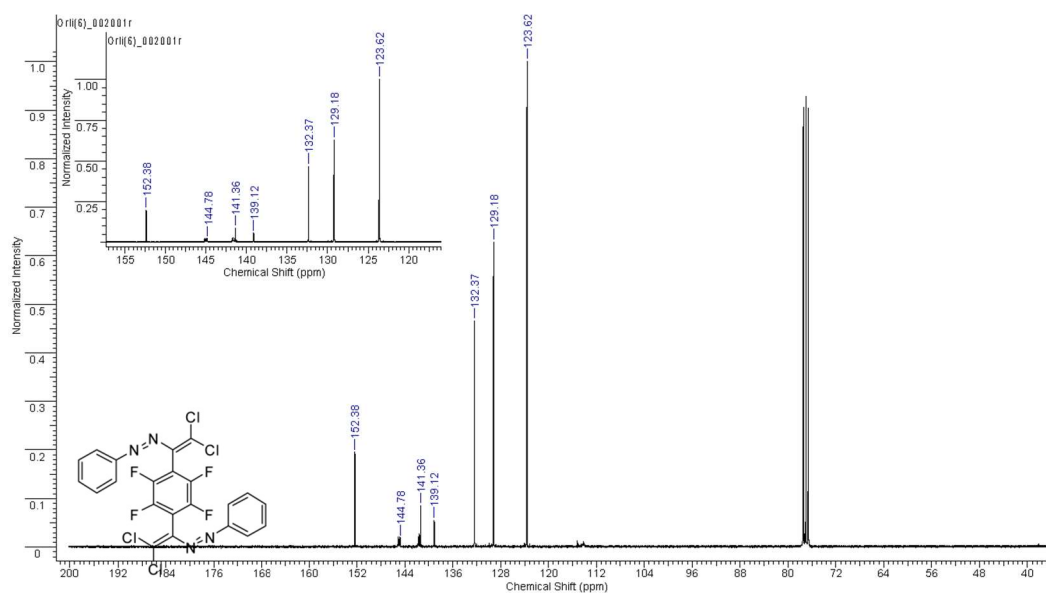


Figure 2. 2,2'-(1-phenyldiazene)-2,2'-bis(2,2-dichloroethene-1,1-diyl)bis(perfluoro-1,4-phenylene) in ^{13}C spectra.

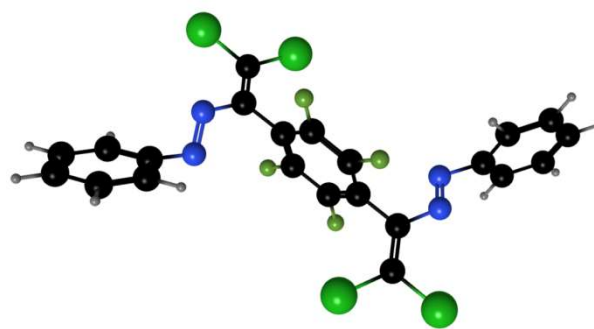
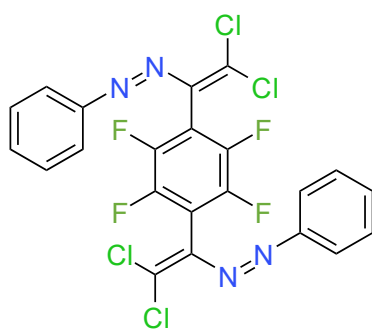


Figure 3. Molecular structure of the compound. intermolecular halogen bonds sky is indicated by broken lines.

Thus, from our side, having a perfluorinated aromatic nucleus and having substituents in the para position (-H, -OCH₃, -CH₃, -F). azo-dyes (**2**) crystallographic characteristics were studied. -OCH₃ and non-covalent bonds formed due to the acceptor or donor centers of -F functional groups are involved in the molecular design of azo-dyes [2].

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Technical Sciences

Study of damage quality of Tao-Klarjeti temples

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Keywords: earthquake, dome, temple, recovery-restoration;

Abstract: The tao-Klarjeti area is rich in monuments of Georgian architecture. This area has been under Turkish jurisdiction for centuries and our temples are neglected and neglected. The passage of time, earthquakes, various atmospheric events, and human vandalism have greatly damaged them. The paper aims to propose the arrangement of the designed seismic damping structural system in a temple for which it will be more effective.

1. Introduction

Georgian cult monuments, in particular, Orthodox Christian churches, are a symbol of our nation's identity and spiritual strength. Cultural heritage is a nation's window into the historical past. That's why it needs to be treated and protected. It is known that Georgia is located in a seismically active zone, which is why earthquakes are frequent here. This natural event for centuries damaged our churches-monasteries, the restoration and strengthening of which was and is very important both for our ancestors and for our generation. Unlike ordinary buildings, during the restoration and deepening of cultural heritage monuments, we must take into account their constructive uniqueness. Its strengthening should be done with great clarity. Tao-Klarjeti is the richest in monuments of Georgian cultural architecture. The purpose of this paper is to visually examine the degree of destruction (damage) of the existing temples there. This study was conducted based on photographs from the Internet and various used literature, for which several temples were selected. These are Bana, Oshki, Ishkhani, and Khandzta.[1,2,3,4]. The restoration of architectural monuments was also ongoing during the previous centuries. Since the middle of the last century, a specific scientific theory of the restoration of architectural monuments has been formed, which was founded at the first International Congress of Architecture and Technical Specialties in Athens, which was held in 1931, where the "Restoration-Restoration Charter" of the Italians, based on G. by Giovannini, presented their views. In 1964, at the Second International Congress, issues were discussed about the need to determine the need for the restoration of architectural monuments; The first attempt to perfect the theory of restoration was attributed to the French scientist Paul Leon, who formulated concrete methods of restoration of monuments (1938), based on N. Balanos' restoration of the architectural monuments of the Acropolis of Athens demonstrated that restoration can serve several purposes. Alonza Riegl (1903) of the Austrian Empire pointed out that there are different methods of restoration of architectural monuments, and that they should be used accordingly. The eminent Italian scientist Amborgio Annoni argued that one cannot use the same method during the restoration of different monuments. He claimed that the restoration of architectural monuments is an extremely difficult process, it is specific, and sometimes even the restorers themselves have a hard time imagining the goal and task of restoration.

2. Discussion

Bana Cathedral is an original and unique monument of Georgian architecture. It is a central domed temple, which was surrounded, the remains of which are still preserved today. After Tao-Klarjeti became a part of the Ottoman Empire, Georgian Christian churches found themselves in a deplorable state. During the Russo-Turkish War in the 19th century, the Turks used the temple as a fortress, which made it a terrible target for Russia. This further damaged this magnificent temple. It can be seen from the pictures that the dome of the temple has collapsed, there is no longer a dome neck. The railings on the walls are cracked. None of the 8 columns that supported the dome have survived, the wall on one side has completely collapsed. In terms of restoration and strengthening, the situation here is very difficult. My dissertation cannot deal with these difficulties. Here, perhaps, the conservation method will be more useful than restoration.



Fig. 1. Bana

Oshki represented the Episcopal Church; It is a cross-domed temple with a free dome. For a long time, the existence of Oshki was shrouded in fog for Georgians; Only in 1902, when Ekvtime Takaishvili traveled to Tao-Klarjeti for the first time and accurately described the state of the monument, its existence became known.

Oshki is currently in a deplorable state; If its restoration-strengthening is not done in time, it may collapse (Fig. 2.); Especially since this shoulder is in the zone of high seismic activity. The main load-bearing structures of the temple, including the dome, still exist, although they appear to be quite damaged. As can be seen from the pictures, the dome's neck has not yet lost its stability, although the arched roof of the western arm has completely collapsed (Fig. 2). With the intervention of the World Organization for the Protection of Monuments, an agreement was reached between the Tukul and Georgian sides regarding the restoration of Oshki by the Georgian side. The seismic damping system developed by us can be used in the restoration of this temple.[5]

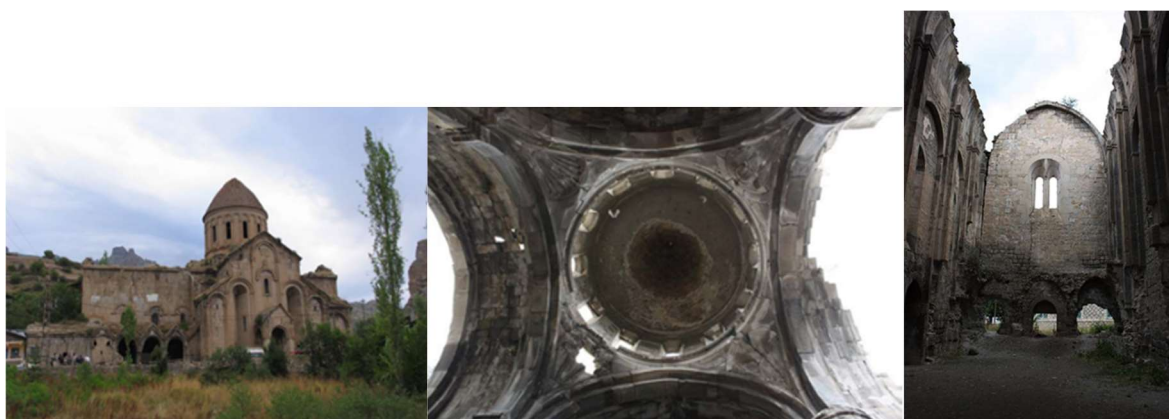


Fig. 2. Oshki - facade, dome, western arm

Ishkhan - the temple built by Grigol Khandzteli and his disciples, namely Saba Ishkhaneli. Outwardly, it seems to be the best preserved, however, after a detailed inspection, we will

discover the damages that are numerous in the temple and which, like other temples, require immediate help. The temple is an elongated cross-domed building (Fig. 3). The dome is badly damaged, with a fairly wide crack running radially from the cleat to the support ring. The throat of the dome is also damaged; The arched (vaulted) roof of the elongated western arm has completely collapsed. It is subject to restoration-strengthening.

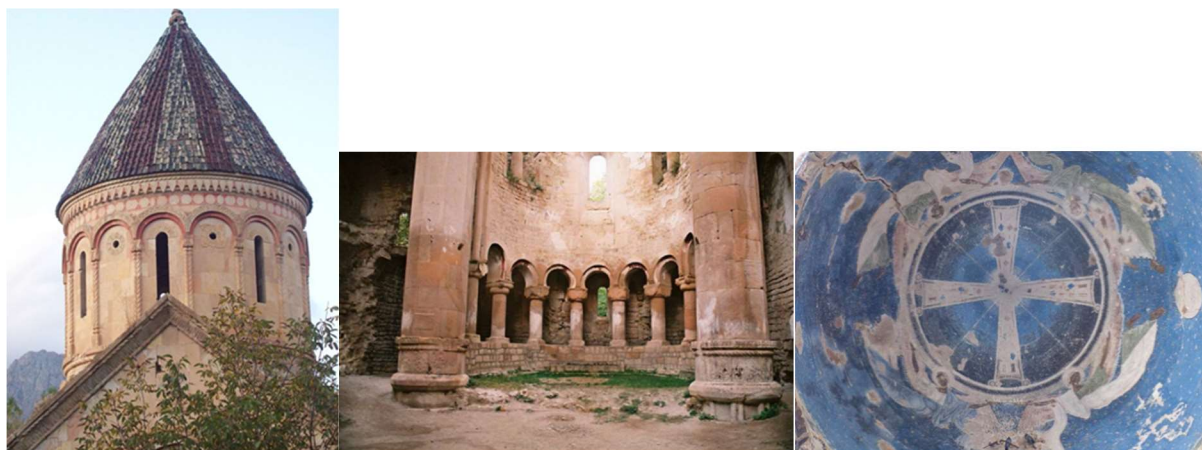


Fig. 3. Ishkhan - the throat of the dome, the altar, the dome from below

Khandza - the main temple is in the shape of an inscribed cross - it is a cross-domed temple (Fig. 4). Its dome rested on the walls of the apse on the east side, and on two piers on the west side, the remains of which have only survived. The pictures taken before 2007 show that the dome still existed (Fig. 4), and in 2010 - the dome collapsed (Fig. 4). However, the neck of the dome is visible, which, in case of restoration of the temple, it is possible to arrange a new dome. In this case, too, it is possible to use the seismic suppression system developed by me.



Fig. 4. Khandza

As the above studies show, the main reason for the damage to our historical monuments in Tao-Klarjeti, along with time, is strong earthquakes. This event for centuries damaged our churches-monasteries, the restoration and strengthening of which was and is of the utmost importance both for our ancestors and for our generation.

Unlike ordinary buildings, during the restoration and deepening of cultural heritage monuments, we must take into account their constructive uniqueness. Its strengthening should be done with great clarity. The purpose of this work is to use seismic protection measures in the restoration of domes of damaged temples. Our ancestors used anti-seismic measures during the construction of temples from time immemorial. An example of this is the "swallowtail", or the use of stone blocks in dry stacking. They arranged the frames mainly at the neck of the dome or shell, where one structural part ends and the other - the dome or shell - begins because there is a change in stiffness. It is this place that is dangerous during seismic impacts. The goal of our work is to restore

the damaged dome of the temple and to equip it with seismic protection measures so that its authenticity is not violated. For this purpose, a computer calculation model was created, the spatial calculation of which was performed using the finite element method using the computing complex "LIRA SAPR-2016". In general, the purpose of a seismic protection system is to reduce the seismic acceleration transmitted from the ground to the building. In our case, the cross-domed temple is structurally divided into two parts - the under-dome (cross) part and the dome itself. The function of the dampers placed between them is to reduce the seismic acceleration transmitted to the part of the dome.[5].

The constructional solution of seismic damping systems is as follows: a reinforced concrete grooved belt is arranged on the support ring, which is also the binder of the arches. Metal sheets will be anchored in the groove, on which the damper is mounted: rubber-metal (widely used in viaducts and overpasses in the places of support of the Mali structure) and spring. The throat of the dome is connected to the damper by a valve. Holes are made in the throat of the dome (shown in the diagram below), in which metal anchors are placed to limit vertical movement. As far as is known, this type of construction has not yet been used in practice, so it is a novelty.

Rubber-metal dampers of the new seismic suppression system were used for seismic isolation. The Seismic Isolating Rubber Bearing consists of alternating laminations of thin rubber layers and steel plates (shims), bonded together to provide vertical rigidity and horizontal flexibility.

Vertical rigidity assures the isolator will support the weight of the structure, while horizontal flexibility converts destructive horizontal shaking into gentle movement.

Rubber-metal dampers, as well as spring-type dampers, may be arranged in the structure in the throat of the dome of the temples under construction. Based on their positive and negative characteristics, as well as the calculation, it should be decided which of these types of dampers we will choose for temples (Fig. 5).

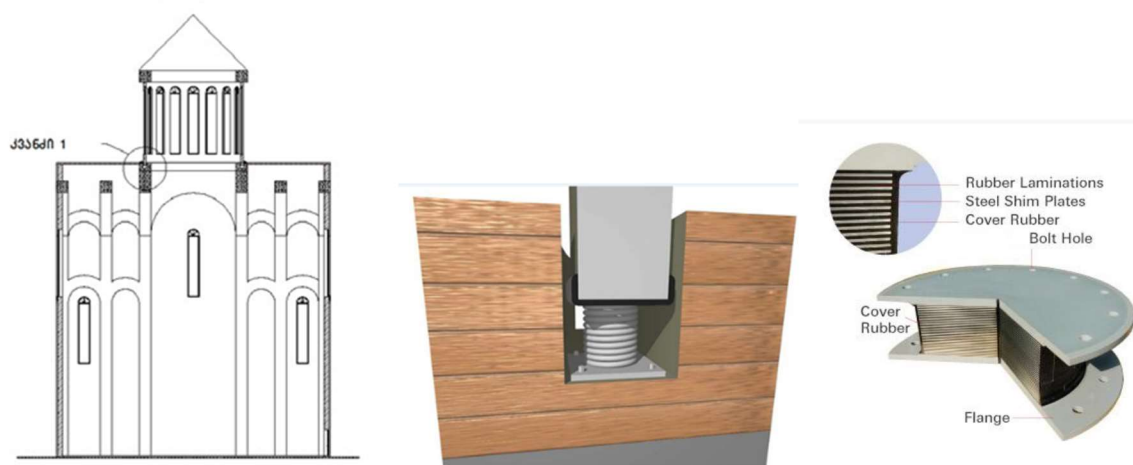


Fig. 5. Temple slit; Seismic Isolating Rubber

3. Conclusion

As the analysis of the results of strong earthquakes shows, the contact zone between the under-domed part of the temple and the dome is the most damaged and often becomes the cause of the collapse of the dome. Tensile stresses caused by seismic impact in this zone are several times higher than the calculated tensile resistance of the stone (brick) pile. Therefore, it is possible to specify the purpose of our proposed dampers - to reduce as much as possible the value of seismic bending moments in the mentioned contact zone, which will minimize the value of tensile stresses.

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PECULIARITIES OF ASYMMETRIC REINFORCED CONCRETE HIGH-RISE BUILDINGS AND THEIR DESIGN

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Abstract: Tall buildings are unique in terms of architecture, construction, construction technology, operation and reliability and are a symbol of the country's strength and technological progress. They belong to the facilities around the world that have the highest level of responsibility and reliability.

Keywords: asymmetrical; stiffness; rigidity; shear walls;

1. INTRODUCTION

The design and construction of tall buildings is closely linked to the development of economic and scientific technologies. The level of design of these types of buildings is quite high today, however, they have essential features that distinguish them from the design of traditional houses. In particular, the loads on the load-bearing structures and foundations of the building increase significantly. The height of the building determines the complexity of engineering systems and communications. Enhanced requirements for fire and safety measures will be imposed. All this has a significant impact on the selection of architectural and construction solutions, as well as a number of natural and man-made factors, such as - seismic, atmospheric, aerodynamic, vibrational.

Due to the asymmetrically placed rigidity and rigidity in the plan, the building experiences torsion during an earthquake. In many buildings, the centers of stiffness and mass do not match. Reducing the distance between the centers of mass and stiffness can reduce the gripping effect. The strength characteristics determine the dynamic reaction of the structure. The selection of structural strength characteristics is an essential part of conceptual design. Good construction behavior is achieved by a well-distributed transverse force bearing system. Non-elastic seismic action on an asymmetric building is considered based on the information available so far from the base

reaction and the oscillating moment. Seismic response is determined by eccentricity, tolerance to transverse force and torsional moment, distribution and excitation of stiffness in the plane.

2. METHODOLOGY

The constructions of multi-storey buildings depend on the available materials, construction technology and relevant service. High strength and structurally more effective materials such as concrete and steel rebars have been used since the late 19th century.

The structure of a high-rise building should be simple, regular, and the structural elements should have clearly defined load traces. As far as possible, configuration and geometry of the system should not be used which would complicate the behavior of the building and its calculation.

As a result of theoretical and experimental studies, recommendations have been developed for the calculation of flexible compressed elements, which are subsequently reflected in the norms of reinforced concrete structures in the SNC.

According to the current normative documents, the construction can be calculated according to the deformed scheme, taking into account the longitudinal bending of the non-linear deformed system, columns and beams. On the other hand, a construction design is allowed even with an unformed scheme.

Peculiarities of the design of high-rise buildings are the increased values of horizontal and vertical loads on the load-bearing structures of the building and the ground soils caused by the building's own weight, natural (seismic, atmospheric, aerodynamic) and man-made (vibration, noise, accident, local damage and fires).

These features must be taken into account when choosing a construction scheme and designing load-bearing structures.

3. MAIN PART

One of the main requirements for the design of high-rise buildings is the restriction of movement caused by horizontal loads on its load-bearing structures. The values of such displacements are limited by construction norms. For example, according to US and EU norms, their value should not exceed $1/500$, although this value is much lower for this type of building. The ratio of the height of a tall building to its smallest side in the plan is called the coefficient of flexibility. As the world practice of designing high-rise buildings has shown us, the value of this coefficient should not exceed 8, otherwise either the sanitary norms of the building are not met (vibration of roofing structures exceeds the norm) or expensive measures are taken to increase the rigidity of the building. Fig.1 graph clearly shows how the costs increase with increasing the number of storeys of the building to give it the necessary rigidity.

The components of the load-bearing structures of the building are:

Linear elements: columns, beams.

Flat elements: shear walls, slabs, ribbed slab.

Spatial members: rigidity core, outer rigidity shell or core.

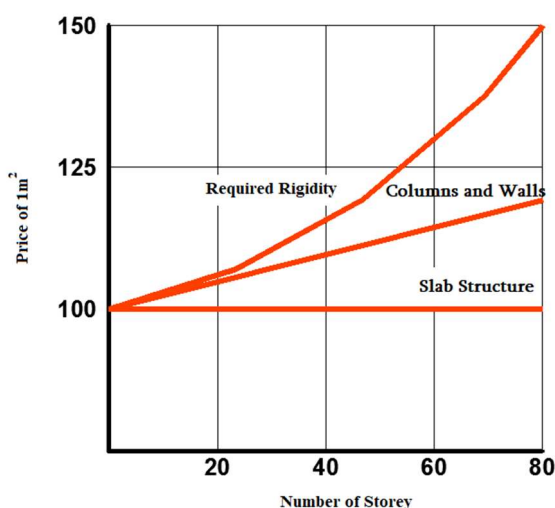


Fig.1 Increase in costs to ensure the necessary rigidity of the building.

Multi-storey framed buildings are complex spatial systems consisting of load-bearing vertical flat elements (frames, shear walls). From locked elements (rigidity core) and their connecting horizontal elements. The whole system of the building is placed on a flexible or rigid basis and is subjected to vertical and horizontal loads. The elements of the building in the vertical

direction resist their own mass, payload and uneven landing of the foundation, while in the horizontal direction wind and seismic loads. According to the horizontal load test, the structural schemes of frame buildings are divided into: cantilever, frame, frame-pylon, frame-connection and connection schemes (Fig. 2). In the carcass console scheme, joints are formed when connecting the columns to the columns: the columns act as shear spools (may be non-corrugated) under the influence of vertical loads, and the columns work as multi-storey cantilever branches under horizontal loads (Fig. 2a). In the frame scheme, rigid nodes are arranged when joining the columns of the beam, which improves the work of the columns at horizontal loads (Fig. 2b). In the frame-junction scheme of the frame, some sects expand in the form of pylons, causing the ridges to unload when horizontal forces are applied to them (Fig. 2c).

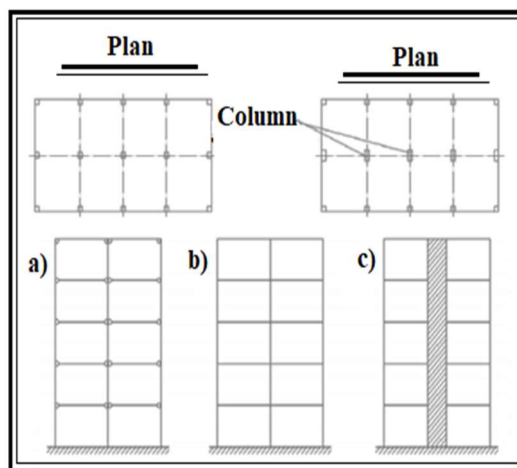


Fig.2 Construction scheme of framed building: a – cantilever; b – framed; c – frame-pylon

In the carcass frame-connection scheme, some of the cells in the frame are filled with walls or rafters, and they at the same time turn into rigid shear walls that work like a wide console. Most of the horizontal loads are received by the vertical diaphragms due to their high stiffness, while a small part is transmitted to the frame (Fig. 3d). In frame connection systems, all horizontal loads are received by vertical shear walls, due to the large flexibility of the frame, which is due to the joint connection with the columns of the railings or the small intersection of the railings, with the frames receiving only vertical loads. In order to work the frame connection scheme more clearly, it is desirable to increase the stiffness of the vertical diaphragms, for which the core of the open or closed type of stiffness is inserted in the frame (Fig. 3e). The construction scheme predetermines the decision of frame partitions and frame building nodes

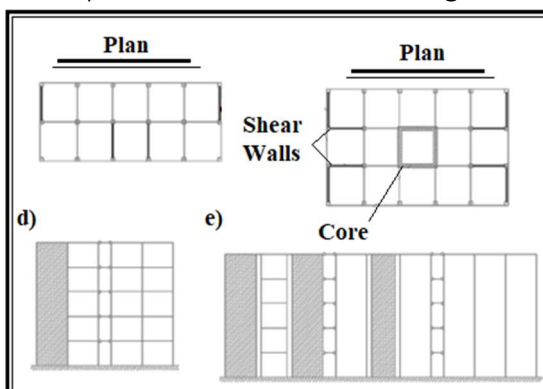


Fig.3 Construction scheme of building: d – framed-connection; e- with connections and shear-walls

The asymmetry contributes to the eccentricity between the center of gravity and the centers of stiffness, resulting in a curvature. It is true that torsion can occur for other reasons, e.g. due to the uneven distribution of masses in the building, even if the building is symmetrical. But the asymmetric solution of the plan almost always causes a twist. In addition, the asymmetry of the structures often leads to voltage concentrations. Simplicity of configuration is required to reduce the voltage concentration while maintaining symmetry. It is noteworthy that the symmetry is determined not only by the solution of the plan of the whole building, but also by the elements and nodes. A study of the working structures of buildings in the pre-earthquake period showed a relatively high sensitivity to minor, small changes in the

symmetrical plan. This is especially true for design solutions that involve the use of load-bearing diaphragms and stiffness cores. Sometimes basic structural elements, such as stiffness cores, are asymmetrically located in a generally symmetrical configuration building. In this case we are dealing with the so-called "pseudosymmetry", which emphasizes the fact that the concept of symmetry includes not only the geometric symmetry of the plan and the symmetrical arrangement of external elements, but also the internal arrangement of load-bearing and non-load-bearing elements of buildings and structures; There may also be cases where an asymmetrically designed structural system in a plan is designed so that its dynamic response corresponds to the symmetrical arrangement of the elements, which almost completely eliminates the possibility of generating a moment.

In the early stages of conceptual design of a building in seismic regions, seismic hazard issues should be considered, which are necessary at an acceptable cost to the construction system. To provide and also to meet basic requirements.

The basic principles of conceptual design are:

- Constructive simplicity;
- Uniformity, symmetry and stock;
- Two-way resistance and stiffness;
- Resistance to hardness and stiffness;
- Shear wall behavior at floor level;

3.1 Proper foundation

The calculation of the multi-storey asymmetric reinforced concrete building was carried out in st. In Batumi I. To build a 52-storey multifunctional hotel complex on Chavchavadze Avenue (Fig. 4). The calculation of the load-bearing structures of the building was carried out by means of the calculation complex "SAP 2000", based on the finite element method. The calculation model is spatial. The frame of the building (columns, rails) and rafters are modeled with stem end elements, basement walls, diaphragms and floor tiles with rectangular and triangular elements, the calculation was performed according to the limit conditions of groups I and II.

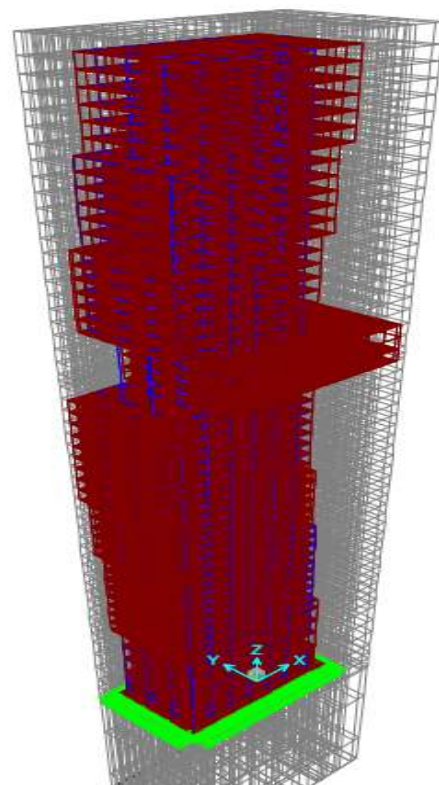
The building model of the building is compiled taking into account the requirements of various normative documents (Fig. 6). The construction materials used are:

A) Concrete B40 grade (initial modulus of elasticity $E = 36000$ MPa, compressive strength at compression $R_b = 20$ MPa);

Concrete B50 grade (initial modulus of elasticity $E = 39000$ MPa, compressive strength $R_b = 25$ MPa);

B) Armature class A500c (initial modulus of elasticity $E = 190000$ MPa,

Computational resistance to compression and tension $R_s = R_{sc} = 459$ MPa, to shear $R_{sw} = 300$ MPa.)



3.2 Analysis results:

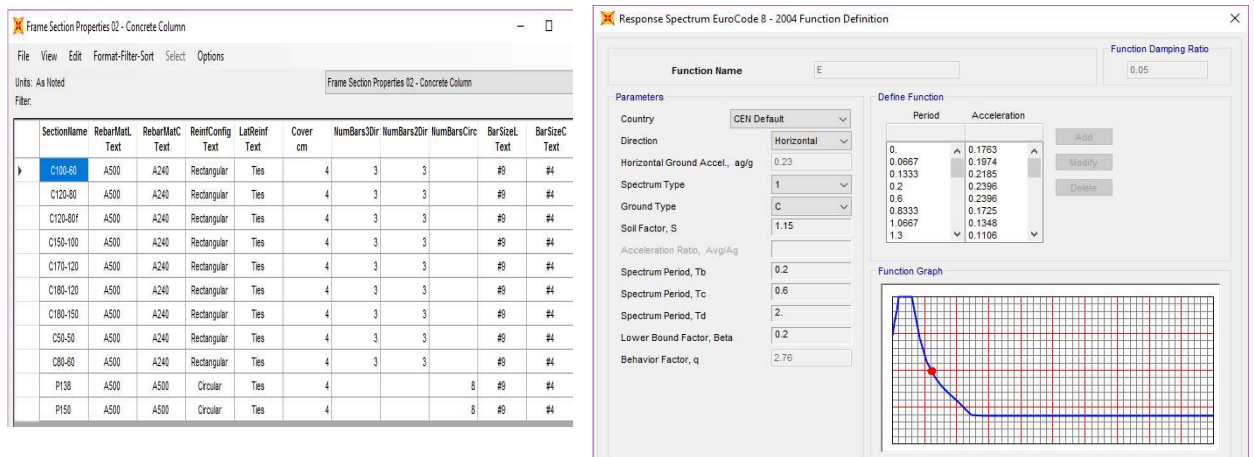
The total weight of the building $Q = 92362t$. Decisive force from seismic: along the X axis $V_x = 1473t$, along the Y axis $V_y = 1703t$.

Characteristics of stem elements 01-columns

Characteristics of stem elements (spools) / Stiffness modification coefficient

4. Conclusions

1. Reinforced concrete buildings, due to their structural complexity, need to be assessed for both overall and local resilience. Overall and local sustainability are actual events, but their analysis should not be divided into two independent calculations, as the overall sustainability loss is manifested by the local weakness of one of the columns.
2. Seismic impact "X" in the horizontal direction; "Y"; And the computer's diagonal angle of 450 is performed by the spectral method, according to the seismic properties for a Category II soil with an 8-magnitude seismic impact and using synthetic accelerograms.
3. Of particular importance is the impact of seismic impact, which causes a change in the value of the calculated length of the column. Accurate calculation of the calculated length determines the rest of the stability parameters: marginal flexibility and critical load, however it is important to determine the shape of the column reinforcement.
4. The effect of asymmetry on reinforced concrete buildings is exerted by the generation of a bending moment, which generates additional forces in the already tense columns. During horizontal seismic impact, twisting occurs in the structural elements of buildings not only due to the wavy nature of the foundation movement, but also due to the complex architectural forms of buildings and structures, non-standard construction scheme, which differs by irregular distribution of load-bearing masses and stiffness. It is therefore necessary to follow the basic recommendations and guidelines given in the current construction norms and rules and Eurocodes on the initial stages of design.



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УДК 669

Металлургия қалдықтары негізіндегі минералды қоспалармен композитті материалдар алу

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Түйіндеме. Бұл мақалада металлургия өндірісі қалдықтары негізіндегі минералды қоспаларды бетон технологиясында қолдану мүмкіндігі баяндалған. Эксперименттік зерттеулер өзінше гидравликалық белсенділік көрсетпейтін металлургия өндірісі қалдықтарын $3000-3100\text{см}^2/\text{г}$ меншікті бетке дейін ұнтақтап, байланыстырушы заттың құрамына 10%...15% мөлшерінде қосқан кезде кристалды гидратты жаңа түзілімдер үлесінің артуына ықпал ететін, қатайған цемент тасы беріктігінің жоғарылауын қамтамасыз ететіні анықталды.

Кілтті сөздер: металлургия қалдықтары, минералды қоспалар, ауыр бетондар, физика-механикалық қасиет

Абстракт. В данной статье описана возможность использования минеральных добавок на основе отходов металлургического производства в технологии бетона. Экспериментальные исследования показали, что отходы металлургического производства, которые сами по себе не проявляют гидравлической активности, при измельчении до удельной поверхности $3000-3100\text{ см}^2/\text{г}$ и добавлении в состав вяжущего в количестве 10...15%, увеличивают количество гидратных новообразований и обеспечивает увеличение прочность бетона.

Ключевые слова: металлургические отходы, минеральные добавки, тяжелый бетон, физико-механические свойства.

Қазақстан Республикасында өнеркәсіпті дамыту барысында ауыр өнеркәсіп, агробизнес және тау-кен өнеркәсібі қалдықтарының айтарлықтай көлемі жинақталған. Сонымен қатар, мұндай қалдықтардың едәуір бөлігі улы, ал бір бөлігі радиоактивті болып табылады.

Технологиялар мен инфрақұрылым экономикалық ынталандырудың, сондай-ақ басқа да ынталандырушы аспектілердің болмауына байланысты заманауи талаптарға сәйкес келмейді, ал оларды қайта өңдеу бойынша техникалық нормалар мен талаптарды мемлекеттік бақылаудың жеткіліксіздігінен енгізу деңгейі төмен. Сонымен қатар, жергілікті билік органдары мен қалдықтарды қайта өңдеу секторындағы кәсіпорындарды ынталандырудың жеткіліксіздігі, техногенді қалдықтарды кең көлемді пайдалануға

мүмкіндік бермеуде [1].

Өнеркәсіптік қалдықтарды қайта өңдеуді кеңейтудің өзектілігі мен қажеттілігі жыл сайын минералды шикізат қорларының сарқылуына, оларды өндірудің қалыптасқан құрылымына, құрылыс материалдарына қажеттіліктің артуына және қалдықтарды сақтау проблемасының нашарлауына байланысты артып келеді [2].

Қазақстанда кең көлемде жинақталған техногенді қалдықтардың түрі – бұл қара және түсті металлургия қалдықтары болып табылады. Қазақстанның оңтүстік өңірлерінің өзінде құрылыс материалдарын өндіруге жарамды металлургия қалдықтарының орасан зор қоры бар, мәселен, Ащысай полиметалл зауытында – 182 млн тонна, «Южполиметалл» АҚ-да – 2,3 млн тонна қорғасын өндірісінің металлургиялық қалдықтары жинақталған [3].

Бұл қалдықтарды құрылыс индустриясында пайдалану техногенді қалдықтарды залалсыздандыру арқылы аймақтың экологиялық жағдайын жақсартумен бірге, құрылыс материалдарының өзіндік құнын төмендету арқылы құрылыс индустриясының тиімділігін арттырға мүмкіндік беретін өзекті мәселе болып табылады.

Құрылыс материалдарын өндіруде ең көп қолданылатын домна қождары, оның өнімділігі отандық металлургиялық зауыттарда 1 тонна шойынға шамамен 0,5–0,6 тоннаны құрайды. Қайта өңделген домна қожы цемент өндірісінде, бетонға қож-сілтілі цементті толтырғыштар, бетон толтырғыштарын, қожды-сілтілі пемза, минералды қожды ұлпа, қиыршық тас және құм өндіруде кеңінен қолданылады.

Ғылыми еңбектерді жан-жақты талдау техногенді қалдықтар химиялық құрамымен, физикалық, механикалық және басқа қасиеттерімен және олардың түзілу жағдайларымен ерекшеленетінін көрсетті. Мысалы, байланыстырғыш заттар өндірісінде қара металлургияның екінші реттік қалдықтарын (домна пешінің түйіршіктелген қождары, қож құмдары) композиттік материалдарды өндіру үшін пайдалану жақсы нәтиже беретіні анықталған [4, 5].

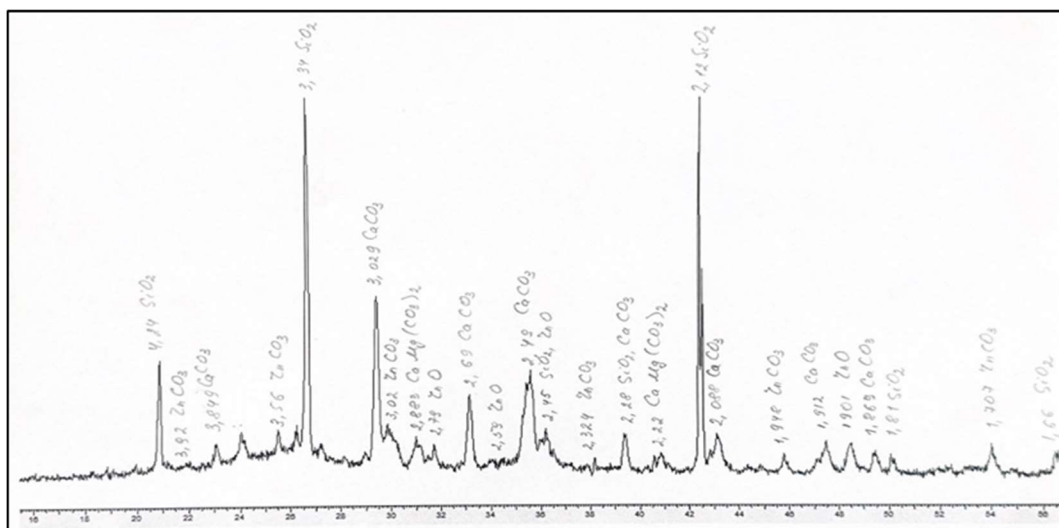
Қазіргі кезде композиттік құрылыс материалдарын өндіруде техногенді қалдықтар негізіндегі жоғарыдисперсті қоспалар кеңінен қолданылуда.

Авторлар композиттік байланыстырғыштарды алу үшін қолданылатын әртүрлі жоғары дисперсті минералды қоспаларды екі топқа бөледі [6]:

- арнайы ұнтақтау диірмендерінде белсендірілгеннен кейін гидравликалық немесе пуццоландық қасиетке ие белсенді минералды қоспалар;
- гидравликалық қасиетке ие емес, бірақ ерітінді бөлігінің түйіршіктік құрамын жақсартатын және цемент тасы мен бетонның құрылымын түзетін толықтырғыш қоспалар.

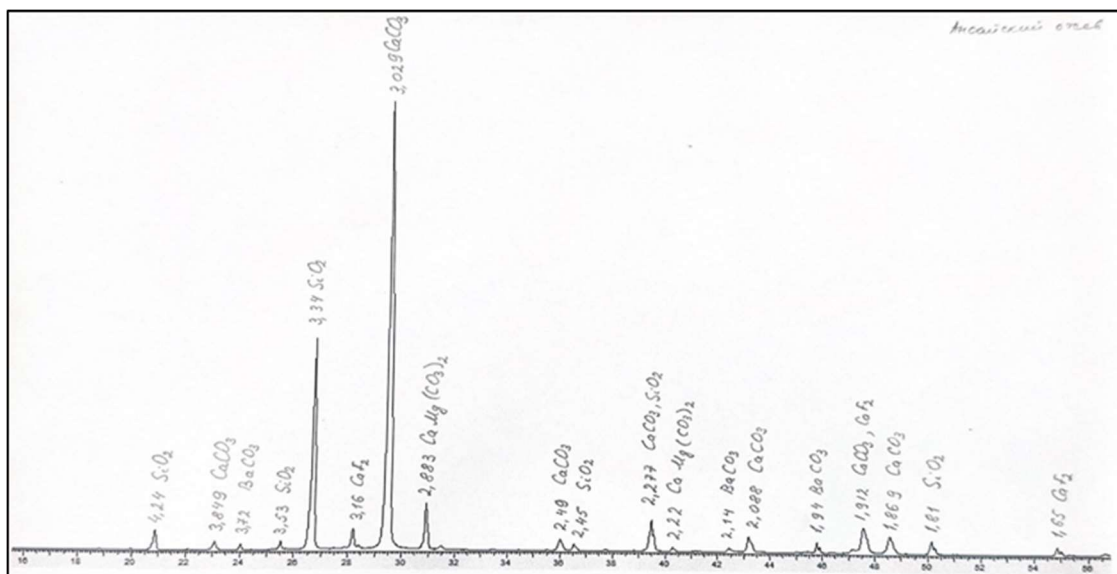
Металлургия қождары негізінен кальций, кейде магний және басқа да екі валентті металдардың түрлі силикаттары мен алюмосиликаттарынан, кремний қос тотығынан сонымен бірге сульфидтер, кейде фосфаттар мен титаниттердің араласпаларынан тұратын кешенді балқыма болып табылады.

Біз зерттеулерімізде Ащысай полиметалл комбинаты және Кентаудағы Ансай кен орнындағы металлургия қалдықтарын әртүрлі мақсаттағы бетонға минералды қоспалар ретінде пайдалану мүмкіндігін зерттедік.



1 сурет – Ащысай кенорыны техногенді қалдықтарының рентгенодифрактометриялық талдау нәтижелері

Ащысай кенорыны техногенді қалдықтарын рентгенодифрактометриялық талдау нәтижелері оның құрамында CaCO_3 (кальций корбанаты) $d = (3,849-3,029-2,49-2,277-2,088-1,912-1,869-1,626 \text{ \AA})$, SiO_2 (кварцит) $d = (4,24-3,34-2,45-2,28-1,81-1,66-1,54 \text{ \AA})$, $\text{CaMg}(\text{CO}_3)_2$ (доломит) $d = (2,883-2,22-1,54 \text{ \AA})$, ZnCO_3 (смитсонит) $d = (3,92-3,56-3,02-2,79-2,324-1,948-1,727-1,495 \text{ \AA})$ және ZnO (цинкит) $d = 2,79-2,594-2,45-1,901-1,49 \text{ \AA}$ бар екенін көрсетті.



2 сурет – Ансай кенорыны техногенді қалдықтарын рентгенодифрактометриялық талдау нәтижелері

Рентгенодифрактометриялық талдау нәтижесінде Ансай кенорыны техногенді қалдықтары құрамында CaCO_3 (кальций карбонаты) $d = (3,849-3,029-2,49-2,277-2,088-1,912-1,626 \text{ \AA})$, SiO_2 (кварцит) $d = (4,24-3,53-3,34-2,45-2,28-1,81-1,54 \text{ \AA})$, $\text{CaMg}(\text{CO}_3)_2$ (доломит) $d = (2,883-2,22-1,54 \text{ \AA})$, BaCO_3 (витерит) $d = (3,72-2,14-1,94-1,52 \text{ \AA})$, CaF_2 (флюорит) $d = 3,16-1,912-1,65 \text{ \AA}$, $\text{CaMg}(\text{CO}_3)_2$ (доломит) $d = 2,883-2,22-1,54 \text{ \AA}$ бар екені анықталды.

Физика-химиялық талдаулар екі қалдықтың құрамында да кальций карбонаты, кварцит, доломит сияқты бетонға минералды қоспалар түрінде пайдалануға жарамды табиғи минералдардың барын көрсетті. Ащысай полиметалл комбинаты қалдықтарында

кальций карбонаты мен кварциттің мөлшері Ансай кен орнының қалдықтарына қарағанда жоғары.

Композиттік байланыстырғыштарды өндірудің дәстүрлі технологиясы портландцемент клинкерін, гипсті және нормативтік құжаттамамен реттелетін белгілі бір мөлшердегі белсенді минералды компоненттерді бірге ұнтақтауға негізделген. Бірақ эксперименталды зерттеулер оңтайлы дисперсиядағы минералды компоненттің белгілі бір түрі үшін жеке ұнтақтауды қолданудың тиімді екенін көрсетті. Байланыстырғыштың құрамдас бөліктерін белгілі бір дисперстілік дәрежесіне дейін бөлек ұнтақтау әлдеқайда тиімдірек немесе портландцементке майда дисперсті компоненттерді қосуға болатыны анықталды.

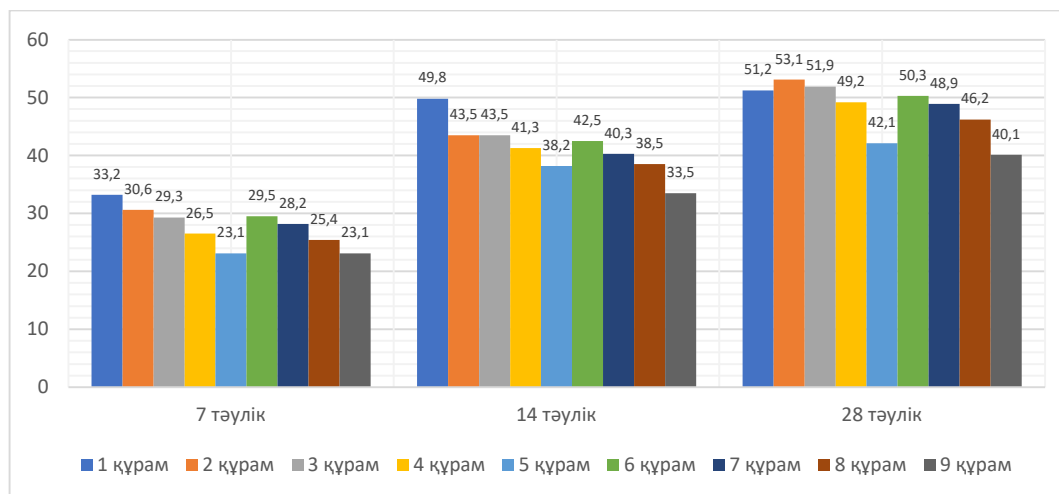
Таңдап алынған техногенді қалдықтар зертханалық шарлы диірменде 3000-3100см²/г меншікті бетке дейін ұнтақталып, 10-25% мөлшерінде қолданылатын цементтің орнына ендірілді. Ол үшін минералды қоспаның таңдап алынған мөлшері цементпен біртекті масса түзілгенге дейін араластырылып, одан кейін құрғақ компоненттерге қосылды.

Таңдалған құрамдардағы дәстүрлі толтырғыштардың 50% металлургия өндірісі қалдықтары негізіндегі толтырғыштармен ауыстырылған.

1 кесте – 1м³ бетонның құрамы

	Составы бетона	1м ³ бетонның құрамы, кг								
		Цемент	Минералды қоспа	Қиыр тас	Құм	Су	Ащысай қалдығы негізіндегі қиыр	Ащысай қалқығы негізіндегі құм	Ансай қалдығы негізіндегі қиыр	Ансай қалдығы негізіндегі құм
1	Бақылау құрамы	432	-	1200	720	182				
2	Ащысай қалдығы негізінде	388,8	43,2	600	360	182	600	360	-	-
3		367,2	64,8	600	360	182	600	360	-	-
4		345,6	86,4	600	360	182	600	360	-	-
5		324	108	600	360	182	600	360	-	-
6	Ансай қалдығы негізінде	388,8	50	600	360	182	-	-	600	360
7		367,2	100	600	360	182	-	-	600	360
8		345,6	125	600	360	182	-	-	600	360
9		324	125	600	360	182	-	-	600	360

Эксперименттік зерттеулер өзінше гидравликалық белсенділік көрсетпейтін металлургия өндірісі қалдықтары 3000-3100см²/г меншікті бетке дейін ұнтақталып, байланыстырушы заттың құрамына 10%...15% мөлшерінде қосқан кезде кристалды гидратты жаңа түзілімдер үлесінің артуына ықпал ететіп, қатайған цемент тасы беріктігінің жоғарылауын қамтамасыз ететіні анықталды.



1 сурет – Минералды қоспалардың бетонның

Зерттеулер байланыстырғыш заттың белгілі бір үлесін металлургия қалдықтары негізіндегі минералды қоспалармен ауыстыру бетонның беріктік жинау жылдамдығын аздап баяулататынын көрсетті. Дегенмен 28 тәуліктік мерзімде 2 және 3 құрамдарда (Ащысай кенорыны қалдықтары толтырғыштары мен минералды қоспалары негізіндегі құрамдар) беріктік жинау көрсеткіштері бақылау құрамымен салыстырғанда сәйкесінше 3,7 және 1,3%-ға жоғары болатыны анықталды. Осылайша байланыстырғыш заттың мөлшерін 10-15% техногенді қалдықтар негізіндегі минералды қоспалармен ауыстыру бетонның ең қымбат компоненті цементтің шығығын төмендету есебінен 1м³ бетонға 1200 тенге тиімділікке қол жеткізуге мүмкіндік береді.

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Specifics for manufacturing insulating needle-punched nonwoven materials from coarse wool

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The properties of the finished insulating needle-punched non-woven material depend on the nature of component fiber, the manner in which the fibers are arranged in the structure, and the degree of consolidation. A proper understanding of the role of different parameters in the manufacture of nonwovens is important in mat design and operation. Since many factors can affect the insulation properties. This paper is intended to study and analyze the peculiarities of the technology of needle-punched nonwoven. The process of creating nonwoven mats from 100% coarse sheep wool was studied, as well as the principles of operation of the machines included in the production line, the specifics of the needle used to create mats, and the method of needle setting.

Keywords: sheep wool, nonwoven fabric, natural fiber, insulation material, needle-punching.

The properties of finished nonwoven insulation materials are determined mainly by two groups of factors:

- 1) depends on the composition and properties of the fibers included in the mixture;
- 2) on the parameters of the technological process of mat production.

The first group includes the fiber type, dimensions, physical, mechanical, and operational properties. The second group includes parameters of fibrous canvas: thickness, density, unevenness, weight of 1 m in grams, orientation and degree of straightening of the fibers, and parameters of needle-puncturing (number of punctures per 1 cm, depth of puncturing in mm, etc.). All these factors, or parameters, determine the structure of the nonwoven fabric and, in combination with the properties of the fibers included in the mixture - the properties of the finished product, needle-punched fabric [1].

The wool of coarse wool or semi-coarse wool sheep breeds is mainly used for the production of insulating mats. The length of coarse wool is usually 65-70 mm, and the fineness is 33-35 microns. Semi-coarse wool - 80-90 mm, fineness - 33-35 microns.

Needle-punched nonwoven is a fabric made of a web consisting of fibers that have been tangled with serrated needles from top to bottom or bottom to top. This needle-punching action binds the fibers together and holds the structure together through frictional forces [2].

The process of producing wool non-woven material consists of several stages:

- 1) fiber preparation
- 2) carding
- 3) canvas forming
- 4) binding of fiber canvas

The above mentioned stages are carried out on machines installed on the production line, which allows to increase the productivity of the process.

The production line consists of:

1. Carding machine
2. Web converter
3. Pre-needle punching machine with the direction of punching from top to bottom, with a sealing device
4. Winding device, removal is carried out manually
5. The main needle punching machine with the direction of punching from top to bottom, with a sealing device
6. Winding device, removal is carried out manually

Feeding to the main needle punching machine is carried out manually. The fibers are loosened before being fed into the hopper. The canvas is formed mechanically from several layers of web coming from the removable drum of the carding machine. The carding machine consists of the following main units: a hopper feeder, a device for controlling the supply of fibrous material to the carding machine, a feeding device, a pre-carding unit with a baffling rapier-cleaning roller, and the main unit. The web converter performs multiple foldings of the web removed from the removable drum of the carding machine in order to produce a multilayer fibrous canvas of a certain width and surface density with a cross-oriented arrangement of fibers. Receiving, compensating, and spreading belt conveyors through the guide rollers transfer the web to the slatted diverting conveyor [3]. The minimum number of layers in the canvas is 2.



Figure 1 – Web converter

Working principle of needle punching technology. At needle-punching processing, the joining of fibrous fabric occurs as a result of the interweaving of fibers and friction between fibers caused by compression of the fabric. The stages of the needle punching process are shown in Figure 2.

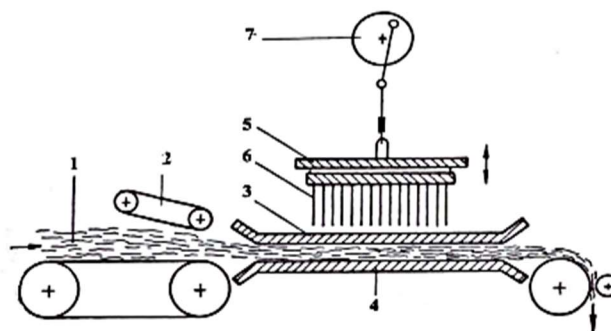


Figure 2 – Stages of needle punching mechanism:
1-fiber layer, 2-input device, 3-top perforated plate, 4-bottom perforated plate, 5-needle board, 6-needles, 7-main drive

The fiber layer is conveyed by a conveyor belt to the needle punching area. Here, the machine's main drive drives the needle board, needle plate, and needles, which together make a reciprocating downward and upward movement via the crank mechanism. The type of transmission is chain transmission. In the needle-puncturing zone, the web is between the perforated plates. The lower perforated plate supports the web and serves to adjust the punching depth, it is often referred to as a lining table. The upper perforated plate lifts the web and serves to clear the needles from the fibers as they move backwards. The pull-off rollers pull the finished material away and simultaneously pull the web through the needle-punched area. The needle impact is performed 360 times per minute on the main needle punching machine.



Figure 3 – Main needle punching machine

The density, strength and functionality of the web can be customized by adjusting the needle penetration depth, number of needles and other parameters.

Thus, the working element of the needle felting machine is the penetrating needles.

A felting needle is a special needle with notches in the working part, necessary for the tangling of fibers, which occurs due to catching of wool fibers and pushing them into the lower layers.

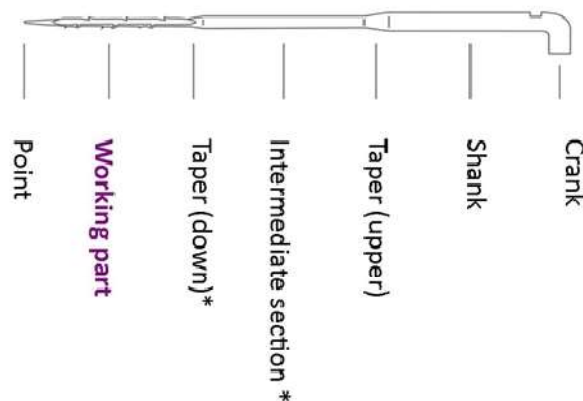


Figure 4 – Structure of a felting needle

There are many modifications of felting needles: shortened, extended, with a modified shape of the working surface. The thickness of the needle ranges from 0.5 mm to 1 mm. From the thickness of the needle depends on its number (size). The thickest needles are assigned smaller numbers, for example, #19 is the thickest needle. Needle #42 is considered the thinnest needle. Thick needles are needed for felting coarse wool, and they are used at the very beginning of felting. In the process of felting thick needles, change to thinner needles that do not leave "holes" and are easier to enter the wool. Medium-thick needles, could be used to weld the product from the beginning to the end of the process. Thin needles are used for finishing the parts.

In addition to length and thickness, felting needles have different cross-sectional shapes, different number and direction of serrations. The working part of the needle can be in the form of "star", "crown", forked, twisted, and triangular [4].

Triangular needles have a triangular cross-section. They are used at the initial stage of work. Triangular needle easily penetrates into the product and thus speeds up the process. This is the most "popular" needle. The thickest triangular needles are needed at the beginning of work - for piling coarse fibers. Medium thickness - universal needles, which can be used to create a product from start to finish. Thin triangular needles are used for final processing [5].

Another essential factor in needle punching is the way the needles are set in the needle board. A needle punching machine has a main working body, the needle board, into whose holes the needles are inserted. Needle boards are a replaceable unit of the machine with different number of needles, different needles, with different dial pattern. These factors determine the structure and properties of the nonwoven fabric. Figure 5 shows the most commonly used methods (systems) of needle setting in the needle board: a – "herringbone"; b – "checkerboard"; c – "chaotic". Of the above systems of set in practice usually use the system "herringbone", which allows you to get a more uniform punching on the entire plane of nonwoven fabric. The "checkerboard" system is mainly used to obtain a pattern on the material [6].



Figure 5 – The system of needle setting in the board a - "herringbone" b - "checkerboard" c - "chaotic"

Thus, the insulating properties of nonwoven materials are greatly influenced by the initial materials included in their composition, thermal insulation and sound insulation properties. The most significant factors affecting the above properties are fiber parameters, process parameters, needle-puncturing parameters.

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ХИМИЧЕСКИЕ СОЕДИНЕНИЯ ВЫСОКОЭФФЕКТИВНЫХ ПРОТОННЫХ ПРОВОДНИКОВ ПОСРЕДСТВОМ РАДИАЦИОННОГО ОБЛУЧЕНИЯ ПЕРОВСКИТНЫХ СТРУКТУР АВОЗ

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Аннотация: Целью данного исследования было изучение возможности синтеза высокоэффективных протонных проводников путем радиационного модифицирования известных перовскитных АВОЗ структур. Актуальность выбранного направления исследований вызвана необходимостью совершенствования технологий синтеза высокоэффективных протонных проводников для водородной энергетики будущего. Объекты исследования – цераты бария BaCeO_3 , недопированные и допированные низковалентными катионами Nd^{3+} , Gd^{3+} , Sm^{3+} . В работе использован комплекс экспериментальных методов исследований, включающий рентгенофазовый анализ, растровую электронную и атомно-силовую микроскопию, термодесорбционную, инфракрасную и импедансную спектроскопию. На основе полученных результатов сделано заключение о перспективности использования радиационного модифицирования перовскитных АВОЗ структур для синтеза высокоэффективных протонных проводников электродных материалов.

Ключевые слова: водородная энергетика, протонный проводник, церат бария, радиационное модифицирование, электронное облучение, импедансная спектроскопия.

Abstract: The purpose of this study was to study the possibility of synthesizing highly efficient proton conductors by radiation modification of known perovskite ABO₃ structures. The relevance of the chosen research area is caused by the need to improve technologies for the synthesis of highly efficient proton conductors for the hydrogen energy of the future. The objects of the study are barium cerates BaCeO_3 , undoped and doped with low-valent cations Nd^{3+} , Gd^{3+} , Sm^{3+} . The work uses a set of experimental research methods, including X-ray phase analysis, scanning electron and atomic force microscopy, thermal desorption, infrared and impedance spectroscopy. Based on the results obtained, a conclusion is made about the prospects of using radiation modification of perovskite ABO₃ structures for the synthesis of highly efficient proton conductors of electrode materials.

Keywords: hydrogen energy, proton conductor, barium cerate, radiation modification, electron irradiation, impedance spectroscopy.

Введение и обзор литературы. Водородная энергетика – это альтернативная энергетика ближайшего будущего, которая должна обеспечить устойчивое развитие и

энергетическую безопасность мирового сообщества. Перспективность водородной энергетики обусловлена экологичностью получения электроэнергии и высоким коэффициентом полезного действия топливных элементов за счет прямого преобразования энергии электрохимического окисления водорода в электрическую энергию. Следует отметить, что, хотя запасы водорода в мире практически не ограничены, интенсивное использование водорода в качестве энергоносителя связано с рядом принципиальных проблем, обуславливающих в настоящее время высокую себестоимость вырабатываемой электроэнергии и сдерживающих развитие этой отрасли энергетики. Особенно следует подчеркнуть высокую себестоимость водорода, получаемого путем электролиза, проблемы с транспортировкой, хранением и распределением водорода, а также невысокую пока рентабельность электрохимических генераторов (ЭХГ). Электрохимические генераторы формируются путем набора топливных ячеек, которые, в свою очередь, состоят из электролита и электродов. Поэтому низкая рентабельность электрохимических генераторов может быть обусловлена недостаточной эффективностью материалов электролитов и электродов топливных ячеек. Для снижения себестоимости электроэнергии и повсеместного внедрения водородных ЭХГ в промышленность и народное хозяйство необходимо решение всех перечисленных выше проблем [1].

Исследования, которые в настоящее время проводятся в области водородной энергетики, связаны, главным образом, с повышением эффективности топливных элементов, одним из основных направлений которых является оптимизация состава мембран и электролитов топливных ячеек путем синтеза новых композитов. Интенсивный поиск подобных электролитов с высокой протонной проводимостью продолжается на протяжении нескольких десятилетий. Многообразие известных в настоящее время твердых протонных проводников обычно классифицируют по рабочим температурам, выделяя низко-, средне- и высокотемпературные протонные проводники.

Каждый класс, с точки зрения их практического использования, обладает определенными достоинствами и преимуществами, но в то же время и специфическими недостатками, сдерживающими их успешную коммерциализацию [2-5]. В этой связи основной материаловедческой задачей является синтез новых материалов с заданными функциональными свойствами. В качестве материала электролита, работающего в диапазоне высоких и средних температур, предлагается использовать твердооксидные ионные проводники, которые обладают структурой перовскита ABO_3 и проявляют свойство протонной проводимости [6, 7]. Основные требования, которым должен удовлетворять материал электролита – это высокая проводимость и высокая химическая стабильность в отношении диоксида углерода [8]. В твердооксидных протонных проводниках водород не является составной частью химической формулы, его появление в структуре сложного оксида обеспечивается равновесием с H_2O/H_2 -содержащей атмосферой и описывается в рамках квазихимического формализма, как процесс диссоциативного растворения паров воды/водорода. Основным фактором, ответственным за появление протонных дефектов, является наличие вакансий кислорода, поэтому величина протонной проводимости напрямую связана с дефектностью сложного оксида. Традиционно дефектность в сложных оксидах обеспечивается путем введения акцепторного допанта, редкоземельного иона Re^{3+} [9], например Nd^{3+} , Sm^{3+} , Gd^{3+} , Yb^{3+} или Y^{3+} . В ходе процесса допирования происходит частичное замещение четырехвалентного катиона в позиции В трехвалентным металлом, которое сопровождается образованием в решетке кислородных вакансий с эффективным зарядом +2. В конечном итоге образовавшееся соединение может быть описано следующей формулой $A_2B_4 1-xRe^{3+} xO_{23-x/2}$. Образовавшиеся кислородные вакансии при определенных условиях могут заполняться гидроксильными группами, и водород, диффундируя по ионам кислорода, обуславливает появление протонной проводимости. Это,

так называемое, примесное разупорядочение, которое характерно для высокотемпературных протонных проводников типа цератов и цирконатов щелочноземельных металлов (ЩЗМ) [10]. Кроме примесного типа разупорядочения, существуют и другие способы организации кислородного дефицита, например, структурная разупорядоченность кислородной подрешетки. В таких соединениях присутствие координационно-ненасыщенных полиэдров может обеспечить возможность поглощения воды из газовой фазы и появление протонной проводимости. Поскольку число незанятых кристаллографических кислородных позиций может быть велико, то могут реализоваться достаточно высокие концентрации протонных носителей тока. К таким соединениям следует отнести криолиты $\text{Sr}_6\text{Nb}_2\text{O}_{11}$ и браунмиллериты $\text{Ba}_2\text{In}_2\text{O}_5$, для которых также характерен протонный перенос [11, 12]. Следует отметить, что для систем с примесным разупорядочением наиболее распространенным является допирование А- и В- катионных подрешеток, и такие системы наиболее полно исследованы. Гораздо меньшее внимание уделяется способам воздействия на анионную подрешетку. Так, в работе [13] было предложено использовать анионное замещение, как новый способ модификации структуры и свойств соединений. При этом предполагалось, что введение в анионную подрешетку вместо кислорода ионов другой природы, в частности, фтора, значительным образом повлияет на подвижность кислорода и, как следствие, на подвижность протонов. Комплексное исследование кислород-дефицитных оксифторидов на основе $\text{Ba}_2\text{In}_2\text{O}_5$ и $\text{Ba}_4\text{In}_2\text{Zr}_2\text{O}_{11}$ показало, что при малых концентрациях фтора наблюдается рост проводимости, который, по мнению авторов, обусловлен дополнительным электростатическим отталкиванием ионов F^- и ионов кислорода в анионной подрешетке, приводящим к активации кислородной подрешетки и увеличению подвижности, как кислорода, так и протонов. В работе [14] изучено влияние гомогенного и гетерогенного допирования $\text{Ba}_2\text{In}_2\text{O}_5$ на процессы гидратации и транспортные свойства, в частности, на кислородно-ионную и протонную проводимость и показано, что при введении Al^{3+} и W^{6+} на место In^{3+} , рост кислородно-ионной и протонной проводимостей обусловлен увеличением подвижности ионных носителей, как результат статистического расположения вакансий кислорода. Традиционный способ получения протонных проводников путем катионного допирования широко применяется в настоящее время, однако эффективность твердых электролитов, полученных данным способом, невысока, поскольку синтезированные материалы имеют ряд недостатков, обусловленных, главным образом, искажением решетки за счет различия ионных радиусов катионов «хозяина» и допанта и их электронных структур. В случае решения данной проблемы и исключения отмеченных выше недостатков можно ожидать получение протонных проводников с более высокой проводимостью и, соответственно, эффективностью электрохимических устройств на их основе, включая источники тока, а также разного рода водородные датчики, насосы, электролизеры и т.д.

Выполненные нами ранее исследования по влиянию реакторного облучения на бариевые цераты BaCeO_3 выявили сходство эффектов облучения и допирования этих материалов низковалентными катионами [18-20]. Методом термодесорбционной спектроскопии было показано, что концентрация протонов, внедренных в решетку оксида, растет с ростом степени катионного допирования, а также с ростом дозы облучения. На основании этого было сделано предположение о возможном изменении валентности церия в процессе реакторного облучения. Появление трехвалентного катиона в процессе облучения создает предпосылки для создания новой – радиационной технологии синтеза протонных проводников при облучении перовскитных ABO_3 структур. Практическое использование реакторного облучения для этих целей затруднено в связи с активацией этих материалов при нейтронном облучении, поэтому был выполнен анализ по выбору вида

радиационного воздействия на перовскиты. Одним из критериев выбора типа частиц для модификации бариевых цератов в данном случае послужило сохранение катионного состава этих материалов после облучения и последующих обработок. В случае облучения нейтронами, гамма квантами и электронами это условие выполняется априори. Облучение ионами бария или церия, которые являются составными элементами этих материалов, неизбежно приведет к изменению их стехиометрического состава, что весьма нежелательно. Из анализа литературных данных и выполненных нами предварительных исследований ожидается, что при облучении ионами кислорода в случае частичного изменения валентности церием стехиометрия $\text{BaCe}_{4-x}\text{Ce}_x\text{O}_{3-x/2}$ должна трансформироваться в $\text{BaCe}_{4-x}\text{Ce}_x\text{O}_{3-x/2}$. Образованные при этом кислородные вакансии, концентрация которых должна составить примерно $x/2$, должны заполниться гидроксильными группами при отжиге на воздухе. Особого рассмотрения требует облучение этих материалов протонами. Хотя водород не является элементом структуры этих материалов, именно он является носителем заряда и обеспечивает свойство протонной проводимости. Из полученных нами экспериментальных данных и выполненного литературного анализа ожидается, что в случае подтверждения возможности восстановления Ce^{4+} до Ce^{3+} при облучении, в данных материалах при взаимодействии с окружающей средой установится примерно такая же стехиометрия, как в случае облучения ионами кислорода. Исходя из выше сказанного, сделано заключение о целесообразности выбора ионов кислорода и протонов для модификации перовскитов. Также представляет огромный интерес и возможность модификации свойств перовскитов посредством облучения их гамма квантами и электронами. В связи с этим комплексное изучение влияния облучения на свойства протонных проводников является актуальной задачей.

Целью данной работы являлось изучение возможности синтеза высокоэффективных протонных проводников путем радиационного модифицирования известных перовскитных АВО₃ структур. Актуальность выбранного направления исследований вызвана необходимостью совершенствования технологий синтеза высокоэффективных протонных проводников для водородной энергетики будущего. Объекты исследования – цераты бария BaCeO_3 , недопированные и допированные низковалентными катионами Nd^{3+} , Gd^{3+} , Sm^{3+} . Методика исследования. В работе использован комплекс экспериментальных методов исследований, включающий рентгенофазовый анализ, растровую электронную и атомно-силовую микроскопию, термодесорбционную, инфракрасную и импедансную спектроскопию. Полученные результаты и заключение. В ходе выполнения настоящей работы синтезированы керамические образцы состава $\text{BaCe}_{1-x}\text{R}_x\text{O}_{3-x/2}$, где R – Nd, Gd, Sm, а x – степень катионного допирования равная 0.05, 0.1, 0.15 и 0.2. Проведен контроль качества синтезированных образцов и характеристика структуры, морфологии поверхности и состояния газовых компонент в решетке цератов. Изучено влияние типа катиона-допанта на процессы термодесорбции молекул кислорода, диоксида углерода и воды из цератов бария. С помощью программы SRIM-2011 проведено моделирование процессов имплантации протонов и ионов кислорода в решетку оксида. Моделирование позволило получить информацию о пробегах ионов в церате бария, процессах дефектообразования и распыления, выбрать оптимальные условия модифицирования перовскитов. В случае ионов кислорода энергия имплантации была выбрана 28 МэВ, а в случае протонов – 1.1 МэВ. Такой выбор энергий обеспечивается приблизительно одинаковый пробег ионов кислорода и протонов в церате бария. Выполнено облучение церата бария протонами с энергией 1,4 МэВ и проведены комплексные исследования структуры и свойств облученного материала. Показано, что протонное облучение до дозы 10^{17} см^{-2} приводит к сглаживанию рельефа и стимулирует образование ячеистых структур на поверхности церата. Выполнены расчеты, позволяющие оценить распределение температур в образцах церата бария при их

облучении ионами кислорода с энергией 28 МэВ и электронами с энергией 1,3 МэВ. Выполнено облучение недопированного и допированного неодимом цератов бария ионами кислорода с энергией 28 МэВ до различных доз. Обнаружен рост концентрации гидроксильных групп в допированных образцах бариевых цератов с дозой облучения. Замечено, что облучение ионами кислорода приводит к очистке поверхности материала от диоксида углерода. Проведено облучение цератов бария с различным допантом электронами с энергией 1.3 МэВ до доз 1.0, 5.0 и 10 МГр. Установлено, что электронное облучение приводит к существенному сглаживанию рельефа облученной поверхности и стимулирует на ней формирование игольчатых структур. Размеры вновь образовавшихся структур (< 50 нм) позволяют сделать вывод о наноструктурировании поверхности при электронном облучении. Более отчетливо эти эффекты проявляются на церате, допированном гадолинием, и усиливаются с ростом дозы облучения. Наряду с изменением рельефа, электронное облучение способствует очищению поверхности от карбонатных структур.

Проведены исследования импеданса допированного неодимом церата бария после облучения электронами с энергией $E=1.3$ МэВ. Установлено, что электронное облучение вызывает уменьшение электросопротивления электролита в ~ 3 раза. Полученные результаты доказали справедливость высказанных предположений о возможности использования радиационного модифицирования, как способа направленного улучшения свойств исследованного электродного материала.

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Термохимиялық өзгеріс кинетикасын ескере отырып органикалық қалдықтарды плазмалық өңдеуді модельдеу

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Кілт сөздер: органикалық қалдықтар, плазмалық өңдеу, синтез газы

Аннотация: Аталмыш мақалада органикалық қалдықтарды плазмалық өңдеудің тиімділігін түсіндіру көзделген.

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Моделирование плазменной переработки органических отходов с учетом кинетики их термохимических превращений

Ключевые слова: органические отходы, плазменная переработка, синтез-газ.

Аннотация: В данной статье предусмотрено разъяснение эффективности плазменной обработки органических отходов.

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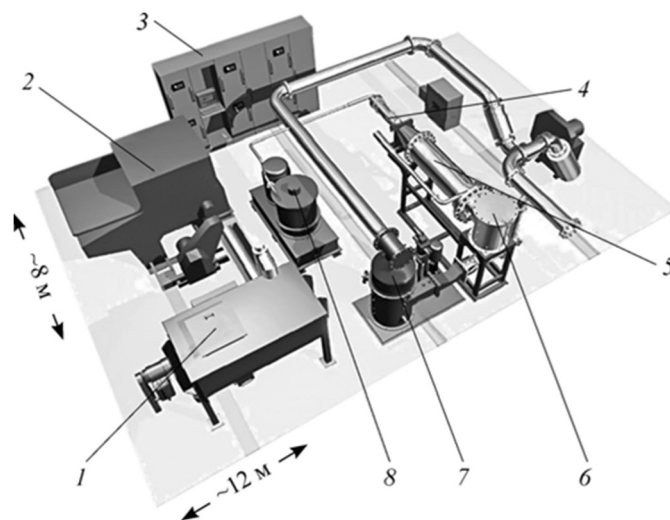
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Modeling of plasma processing of organic waste, taking into account the kinetics of their thermochemical transformations

Words: organic waste, plasma processing, synthesis gas.

Annotation: This article provides an explanation of the effectiveness of plasma treatment of organic waste.

Құрамында органикалық заттар бар қалдықтардың пайда болу көздері: тұрғындардың өмір-тіршілігі, кәсіпорындардың өндірістік және әкімшілік-шаруашылық қызметі болып табылады. Мұндай қалдықтардың мысалдары ретінде: коммуналдық қалдықтар, органикалық заттармен ластанған топырақтар, жарамсыз және тыйым салынған пестицидтер, тұрақты органикалық ластағыштар, соның ішінде полихлорланған бифенилдер, мұнай шламдары, химия өнеркәсібінің хлорорганикалық өндірістерінің қалдықтары, минералды тыңайтқыштар мен өсімдіктерді қорғаудың химиялық құралдары өндірісінің қалдықтары, Органикалық синтез өндірісінің қалдықтары (қышқылдар, альдегидтер, кетондар, спирттер), кондиционерленбеген зымыран отыны, ағынды сулар және басқалары[1].



Сурет 1. Органикалық қалдықтарды плазмалық газдандыру схемасы.

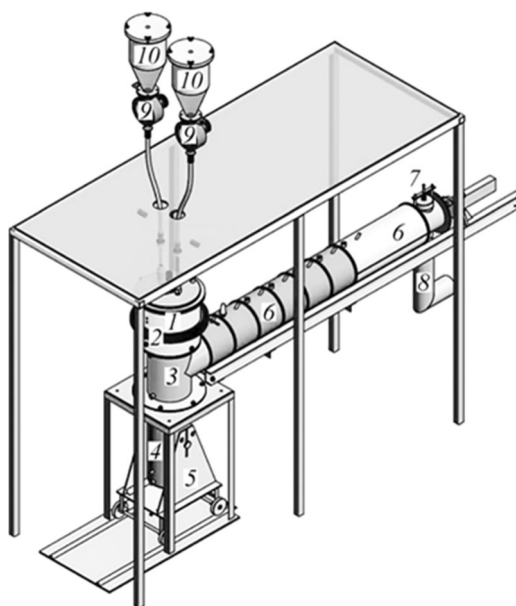
1-қалдықтарға арналған бункер, 2-қалдықтарды ұсақтағыш, 3-плазмалық қондырғының электрмен жабдықтау көзі, 4-плазмотрон, 5-газификатор, 6-газдандыру өнімдерін сөндіру камерасы, 7-Вентури скруббері және циклон камерасы бар синтез газын тазарту жүйесі, 8-қалдықтарды ұнтақтауға арналған диірмен.

Қалдықтарды жоюдың дәстүрлі процестерінің экологиялық және технологиялық тиімсіздігі байқалып отыр. Қатты органикалық қалдықтарды плазмалық өңдеу, оның ішінде қауіпті және зиянды қалдықтарды өтімді өнімге, отын газына қайта өңдеудің жаңа экологиялық таза процесі болып табылады. Дамыған елдерде соңғы жылдары қалдықтарды плазмалық өңдейтін зауыттар пайдалануға берілуде. Қалдықтарды қайта өңдеудің бұл технологиясы қалдықтарды ірі-тоннаждық қайта өңдеу және энергетикалық газ алу үшін белсенді даму сатысында тұр.

Нормативтік материалдарға сәйкес, агрегаттық күйі мен физикалық формасы бойынша қалдықтар дисперсті жүйелерді қоса алғанда, газ тәрізді, сұйық және қатты болып бөлінеді. Плазмалық технологиялар әсіресе дисперсті қалдықтарды қайта өңдеуде тиімді. Канадалық PyroGenesis компаниясы әзірлеген шаң күйіндегі қалдықтарды плазмалық газдандыру схемасы 1-суретте көрсетілген. Пилоттық плазмалық қондырғының өнімділігі қалдықтардың құрамына байланысты 25-тен 100 кг/сағ-қа дейін өзгереді. 1-бункердің қалдықтары 2-ұсақтағышқа, содан кейін 8-диірменге түседі. Шаң тәрізді қалдықтар ауамен 4-плазмотрон бар 5-газификаторға тасымалданады, онда оларды газдандыру жүзеге асырылады. 6-су буымен сөндірілгеннен кейін алынған синтез-газ 7-газ тазарту жүйесінде тазартылады және ПЭК-і 35-40% тиімділікпен электр энергиясын өндіру үшін кәдеге жарату жүйесіне түседі. Газды тазарту жүйесінен кейінгі синтез-газы келесі құрамға ие болады, % көлем: CO - 27,6, H₂ - 13,2, CO₂ - 4,8, оның жану жылуы 5,2 МДж/кг құрайды.

Қатты отынды қолданудың плазмалық технологиялары көмір шаңын тұтандыру және газдандыру үшін плазмалық отын жүйелерін пайдалану кезінде энергетика мен металлургияда өзінің тиімділігін көрсетті[2-3]. 2-суретте 1-цилиндрлік плазмалық реактор, 3-синтез-газ және қожды бөлу камерасы, 4-қож жинағыш, 6-салқындату және синтез-газ сынамаларын алу камералары және 9,10-отын жүйелерін қамтитын көмірді плазмалық газдандыруға арналған эксперименттік қондырғы ұсынылған (реактордың электр қуаты 30-дан 100кВт-қа дейін өзгереді). Қондырғы ауадағы, су буындағы, көмірқышқыл газындағы, оттегідегі және олардың қоспасындағы әртүрлі ортадағы көмірді газдандыруды жүзеге асыруға арналған. Тәжірибелер нәтижесінде процестің

жоғары көрсеткіштері алынды: көмірді газдандыру дәрежесі 95% дейін, синтез-газ шығымы бумен газдандыру кезінде 95%, ал ауамен газдандыру кезінде 55,8% дейін.



Сурет 2. Көмірді плазмалық газдандыруға арналған қондырғы.

1-плазмалық газификатор, 2-электромагниттік катушка, 3-шлак пен газды бөлу камерасы, 4-шлак жинағыш, 5-шлак жинағыш көтергіш, 6-газды іріктеу және салқындату секциясы, 7-сақтандырғыш клапан, 8-синтез-газды шығару камерасы, 9-шаң жіберу, 10-көмір шаңының бункері.

Шаң тәрізді қалдықтарды өңдеуге арналған плазмалық қондырғылардың оңтайлы технологиялық және конструктивтік сипаттамаларын таңдау үшін, қарастырылып отырған процестерді математикалық модельдеу негізгі технологиялық есептеудің термодинамикалық және кинетикалық әдістері құрамына кіретін көрсеткіштер керек. Олар реагенттердің оңтайлы температурасы мен жылдамдығы, қалдықтарды конверсиялау дәрежесі, процеске жұмсалатын энергия шығыны, плазмалық реактордың геометриялық параметрлері. Терға бағдарламасы бойынша орындалған қалдықтарды плазмалық өңдеуді термодинамикалық зерттеу, ауа және бу орталарында көміртегі бар қалдықтарды плазмалық газдандыру кезінде синтез-газдың максималды шығысы 1600 K температурада қол жеткізілетінін көрсетті [4].

Қалдықтардың органикалық массасынан жоғары калориялы синтез газын алуға болады, ал минералды масса - негізінен темір карбидінен, кальций моносиликаты, кремнез және темірден тұратын бейтарап шлак болып табылады. Қалдықтардың жақсы сәйкестігін көрсететін плазмалық өңдеу бойынша эксперименттік деректермен термодинамикалық есептеулер нәтижелерін салыстыру жүргізілді. Электр доғасымен және алынған өнімдерді одан әрі термохимиялық өңдеумен екі фазалы реакция ағынының термиялық және динамикалық өзара әрекеттесуі, термодинамикалық модельдеу процестердің толық көрінісін бермейді, өйткені ол процестің жүру уақыты сияқты маңызды критериймен жұмыс істемейді, бұл қалдықтарды плазмалық газдандыру үшін реактордың конфигурациясы мен өлшемдерін анықтауға мүмкіндік бермейді.

Органикалық қалдықтарды плазмалық өңдеудің математикалық моделі

Ағынды қалдықтарды плазмалық өңдеу процесін кинетикалық модельдеу ішкі плазмалық көзі бар цилиндрлік арналардағы тотықтырғыш, термодинамикалық модельге қарағанда, олардың плазмалық газдандыру процесін уақыт бойынша қарастыруға мүмкіндік береді. Химиялық реакциялардың соңғы уақытын есепке алу, плазмалық газдандыру өнімдерінің температурасын, жылдамдығын және концентрациясын анықтаудан бөлек плазмалық реактордың нақты өнімділігіне қатысты қажетті геометриялық өлшемдерді анықтауға мүмкіндік береді. Кез келген өнімділік реакторы үшін әртүрлі типтегі органикалық қалдықтарды плазмалық газдандыруды есептеу үшін математикалық модель және оны жүзеге асыратын Plasma-Waste компьютерлік бағдарламасы әзірленді. Қалдық бөлшектерін плазмалық газдандырудың математикалық моделі электр доғасының ішкі жылу көзі бар реакторда таралатын, екі фазалы, қалдық бөлшектерден және тотықтырғыш газдан тұратын химиялық реакцияға түсетін ағынды сипаттайды. Қалдық бөлшектері мен газ реакторға бірдей температурада түседі. Бөлшектер, газ және электр доғасы арасында жылу-масса алмасу жүреді. Бұдан басқа, ағын мен реактор қабырғасы арасындағы жылу мен импульс алмасуы ескеріледі. Одан басқа органикалық қалдықтардың кейбір химиялық түрленулері қарастырылады, атап айтқанда, бастапқы ұшпа өнімдердің түзілуі, газ фазасындағы бөлінетін ұшпа өнімдердің реакциясы және кокс қалдықтарының газдандыру. Шаң тәрізді қатты отындарды газдандыру процесінің математикалық моделі, соның ішінде органикалық қалдықтар, сызықтық емес қарапайым дифференциалдық теңдеулер жүйесімен ұсынылған және жұмыста егжей-тегжейлі сипатталған [5]. Модель химиялық реакциялардың толық сипаттамасымен, 1-кестеде көрсетілген (n -температура факторы (Аррениус теңдеуіндегі температурадағы дәреже көрсеткіші), E – реакцияның активтену энергиясы, ккал*моль⁻¹) бастапқы өнімдер түзілу реакциясы мен олардың алдағы өзгерісін көрсететінімен ерекшеленеді. Химиялық реакция жылдамдығының тұрақтыларының температураға тәуелділігі Аррениус теңдеуімен сипатталады: $k_j = A_j \cdot \exp(E_j/(RT)) \cdot T^n$.

1-кестеден 1-6 реакциялармен сипатталатын органикалық қалдықтардан ұшпа заттардың бөлінуі байқалады. Газдандыру процесінің шектеу кезеңдері болып табылатын 7-9 гетерогенді реакциялар, көміртектің су буымен, оттегімен, көмірқышқыл газымен әрекеттесуін сипаттайды. Газдандыру кезіндегі бастапқы өнімдердің одан әрі өзгеруі 10-50 радикалды реакциялармен сипатталады. Математикалық модельдің теңдеулер жүйесін шешудің бастапқы шарттарын қалыптастыру кезінде газдың бастапқы жылдамдығы мен температурасының шамаларын және қалдықтардың бөлшектерін, реакторға кірудегі қысымды, реактор қабырғаларының температурасын, бастапқы органикалық қалдықтардың құрамы, газ бен қатты фазаның массалық шығындарының арақатынасы және реактордың ұзындығы бойынша плазмалық көзден жылу бөлудің таралуын енгізу керек.

1-кесте

№	Реакция	$\lg A^*$	n	E	№	Реакция	$\lg A^*$	n	E
1	$[H_2]_s = H_2$	18,2	0	88,8	26	$H + H_2O = H_2 + OH$	11,0	0	20,3
2	$[H_2O]_s = H_2O$	13,9	0	51,4	27	$H_2 + O = H + OH$	7,3	1,0	8,9
3	$[CO]_s = CO$	12,3	0	44,4	28	$H_2O + M = H + OH + M$	13,3	0	105,0
4	$[CO_2]_s = CO_2$	11,3	0	32,6	29	$H_2O + O = OH + OH$	10,5	0	18,3
5	$[CH_4]_s = CH_4$	14,2	0	51,6	30	$CO + OH = CO_2 + H$	4,1	1,3	-0,8
6	$[C_6H_6]_s = C_6H_6$	11,9	0	37,4	31	$CO + O_2 = CO_2 + O$	11,5	0	37,6
7	$C + H_2O = CO + H_2$	3,3	0	29,0	32	$CO_2 + H = CO + OH$	6,2	1,3	21,6
8	$C + CO_2 = CO + CO$	5,3	0	43,0	33	$CO + O + M = CO_2 + M$	12,8	0	4,1
9	$C + O_2 = CO_2$	5,7	0	38,0	34	$C_2H_2 + M = C_2H + H + M$	11,0	0	114,0
10	$CH_4 + H = CH_3 + H_2$	11,1	0	11,9	35	$C_2H_2 = C + C + H_2$	6,0	0	30,0
11	$CH_4 + OH =$ $= CH_3 + H_2O$	0,5	3.1	2,0	36	$C_2H_2 + O_2 = HCO + HCO$	9,6	0	28,0
12	$CH_4 + M =$ $= CH_3 + H + M$	14,2	0	88,4	37	$C_2H_2 + H = C_2H + H_2$	11,3	0	19,0
13	$CH_4 + O = CH_3 + OH$	10,2	0	9,2	38	$C_2H_2 + OH = CH_3 + CO$	9,1	0	0,5
14	$CH_3 + H_2O =$ $= CH_4 + OH$	9,8	0	24,8	39	$C_2H_2 + O = CH_2 + CO$	10,8	0	4,0
15	$CH_3 + H_2 = CH_4 + H$	9,7	0	11,4	40	$CH_2 + H_2O = CH_2O + H_2$	11,0	0	3,7
16	$CH_3 + M =$ $= CH_2 + H + M$	13,3	0	91,6	41	$CH_2 + O_2 = HCO + OH$	11,0	0	3,7
17	$CH_3 + O_2 = CH_3O + O$	10,7	0	29,0	42	$C_2H + O_2 = HCO + CO$	10,0	0	7,0
18	$CH_3 + OH =$ $= CH_2O + H_2$	9,6	0	0	43	$C_2H + H_2O = CH_3 + CO$	9,1	0	0,5
19	$CH_3 + O = CH_2O + H$	11,1	0	2,0	44	$C_6H_6 = C_2H_2 + C_2H_2 + C_2H_2$	12,0	0	85,0
20	$CH_3O + M =$ $= CH_2O + H + M$	10,7	0	21,0	45	$OH + OH = H_2O + O$	9,5	0	1,1
21	$CH_2O + M =$ $= HCO + H + M$	13,5	0	81,0	46	$H + OH + M = H_2O + M$	10,6	0	0,0
22	$HCO + M =$ $= H + CO + M$	11,2	0	19,0	47	$H + H + M = H_2 + M$	9,6	0	0,0
23	$O_2 + M = O + O + M$	12,7	0	115,0	48	$CH_2 + OH = HCO + H_2O$	10,5	0	1,5
24	$H_2 + M = H + H + M$	11,3	0	96,0	49	$H + OH = H_2 + O$	9,8	0	7,0
25	$H + O_2 = O + OH$	11,3	0	16,8	50	$H_2 + OH = H_2O + H$	11,4	0	10,0

Қорытынды

Plasma-Waste бағдарламасының көмегімен 10 кг/сағ плазмалық реактордың өнімділігі үшін ауадағы және бу ортасындағы органикалық қалдықтарды плазмалық газдандырудың кинетикалық есептеулері орындалды. Плазмалық-ауа және плазмалық-бу газдандыру есептеулері салыстырмалы түрде қысқа уақыт ішінде (0,7 және 1,22 с) плазмалық реактордағы қалдықтардың бөлшектерінің реактордан шыққан кезде жану жылуы шамамен 3540 және 5070 ккал/кг болатын жоғары калориялы синтез газы түзілгенін көрсетті. Бұл ретте 1 кг қалдықтардан 1,16 кг жанғыш газ және қалдықтарды бумен газдандыру кезінде 0,87 кг таза синтез-газ түзіледі. Қалдықтарды плазмалық-ауалық және плазмалық-бу газдандыруды салыстыру, ауамен газдандыру кезінде 1 кг қалдықтардан жанғыш газдың меншікті шығымдылығы бу газына қарағанда 26% жоғары, бірақ алынған жанғыш газдың энергетикалық құндылығы плазмалық бумен газдандыру кезінде 30% жоғары екенін көрсетті.

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Study of transverse oscillations of the building as a discrete-continuous system, taking into account the shock effect caused by impulse impact

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Keywords: Impulse, impact, seismicity, oscillation, explosion

Abstract: The nonlinear oscillations of the oscillator when the metal rod works according to Prandtl's scheme only on displacement are studied. The essence of the delay algorithm is established and the formulas for calculating the unknown forces and corresponding displacements taking into account plastic displacements are given.

The results of the calculations performed in the case of the oscillator are given. Plots of displacements and forces are constructed for different values of the parameters. It is shown that under conditions of impulse impact, the influence of the initial speed and not the acceleration on the oscillation process is essential. In the case of repeated impulse impact, the response of the building for different moments of this impact is given.

Introduction: Opinions have been expressed about the existence of the shock effect during an earthquake and its impact on buildings and structures, according to which the shock effect can be named as the main cause of damage due to an earthquake. [1,2,3] A theory has been developed that equates seismic radiation with a mechanical impulse, the propagation of which obeys the shock mechanics. laws. At the same time, there is a heated debate among specialists about the regularity of the provisions, hypotheses, and assumptions that are the basis of the methods of calculating the seismic resistance of buildings [4,5,6,7].

The problems of propagation of stress in the elastic-plastic environment have been in the interest of a wide circle of scientists since the middle of the last century. This is understandable because any more or less intensive impact load causes plastic deformations. Issues of strength and stability of buildings subjected to shocks or explosions can be investigated only by representing the regularity of elastic-plastic deformation propagation[8,9,10,11].

There are two main issues in the theory of oscillation of elastic-plastic bodies: one is the selection of the theory of plasticity and the other is the selection of a mathematical apparatus for the study of dynamic problems.

It is believed that the theory of microplasticity is the most convenient for solving dynamic problems. Harmonic and statistical linearization methods for solving non-linear tensor equations are considered a mathematical apparatus. The use of the mentioned methods requires a sufficient level of mathematical training. To a certain extent, not only the mathematical difficulties but also the impossibility of considering a wide range of tasks under consideration may prove to

be an obstacle to their widespread use. Therefore, it is relevant to develop a method based on simple, visible, and physical processes, which will allow us to study the oscillations of buildings under the conditions of seismic (specifically, impulse) impact on it, taking into account the work outside the limits of elasticity.

2. Introduction Consider the transverse oscillations of the oscillator, which are caused by the horizontal impulse movement of the ground. According to the delay algorithm [12,13,14,15], consider the mass and the rod separately, taking into account the force S of their interaction, at the same time we mean that the force S is modeled in the center of gravity of the mass. Therefore, the movement of the mass is determined only by the force S , which represents the reaction of the rod and which, depending on the state of the rod (in elastic or plastic state), can depend on the end displacements of the rod linearly (in the elastic state) or with some unknown dependence (in the plastic state) $S = F(\Delta)$. According to the same algorithm, let's divide the oscillation time into small sections and consider Δt as a constant in each section, i.e. $S = \sum S_i$

The equation of motion of the suspended mass will have the form.

$$\frac{d^2 y}{dt^2} = \frac{S}{m} = \sum \frac{S_i}{m}$$

If we integrate this equation with zero initial conditions, we get:

$$y = \sum_{i=1}^I \frac{S_i (t_I - t_i)}{2m} \quad (1)$$

Where $t_0=0$, $t_1=\Delta t, \dots, t_I = I \cdot \Delta t$ On the other hand, we have a rod that is subjected to a force acting on the end. As we mentioned, the rod works only on displacement, therefore the elastic displacement at its end will be taking into account the displacement deformation $\frac{Sl}{GF}$, where GF is a shift module, F It is clear that in the process of oscillation, when S reaches the limit value, S will have at the end of the rod.

$$S l$$

Maximum tensile displacement $\frac{S l}{GF}$ And some more plastic displacement Δ_{pl} . to move the end of the mass and rod continuity given that the lower end of the rod has undergone displacement Δ will be written as follows:

$$\Delta - \frac{S l}{GF} - \Delta_{pl} = \sum_{i=1}^I S_i \frac{(t_I - t_{i-1})^2}{2m} \quad (2)$$

given condition (2) It is fair for the horizontal area of the Prantll diagram for elastic area S_{ZRV} . -is instead we will have $S = \sum S_i$, what about Δ_{pl} . It can be represented as follows:

$$\Delta = \sum_{i=1}^{I-1} \Delta_i + \Delta \quad (3)$$

where the first summation in the right side of the equation is the sum of the plastic displacements that have accumulated under consideration from 1 to 2

I-1-till. We present it in the same way (2) The right side of Eq

$$\sum_{i=1}^I S_i \frac{(t_I - t_{i-1})^2}{2m} = \sum_{i=1}^{I-1} S_i \frac{(t_I - t_{i-1})^2}{2m} + S_I \frac{(t_I - t_{I-1})^2}{2m} \quad (4)$$

equality (4) The first summation on the right-hand side is known for the bij $t=t_I$ as well as the first summation of the right-hand side of equation (3). Thus, equality (2) takes the form:

$$\Delta - \frac{Sl}{GF} - \sum_{i=1}^{I-1} \Delta_i - \Delta_I = \sum_{i=1}^{I-1} S_i \frac{(t_I - t_{i-1})^2}{2m} + S_I \frac{(t_I - t_{I-1})^2}{2m} \quad (5)$$

.When in the elastic area, $\Delta_{pl}=0$, the corresponding increase in S_i is determined as follows:

$$S_i = \frac{\Delta_{gr} - \frac{Sl}{GF} - \sum_{i=1}^{I-1} \Delta_i - \sum_{i=1}^{I-1} S_i \frac{(t_I - t_{i-1})^2}{2m}}{\frac{(t_I - t_{I-1})^2}{2m}} \quad (6)$$

If we are in the horizontal area of the Prandtl diagram, then it is clear $S_i=0$ because the force no longer experiences growth, and the growth of plastic deformation is determined from equation 5 Δ_{pl} which will be equal to:

$$\Delta = \Delta - \frac{Sl}{GF} - \sum_{i=1}^{I-1} \Delta_i - \sum_{i=1}^{I-1} S_i \frac{(t_I - t_{i-1})^2}{2m} \quad (7)$$

It is also clear that assembly changes in the horizontal area of the Prandtl diagram. On the elastic area, it maintains the value it had on the horizontal area at the moment of transition to the elastic area. The reduction of the absolute amount of plastic movement will occur only if the opposite sign moves to the horizontal area.

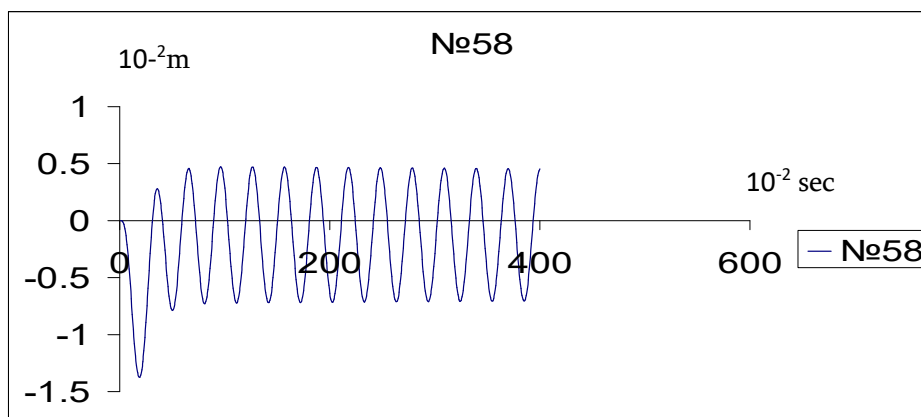
Calculations are performed for the study of non-linear oscillations of a one-story building when the supporting structure of the building is made of metal columns with a diameter of 6 m. in both directions. The columns are composed of two N20a channels, which are covered with 20x20 m. 16 cm thick reinforced concrete slab. The height of the columns is 4 m. shear flow limit $\tau_s=1600\text{kg}/\text{sm}^2$, The total cross-sectional area of the shelves is 800 cm². The mass of the reinforced concrete slab is equal to 15000 kg. As a result of the earthquake, the foundation of the building experiences an impulsive displacement $W = ate^{-\beta t}$ Where is the initial velocity? $\frac{1}{\beta}$

And the time when the movement reaches its maximum. Depending on what is and ... β the impact will be different and the result (as we will see later) will be qualitatively different.

To correctly perceive the obtained results, let's understand the physical picture of the oscillation. With the beginning of the ground movement, the displacement deformation in the stem begins to occur, which can be considered positive. If we were to see longitudinal deformations of the rod, we would have stretching. At the same time, the mass moves in the direction of ground movement. The forces induced in the rod increase, but if the impact is less than a certain value, then the forces may not reach the threshold values, and plastic deformations may not begin to occur. In this case, we have elastic deformations, the mass moves in the direction of the movement of the ground, and at a certain moment the forces will begin to decrease because the movement of the ground approaches the maximum value and then it must start to return, and the mass will continue to move by inertia, and for a certain moment the forces will change their sign (in the case of longitudinal forces we would have kumshva). Obviously, in this case, the displacement of the mass will be greater than that of the ground, and the force will be greater in absolute magnitude than in the case of positive deformations, here plastic deformations can occur, which will reach the maximum value and will not decrease until the deformations change their sign and the forces reach the limit values with the opposite sign.

Once the plastic deformations have finished and we are probably no longer affected by ground motions, free oscillation will occur concerning the residual plastic displacements. As a specific example, the case is considered when $=10 \text{ cm/s}$, and the limit force is kg. According to the given impulse law of ground displacement, the maximum value of acceleration is equal to which gives us approximately The maximum displacement of the ground is equal to 0.73 cm and it is

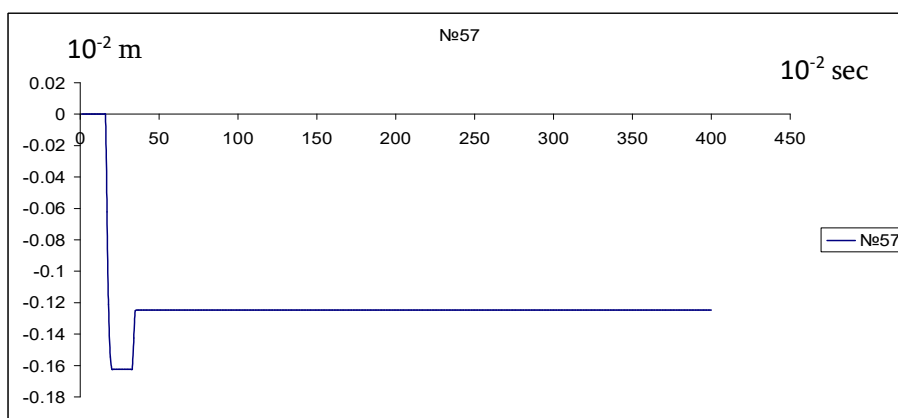
reached after 0.2 s. The maximum displacement of the mass is equal to 1.385 cm and it reaches it after 0.35 s (Fig. 3.4, 3.5, 3.6). The free oscillation is completed with an amplitude of 0.61 cm, concerning the residual plastic displacement of 0.124 cm, the maximum plastic deformation was equal to -0.162 cm. As for the forces, they do not exceed kg. During the free swing, the forces reached only about kg. It should be noted that the maximum displacement during full elastic oscillation is equal to 1.387 cm. Free oscillation occurs with an amplitude of 0.77 cm. As for the maximum value of the force, we have $1.29 \cdot 10^{-6}$, and in free oscillation, it is kg. which indicates the fact that considering plastic deformations significantly reduces the forces. (Fig. 1, 2, 3). The shape of the impulse is given in Fig. 3.9. The same maximum acceleration can be achieved at a different value, e.g. In this case, the maximum mass.



$$\alpha=10$$

$$\beta=5$$

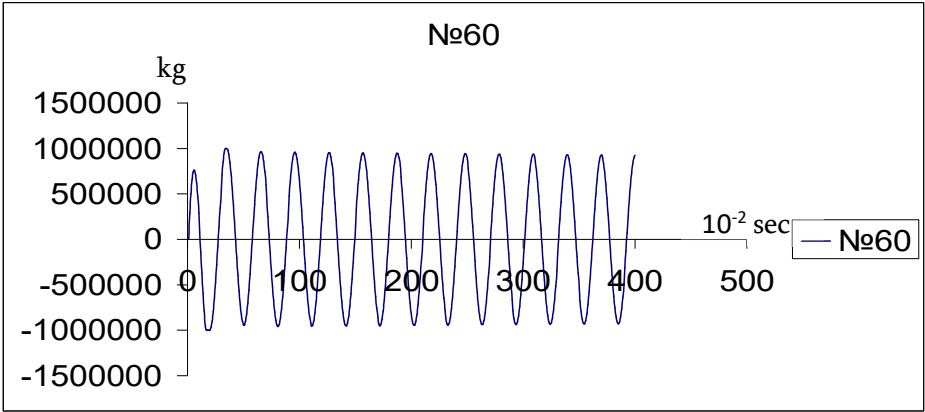
fig. 1 Elastic-plastic oscillator displacements



$$\alpha=10$$

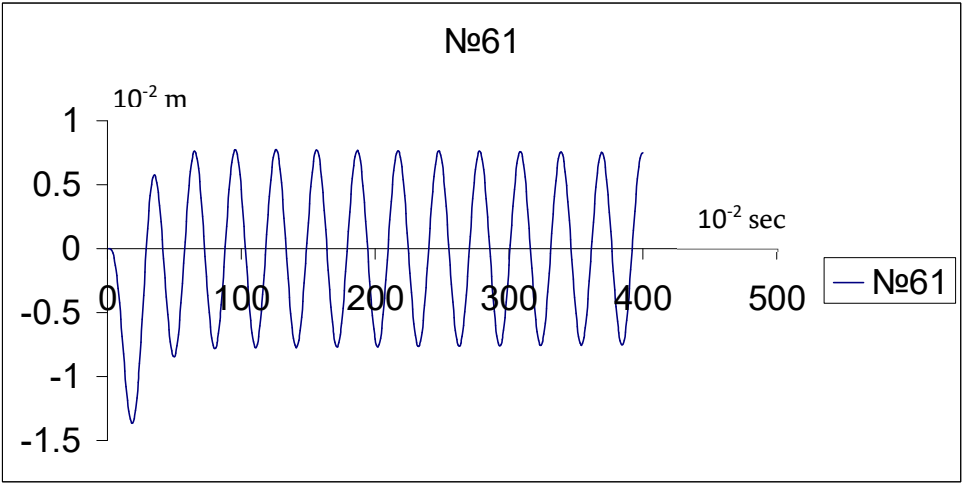
$$\beta=5$$

fig. 2 Plastic displacements



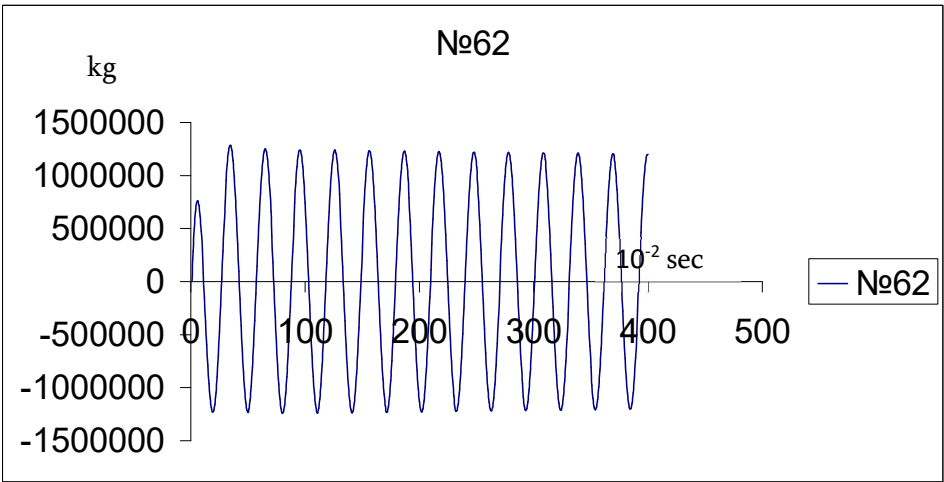
$\alpha=10$
 $\beta=5$

fig. 3 Forces in an elastic-plastic oscillator



$\alpha=10$

fig. 4 Displacements of an elastic oscillator



$\alpha=10$
 $\beta=5$

fig. 5 Displacements of an elastic oscillator

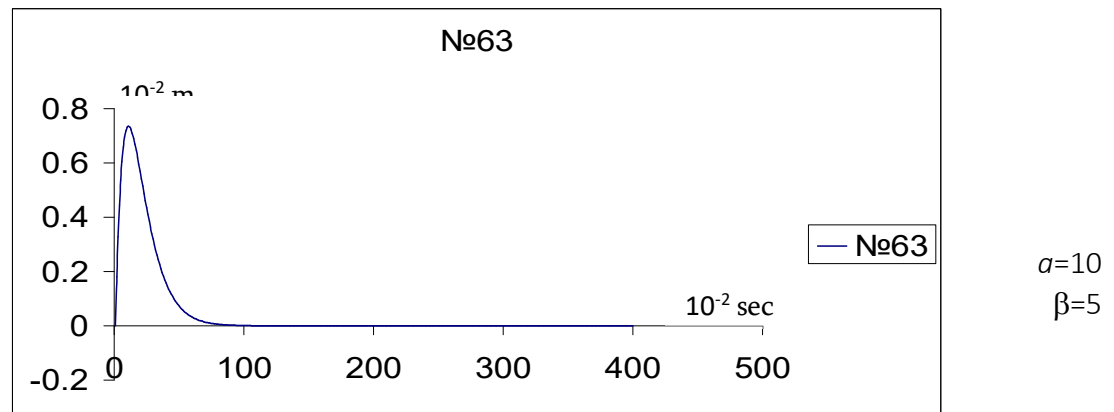


fig. 6 Impulsive displacement of the ground

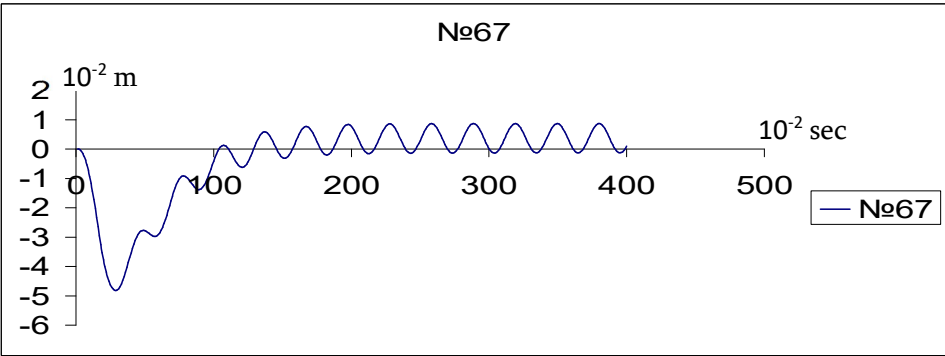
The displacement is -0.3 cm. Free oscillation occurs with an amplitude of cm. As for the forces, their value does not exceed kg. As we can see, in the conditions of the discussed impulse impact, the speed and not the acceleration is essential. A halving of the speed reduced the forces by a factor of two and more, and the displacements even more.

The following case gives the same regularity: here too there is an acceleration. But the maximum displacement is equal to 4.8 cm, free oscillation with an amplitude of 0.35 cm. A residual plastic displacement of 0.37 cm occurs. As for the maximum plastic displacement, it is equal to 1.58 cm. (Fig. 7,8). The maximum force value is kg, and the free oscillation occurs with an amplitude of kg (Fig. 9). The displacement of the ground is equal to 4.6 cm. (Fig. 10). In the case of the same, the full elastic displacement is equal to 7.1 cm. A free oscillation with an amplitude of 2.7 cm relative to the initial location. As for the forces, they reach kg, and the oscillation occurs with an amplitude of ... kg. (Fig. 11, 12)

The given results point to the fact that if the nature of the impact is close to the considered impulsive impact, then the measure of the seismic regions should be not the acceleration but the velocity.

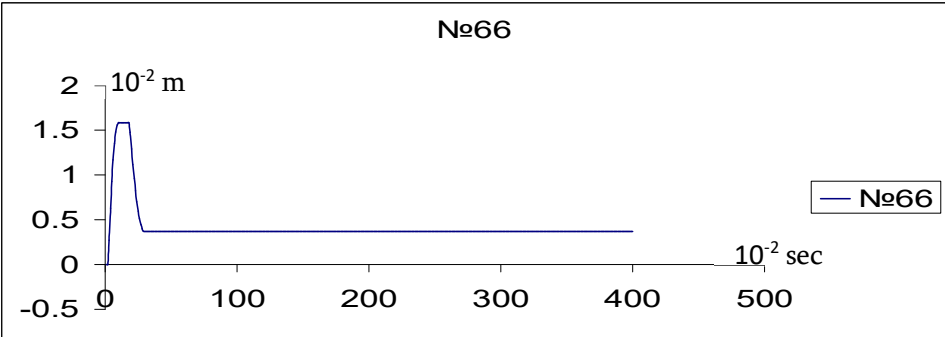
Cases of repeated shocks, when the same impulse acts on the structure after a certain time, have also been investigated. Depending on the moment of the swing the repeated hit is made, the result will be different. The force based on the physical law of the material cannot exceed the limit value, and it can be significantly reduced by reducing it. The situation is almost the same with displacements, with the difference that displacement is not limited and it can be significantly increased.

Both in the case of single and repeated impacts, the cases where the material becomes completely elastic at a certain moment (we no longer have a horizontal area) are considered.



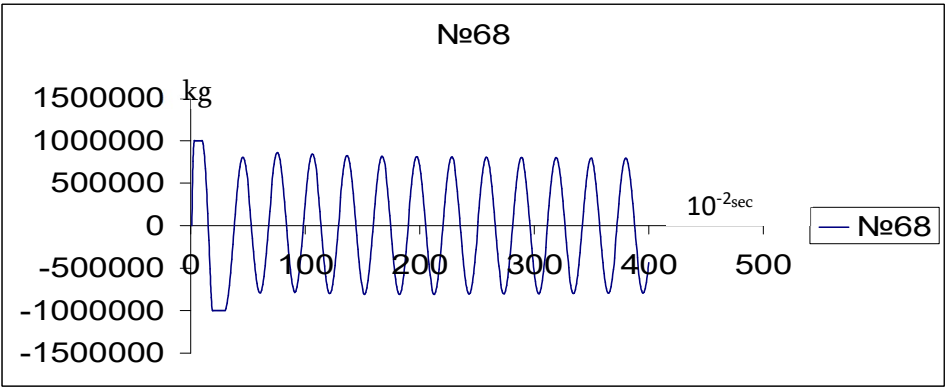
$\alpha=25$
 $\beta=2$

fig. 7 Displacement of an elastic-plastic oscillator



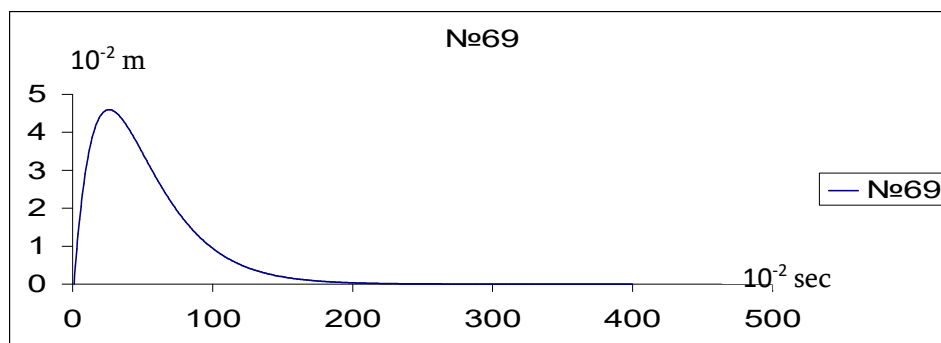
$\alpha=25$
 $\beta=2$

fig. 8 Plastic displacements



$\alpha=25$
 $\beta=2$

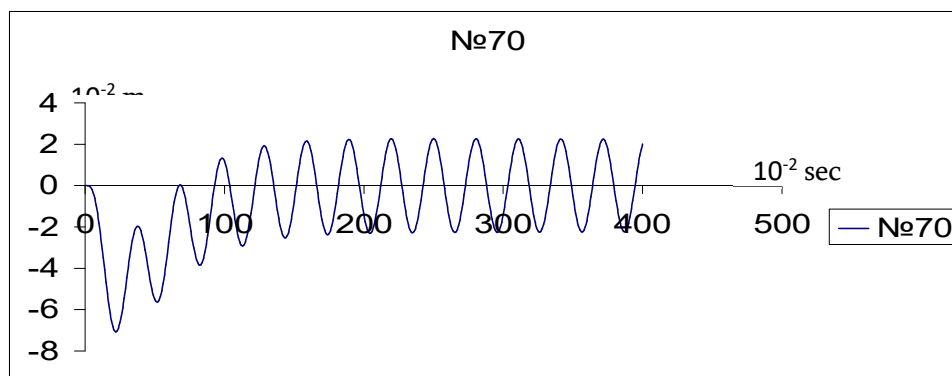
fig. 9 ground displacements



$$\alpha=25$$

$$\beta=2$$

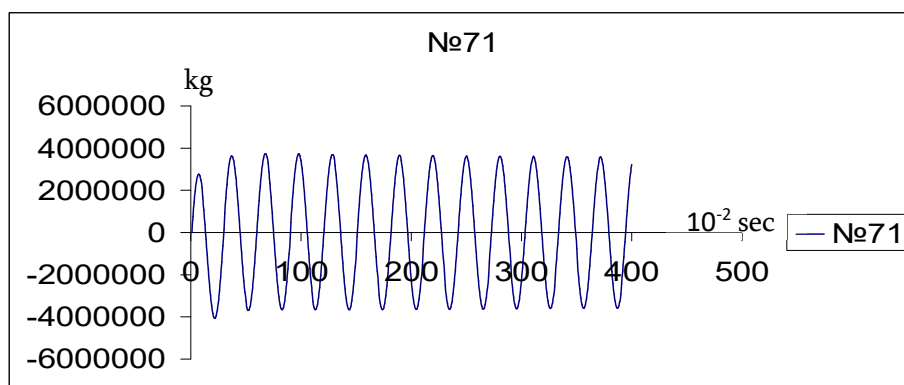
fig. 10 Ground impulse displacement



$$\alpha=25$$

$$\beta=2$$

fig. 11 Displacements of an elastic oscillator



$$\alpha=25$$

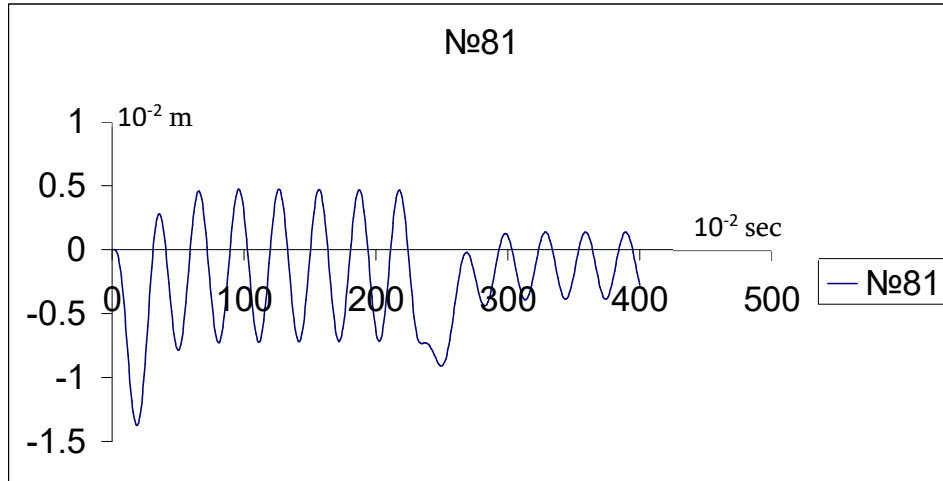
$$\beta=2$$

In a single stroke, if we already have a free swing, then this does not matter, because the total forces are small and do not reach the limit value.

In repeated shocks, the effect would be significant because both displacements and forces are much greater than in a single elastic swing.

This program can be used to study the effect of dampers. Dampers are usually used at the foundation level, ie at the lower end of the rod because it is assumed that the force between the rod and the mass is constant within the rod, so the damper will be affected by the same force as at the top. When the force reaches the threshold value given for the damper, the damper will operate As a plastic body with a horizontal area on the physical law. If we know the shear deformation of the damper and hence the horizontal displacement, then we can calculate the displacement assigned to the lower end of the rod, which will be equal to the algebraic sum of the direct ground displacement and the displacement of the top layer of the damper. We attribute

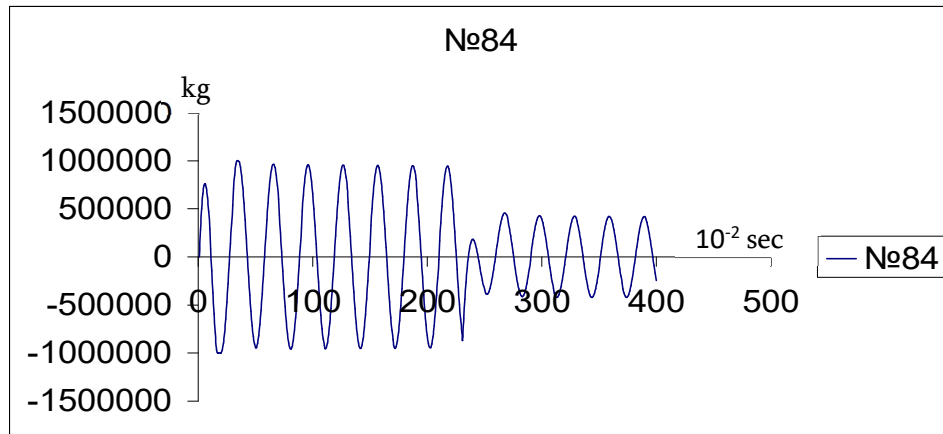
this displacement to a system that operates entirely in an elastic state. Only the deformation of the damper requires determination. In the definition of a plastic body, we read [2], that when the deformation rate is not equal to zero, the material behaves as a viscous liquid defined by the equation, where the deviator of the stress tensor, f is the tensor function of the strain rate tensor..... $\mu = \eta \times I_2$ where η is the viscosity coefficient, and I_2 is the second invariant of shear deformation rates [15].



$$\alpha=10$$

$$\beta=5$$

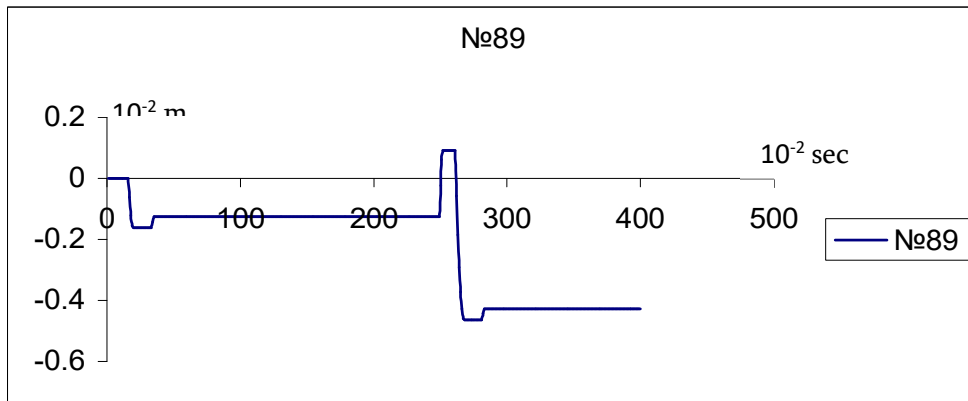
fig. 13. Displacements during repeated impulse



$$\alpha=10$$

$$\beta=5$$

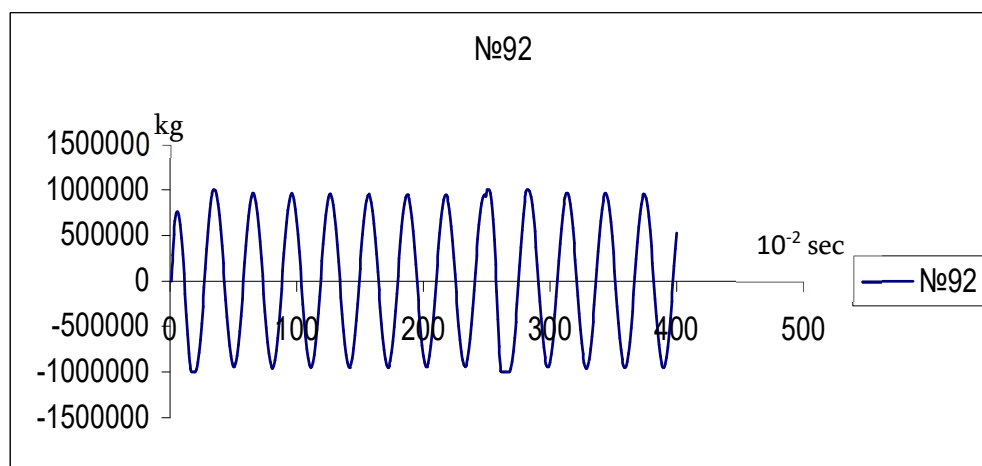
fig. 14. Forces in repeated impulse



$$\alpha=10$$

$$\beta=5$$

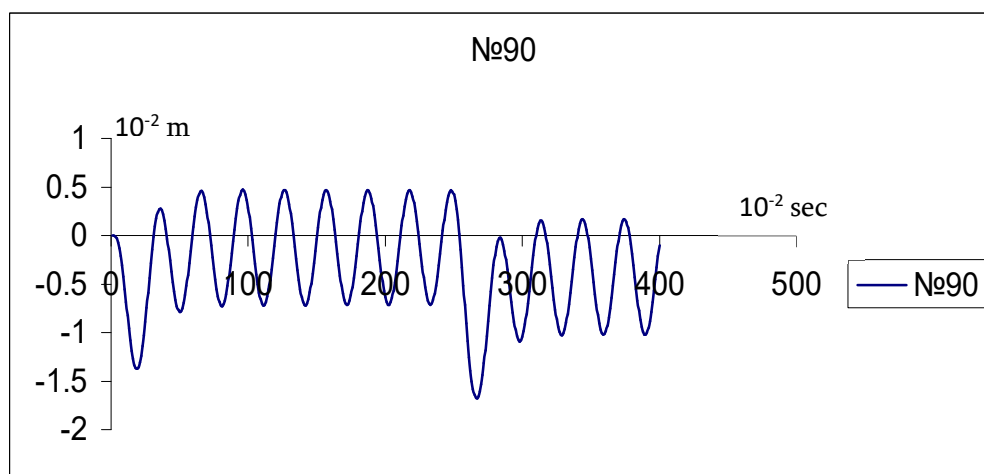
fig. 15 Plastic movements during repeated impulse



$$\alpha=10$$

$$\beta=5$$

fig. 16 Forces in repeated impulse



$$\alpha=10$$

$$\beta=5$$

fig. 17 Displacements in repeated impulse

Conclusions: In the case of impulse action, displacements of the elastic-plastic system are less compared to displacements during elastic oscillation.

In the case of an elastic-plastic system, after the end of the impulse action, the oscillation occurs concerning the residual plastic displacement.

In the case of impulse action, the same acceleration can be caused by different types of velocities, which correspond to the values of displacement and forces. Therefore, in the area adjacent to the tectonic fault, where the impact has the character of an impulse, it is appropriate to take not the acceleration but the speed as the zone of seismic regions.

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Economic Sciences

Challenges of talent attraction and selection in Georgian organizations

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Abstract

Against the background of current challenges, human resource management processes in organizations have become more complicated. Retaining talent and filling vacancies has become an unsolvable problem in modern companies. The reason for this is often mistakes made during the recruitment and selection process, which must be identified and resolved.

In the article, existing shortcomings in the process of attracting and selecting talents in the Georgian cities, their causes, and their solutions are discussed. ways. The issue is real, and in this way, it is not a small problem. Where did you go? Working and solving problems.

Keywords: talent, human resource management, attraction and selection.

ARTICLE

Among the processes of human resources management, the most important is the process of attracting and selecting human resources, which according to Michael Armstrong consists of the following parts: determining requirements, attracting candidates, sorting out applications, interviewing, testing, evaluating candidates, making recommendations and making a final decision (Taylor.,S Armstrong. ,M 2023), organizing and properly managing the mentioned processes requires a lot of effort.

The recruitment and selection stage is preceded by human resource planning (HRP), which aims to develop employees and integrate their individual goals with the strategic plan. Human Resource Planning (HRP) includes talent management, development, job analysis and talent retention. Effective management of the mentioned process ensures competitive advantage and strategic sustainability of the organization (Chakraborty., D, Biswas., W 2020). However, managing this process does not fully address the need to attract and select new talent. An important problem for modern organizations is the increase in the number of employees, unfilled vacancies and complicated recruitment process.

According to the official data of the National Statistical Service of Georgia, the unemployment rate in Georgia in the IV quarter of 2023 was 15.3% (Sakstat., 2024). Nevertheless, it is very difficult for organizations to find the desired talents, interest them and hire them. The problem is compounded by increasing labor migration, freelancing and global competition.

Before the stage of talent attraction and selection, it is important for companies to determine the human resource requirements, the mentioned stage includes a detailed analysis of the amount, what knowledge, skills, qualifications and experience talent the organization needs (Bhattacharya, 2016). The successful implementation of the mentioned stage gives us accurate information whether we need a new employee and what characteristics he should have. The person

responsible for human resources management establishes a job role profile, which details the requirements for the candidate and what he or she will have to do. After this, the competition application is prepared and placed in the news channel.

It can be said that recruiting problems for Georgian companies begin in pre-contractual relations and continue until the hiring process.

In order to study the issue in detail, quantitative and qualitative research methods were selected. Surveys were conducted using pre-selected questionnaires to minimize recruitment and selection difficulties. 264 job seekers were interviewed through a questionnaire. Also, in-depth interviews were conducted with 5 people, within the framework of which their individual cases were discussed, a total of 26 practical cases in pre-contractual relations. We interviewed 2 HR managers as part of a simple interview. As part of the research, we studied 2,500+ applications posted on employment portals (www.HR.ge; www.jobs.ge; www.dasaqmeba.ge; www.hr.gov.ge), and as a result of studying them, we analyzed the mistakes made in the applications and inconsistencies with the legal norms.

The period between 01.01.2023-01.01.2024 was defined as the period of the research. The retrieved information was processed statistically in Excel and SPSS.

According to the results of the research, it was established that Georgian organizations devote less time to creating, refining and improving the employer's brand. A strong employer brand ensures talent retention and attracts the attention of potential employees to outstanding talent. It is important for organizations to take care of five dimensions of HR branding: corporate social responsibility, creating a healthy working atmosphere, training and development of employees; on offering decent wages and benefits and balancing personal and professional life for employees (Bharadwaj., Sh 2024).

According to the Labor Code of Georgia, the pre-contractual relationship with the candidate begins with the publication of the application, at which time it is necessary for the employer to comply with the legal requirements, in particular, in accordance with paragraph 3 of the second article of the Labor Code, in pre-contractual relationships, including during the publication of the vacancy announcement and at the selection stage, any kind of discrimination based on race is prohibited. , skin color, language, ethnic and social affiliation, nationality, origin, property or rank status, place of residence, age, gender, sexual orientation, disability, religious, public, political or other association, including professional union, affiliation, Because of family status, political or other opinion or for other reasons" (Labor Code of Georgia, 2024). Despite this prohibition, in the applications we studied, discrimination based on age, gender, marital status and place of residence was revealed, which is a violation of the law and needs to be corrected. Candidates must have a sense of justice, etc

- To increase the knowledge and qualification of persons responsible for human resources management.
- As a result of detailed analysis, human resources planning process should be implemented.
- To create an attraction and selection strategy, where the processes to be implemented, necessary resources, deadlines and executors will be written in detail.
- Create a strategy implementation monitoring form.
- In pre-contractual relations, the legal requirements and the rights of the job seeker will be respected.
- Create candidate profiles.
- The employer brand of organizations will be studied and improved.
- To prepare a price offer for the candidates, where it is written in detail what the company offers to the candidate and what is required from him.
- Appropriate sources are selected to place the application.

- Determine the stages and terms of candidate selection.
- Candidate evaluation criteria should be developed.
- At the stage of attraction and selection, special attention should be paid to the transparency and efficiency of communication processes.
- To prepare an interview program, including questions to be asked to the candidate, and to exclude discriminatory and unethical approaches as much as possible.
- There should be a time interval between the interviews.
- The interview process should be started with mutual acquaintance of the parties and creation of a positive environment.
- The interview process should be conducted by competent people in a calm and stress-free environment.
- During the interview, all questions of the contestant were answered.
- The interview process should be completed by thanking the contestant.
- Immediately after the interview, the candidate will be evaluated.
- Immediately after the completion of the stages of the competition, the contestants should be informed.
- The contractual relationship should be started and continued taking into account the legal requirements.

In conclusion, we can say that the process of attracting and selecting employees is a difficult task for organizations. Despite the high level of unemployment, there are many open vacancies in the employment market, but organizations are unable to attract and select the desired talent. The problem is complicated by the fact that human capital management as a professional direction is very new in Georgia, which is why there is a shortage of HR professionals. Accordingly, it is important for organizations to pay more attention to the training, development, qualification growth of the persons responsible for human resources management and the implementation of the full cycle of cooperation with a high professional standard. This will have a positive impact on the employer's brand and simplify the recruitment and selection process.

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REVIEW OF THEORETICAL APPROACHES TO THE DEFINITION OF "HUMAN CAPITAL"

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Human capital is a concept that refers to the knowledge, skills, experience and abilities that people possess. And here we are not talking about physical property or money, but rather about what people know and can do. This can be thought of as a kind of "intellectual wealth" that everyone carries with them.

The idea of human capital began to attract a lot of attention around the middle of the 20th century. Economists have begun to realize that investments in education and training can have a big impact on a person's value to society. In fact, the more you learn and develop your skills, the more valuable you become to the economy and society as a whole.

Understanding human capital is incredibly important because it affects many aspects of life. For example, it affects how we approach education, how we train workers, and even how countries shape their economic policies. By better understanding human capital, we can make smarter decisions about education, workforce development, and economic strategies.

The study of various theoretical approaches to the definition of human capital is of great importance for several reasons. Firstly, it contributes to a deeper understanding of the multifaceted nature of human capital. By studying various theoretical points of view, researchers and practitioners can uncover the complexities and nuances inherent in human capital, going beyond simplistic interpretations and contributing to a deeper understanding of its complex dynamics.

Secondly, the study of various theoretical foundations facilitates interdisciplinary discourse and collaboration. Human capital is a concept that intersects with various disciplines, including economics, sociology, psychology, and education. Using various theoretical points of view, scientists can enrich the discourse related to human capital with ideas from these fields, contributing to the mutual enrichment of ideas and the development of more voluminous analytical systems.

In addition, the study of alternative theoretical approaches stimulates critical analysis and intellectual research. By challenging prevailing assumptions and exploring alternative concepts of human capital, researchers can expand the boundaries of knowledge and contribute to the emergence of new ideas in theory development. This encourages scientists to question entrenched paradigms, embrace intellectual diversity, and apply more open-minded approaches to understanding human capital.

In the classical economic approach, human capital is understood as a set of knowledge, skills, experience and abilities of an individual, which together contribute to increasing his productivity and economic value. From this point of view, human capital is perceived as an intangible asset that people develop in various ways, including education, vocational training, on-the-job experience and self-study.

The classical economic approach to human capital owes much to the pioneering work of economists such as Adam Smith, David Ricardo and John Stuart Mill. Adam Smith, considered by many to be the father of modern economics, outlined the fundamental principles of understanding human capital in his seminal work «An Inquiry into the Nature and Causes of the Wealth of Nations» (Smith, 2016), published in 1776. Smith's analysis focused on the key role of

education, skill development, and specialization in stimulating economic progress and social well-being.

In his book, Smith passionately argued for the importance of investing in education and skills acquisition as driving forces in the formation of human capital. He argued that by sharing labor and investing in education and training, individuals can significantly increase their productivity and contribute to the overall prosperity of society. Smith's ideas highlighted the mutually beneficial relationship between the accumulation of human capital and economic growth, thus paving the way for further study of this concept by subsequent economists.

David Ricardo, another influential figure in classical economics. He developed Smith's ideas in his work "The Beginnings of Political Economy and Taxation" (Ricardo, 2016). Ricardo emphasized the crucial role of education and skills development in determining a country's competitive advantages in global markets. He argued that investing in human capital, especially in an industry in which a country has a comparative advantage, can lead to increased productivity and economic success on the international stage.

John Stuart Mill, a student of Ricardo, developed the concept of human capital in his seminal treatise «Principles of Political Economy», published in 1848. Mill emphasized the intrinsic value of education in promoting human development and individual well-being. He wrote: "The dexterity, energy of the workers of a well-known country, their constancy in work are counted among its wealth, like their tools and machines" (Mill, 2007). He also argued that investments in education and skills development not only benefit individuals by increasing their earning potential, but also make a significant contribution to social progress and prosperity.

In this way, Adam Smith, David Ricardo and John Stuart Mill laid the foundation for the concept of human capital, emphasizing the importance of education, training and skills development to increase productivity and promote economic growth. Their work has shown how investments in human capital, such as education and skills acquisition, contribute to increased labor efficiency and technological progress, which leads to an increase in the standard of living and well-being of society.

As economic thought has evolved, scholars such as Gary Becker and Theodore Schultz have further deepened their understanding of human capital. Theodore Schultz and Gary Becker were economists who conducted important research on human capital. They have been awarded Nobel Prizes in Economics for their contributions to this field.

Schultz, who received the Nobel Prize in Economics (the Swedish National Bank's Alfred Nobel Prize in Economic Sciences) in 1979, focused on the idea that investing in education and training is similar to investing money in business. He believed that when people invest in improving their skills and knowledge, it makes them more valuable in the workforce. It may also be more important than investments in machinery and equipment, especially for less developed countries. This, in turn, helps the economy grow, as more skilled workers can produce more goods and services (Schultz, 1971).

Becker, who also received the Nobel Prize in Economics in 1992, developed Schultz's ideas. He showed that individual choices about things like education, vocational training, and even health affect how valuable people are in the economy. Becker's research highlighted the economic benefits of investing in human capital and how this leads to increased productivity and economic growth (Becker, 2003).

The work of Schultz and Becker revolutionized our understanding of human capital. They have shown that investments in education, vocational training and skills development are beneficial not only to individuals — they also have a positive impact on the economy as a whole. Recognizing the importance of investing in human capital, their research has influenced policy and practice and has been aimed at promoting economic development and improving people's lives.

The world of money and society has changed a lot recently. This has brought in a new time where human skills and knowledge are super important. These changes happened because of things like businesses working across the world, new technology, more people moving to cities, and different kinds of jobs appearing. All these changes have made human capital much more important when we talk about money and society nowadays.

In the current era of globalization, knowledge-based industries and services are becoming predominant, highlighting the critical importance of human capital to drive innovation, productivity and competitiveness. The ability of individuals to acquire and apply advanced skills, knowledge and expertise has become a key determinant of success in a globalized economy.

Changes in the population, like more older people and a more diverse mix of cultures, have big effects on human skills and knowledge. When there are more older people, it can mean there are challenges with having enough people to work, not having the right skills, and planning for who will take over jobs when others retire. This makes it super important for everyone to keep learning new things and improving their skills to keep being good at their jobs.

But having different cultures around can actually be a good thing. It gives us a chance to learn from each other and come up with new ideas. When people with different backgrounds and experiences work together, they can be more creative, solve problems better, and come up with new ways to do things in companies and communities.

The way people work is changing a lot. More and more, we see things like freelancing, flexible schedules, and jobs that aren't so secure. This means that to do well in today's job market, it's not just about being good at specific tasks. You also need what we call "soft" skills. These are things like being able to adapt to new situations, bounce back from setbacks, get along with others, and work well in teams. Having these skills is really important for being successful in different kinds of jobs and work environments nowadays.

In today's discussions about money and society, there's a lot of focus on something called "human capital." It's not just about being smart or knowing how to do specific tasks anymore. People are realizing that there's more to success than just technical skills. This idea of human capital is expanding to include a wider range of qualities and abilities. It's not just about what you know, but also about how well you can work with others, understand people's emotions, and come up with creative solutions to problems. These skills are becoming increasingly important in our fast-paced, interconnected world. For example, being able to communicate effectively, collaborate with others, and adapt to change are all considered part of human capital. These interpersonal skills can be just as valuable, if not more so, than technical expertise in many situations. In addition, emotional intelligence—the ability to understand and manage your own emotions, as well as those of others—is gaining recognition as a key component of human capital. People who are emotionally intelligent tend to have better relationships, make better decisions, and perform better in their careers.

Social skills such as communication, teamwork, leadership and empathy are increasingly recognized as essential components of human capital. People with strong social skills are able to navigate a complex social environment, build effective relationships and collaborate productively with others. These interpersonal competencies not only contribute to the overall effectiveness and cohesion of teams and organizations, but also contribute to successful interaction in a variety of personal and professional settings.

Moreover, creativity has become a central component of human capital in the modern economy. Creativity includes the ability to generate new ideas, think critically, and approach problems from new perspectives. In an era characterized by rapid technological progress and breakthrough innovations, creativity is recognized as a key factor in entrepreneurship, business innovation and economic growth. People with creative abilities are well prepared to adapt to

changing circumstances, identify opportunities for innovation and develop solutions to complex challenges, thereby contributing to progress and competitiveness in various sectors.

Technological advances, especially in the field of information and communication technologies (ICT), have revolutionized the nature of work and employment. Automation, artificial intelligence (AI) and robotics have transformed traditional work roles and created new opportunities for those with specialized technical skills and digital literacy. As a result, there is a growing demand for specialists with knowledge in the field of STEM (science, technology, engineering and mathematics) and able to adapt to rapid technological changes.

Due to the digitalization of industries in all sectors, people with knowledge in areas such as coding, data analysis and digital marketing are becoming more and more in demand in the labor market. Moreover, the rapid pace of technological change requires a commitment to continuous learning and adaptability in order to remain competitive in the workforce.

In addition to shaping the skills landscape, technological innovations are also transforming the processes of education and professional development. Online learning platforms, massive open online courses (MOOCs) and virtual reality simulations are revolutionizing traditional educational paradigms by offering people flexible and affordable opportunities to acquire knowledge and skills. These technological tools democratize access to education, allowing students to receive personalized learning experiences according to their interests, preferences and schedules.

In addition, technological innovations facilitate collaboration and networking by removing geographical barriers and expanding the professional connections of individuals. Social media platforms, professional networking sites, and online forums provide opportunities for knowledge sharing, mentoring, and career growth, enriching individuals' social capital and contributing to professional growth and development.

However, along with the opportunities offered by technological innovations, there are also problems that need to be solved. Job displacement, skills obsolescence and the digital divide are among the pressing issues facing individuals and societies in the digital age. Automation and artificial intelligence-based technologies have the potential to disrupt traditional labor markets, leading to job polarization and increased income inequality. Moreover, people who do not have access to technology or digital literacy skills may face alienation from the digital economy, increasing existing disparities and income inequality.

Understanding how people grow and use their skills is really important. We have this idea called "human capital" that helps us understand it better. Human capital is like all the things that make people special and useful in different parts of life, like at work, in school, or in the community.

But this idea isn't perfect. Some people say it's too focused on just job skills and doesn't look at everything that makes people unique. For example, it might not consider things like how creative someone is or how well they get along with others.

To make the idea of human capital better, we need to think about it in a bigger way. We should look at all the different things that make people special, not just their work skills. This means thinking about things like how smart someone is, how they feel, and what they believe in.

We can also learn more by working together with different experts. People who study things like how our minds work, how society is organized, and how money works all have something important to say about human capital. By listening to all these different ideas, we can get a better understanding of how people grow and succeed.

Another thing we can do is find better ways to measure human capital. Right now, we mostly look at things like how much education someone has or how much money they make. But there's a lot more to people than just that. We need to find better ways to measure things like how creative someone is or how well they work with others.

Lastly, it's really important to make sure everyone has the same chances to grow and succeed. Unfortunately, not everyone has the same opportunities. Some people have a harder time because of where they come from, what they look like, or how much money they have. We need to change that and make sure everyone has the same chances to be their best.

By doing all these things, we can make the idea of human capital better and make the world a fairer and better place for everyone.

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Research into the influence of the media on the popularity of public catering establishments

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Abstract: The study aims to analyze the impact of the media on the level of popularity of public catering establishments. Various media platforms and their influence on consumer perception and choice are analyzed, and the effectiveness of advertising strategies for enterprises in this industry is assessed. The results of the study can provide valuable insights for business and marketing in the food service industry.

Key words: restaurant, augmented reality, interactive, healthy food industry, mobile applications, electronic menu

Аннотация: Исследование направлено на анализ воздействия средств массовой информации на уровень популярности предприятий общественного питания. Анализируются различные медийные платформы и их влияние на восприятие и выбор потребителей, а также оценивается эффективность рекламных стратегий для предприятий данной отрасли. Результаты исследования могут предоставить ценные инсайты для бизнеса и маркетинга в сфере общественного питания.

Ключевые слова: ресторан, дополненная реальность, интерактив, индустрия здорового питания, мобильные приложения, электронное меню

Түйін: Зерттеу қоғамдық тамақтану орындарының танымалдылық деңгейіне бұқаралық ақпарат құралдарының әсерін талдауға бағытталған. Әртүрлі медиа-платформалар және олардың тұтынушылардың қабылдауы мен таңдауына әсері талданып, осы саладағы кәсіпорындар үшін жарнамалық стратегиялардың тиімділігі бағаланады. Зерттеу нәтижелері тағамдық қызмет көрсету индустриясындағы бизнес пен маркетинг үшін құнды түсініктер бере алады.

Негізгі сөздер: мейрамхана, толықтырылған шындық, интерактивті, пайдалы тамақ өнеркәсібі, мобильді қосымшалар, электронды мәзір

Advertising is a marketing tool aimed at attracting attention to a product, service or brand in order to stimulate sales or create a positive image. It can use various channels such as television, internet, print media and others to reach the target audience.

1. Attracting Customers: Advertising helps to attract the attention of potential customers and create their interest in products or services.

2. Increase Sales: Through effective advertising, a business can stimulate sales growth by attracting new customers and retaining existing ones.

3. Increasing brand awareness: Advertising contributes to the formation and strengthening of a brand's image, making it more recognizable and trusted in the eyes of consumers.

4. Competitive Advantage: Effective advertising can help you stand out from competitors, highlight the unique characteristics of products or services and attract more attention.

5. Informing about new products and promotions: Advertising allows a business to quickly convey information to the audience about new products, services, promotions and special offers.

Overall, advertising communicates effectively with the market, helping to grow business and establish positive consumer perceptions.

Advertising in the restaurant business has several key meanings:

- Attracting visitors: Advertising helps attract new visitors interested in the restaurant's culinary offerings, as well as create a stream of regular customers.
- Sales promotion: By highlighting promotions, special offers or new dishes, advertising helps increase the number of orders and overall sales.
- Formation of a brand image: Advertising helps to create and strengthen a unique image of a restaurant, highlight its characteristic features and attract the target audience.
- Information about events: Restaurants often organize various events, theme nights or promotions. Advertising serves as a means of quickly and effectively informing customers about these events.
- Strengthening loyalty: Advertising campaigns aimed at regular visitors can help strengthen loyalty, for example, through the provision of discounts or bonuses.

Thus, advertising in the restaurant business is an integral part of the strategy to attract customers, increase sales and create a unique image of the establishment.

In public catering, advertising has a number of specific features. This is, first of all, information about the location of restaurants, cafes, bars, and the services they provide. Advertising should help attract potential consumers there and create a positive opinion about these enterprises.

The educational role of advertising is to be an assistant in organizing a balanced diet, taking into account the physiological norms of food consumption. Advertising, in particular, invites those interested to restaurants where schools for young housewives are organized. Here classes are held on preparing dishes, setting a festive table, selling semi-finished products and culinary products, and catering for family celebrations.

A variety of means are used to advertise restaurants and the services they provide: signs and display windows, posters, banners and panels, newspapers, radio and television.

When creating advertising for restaurants, you should carefully consider the purpose of the enterprise, its style, and the relaxing atmosphere that reigns in it. The main types and purposes of advertising for public catering establishments.

The purpose of advertising a catering establishment is to do everything possible to maintain and increase the constant flow of visitors to this establishment, which is distinguished by its unique flavor, reasonable prices, delicious cuisine and good service. Through restaurant advertising, in a broader sense, public demand for restaurant services is formed.

The functions of advertising for public catering establishments include:

Informing;

Exhortation;

Reminder;

Retaining customers loyal to the advertised brand.

Advertising of a catering establishment always begins with its external design. A luxurious restaurant is matched by a lush façade and bright advertising. For a modest-sized restaurant, advertising should be minimal. A single form of advertising for diverse public catering establishments is unthinkable. Outdoor advertising media are largely individual in nature- they must fit harmoniously into the exterior and perform informational, aesthetic and advertising functions.

Types of advertising in public catering establishments:

- Advertising in the press (advertisements, articles, reviews);

- Print advertising (catalogues, booklets, leaflets);
- Audiovisual advertising (video films, videos);
- Radio advertising (radio commercials, radio broadcasts);
- Television advertising (TV screensaver, TV report);
- Exhibitions and fairs;
- Advertising souvenirs;
- Direct mail advertising;
- Outdoor advertising;
- Computer advertising, cable television.
- An important element of advertising is the restaurant logo.

Its use in combination with an interesting font and design gives a good advertising effect. It's not bad when an emblem-badge decorates the waiter's clothes, posters, and the restaurant sign itself. Let's consider the influence of the media on the popularity of public catering establishments using the example of the Madeleine coffee shop chain.

Today, the Madeleine coffee chain is one of the largest and most dynamically developing companies in the restaurant business in Shymkent and other regions of Kazakhstan. A distinctive feature of each of the coffee shops is its elegant and cozy interior design, warm and unique atmosphere. All rooms are divided into smoking and non-smoking areas. During the warm season, cozy summer verandas open.

The "Madeleine" assortment is very diverse and can satisfy any, even the most sophisticated taste. Along with excellent coffee brewed from freshly roasted beans, premium teas, juices and cocktails, the chain is famous for its pastries and gourmet desserts. All dishes are exclusive and prepared using technologies developed by our confectioners using only natural products. The quality of Madeleine's work, in addition to many years of recognition from visitors, has been confirmed by awards and prizes. The sign at the entrance to any of the coffee shops is quite large and originally designed. The coffee shop chain has its own logo, which is depicted on window displays, menus, and waiters' clothing. Also on the window display cases, information is usually posted about various promotions that take place at the Madeleine and about specialties.

There is always a special display window within easy reach of guests, where you can immediately choose the dessert you like. There are stands at the entrance, which, like window displays, inform about promotions, bonuses and with their brightness lure people passing by.

There is information about the coffee chain on the Internet. Without leaving home, you can view the menu and prices for drinks and desserts, get acquainted with the work, ask a question or leave a review.

Thus, the influence of the media in the restaurant business can be expressed by the following factors:

- Attracting Attention: Media such as newspapers, magazines, television and online platforms can attract attention to the restaurant through reviews, articles about new establishments, interviews with the chef or owner.
- Building Brand Image: Positive reviews and publications can help build an attractive brand image, creating a positive perception among potential visitors.
- Advertising and Promotion: Restaurants can use media advertising platforms to attract target audiences and disclose information about special offers, events or new dishes.
- Trend Creation: Publications about new culinary trends, unique restaurant concepts and culinary research can inspire innovation and attract gastronomy connoisseurs.
- Local Influence: Local media can have a significant impact on a restaurant in a particular region, helping to attract locals and tourists.
- Online Platforms and Ratings: Restaurants actively participate in online platforms, where reviews and ratings influence reputation and attract new customers.

Overall, effective media relations can have a significant impact on the success and growth of a restaurant business, helping it stand out from its competitors and attract its target audience.

Currently, almost all catering enterprises use several types of advertising to more effectively attract customers. The Madeleine coffee chain is no exception. As mentioned above, it has its own brand name, an originally designed sign and window displays, stands, and leaflets are actively distributed on the street. All this helps to attract the attention of potential customers. You can also learn more about coffee shops on the Internet, so it can also be classified as one of the types of advertising.

An interesting fact is that catering establishments use advertising not only to attract new ones and not lose regular customers, but also to attract new employees, like the Madeleine coffee shop.

МРНТИ: 06.81.12

JEL Classification: N4

Кәсіпорындағы персонал қызметінің мәні мен маңыздылығы

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Аңдатпа

Зерттеу мақсаты. Персоналдың қызметі кез-келген кәсіпорынның сәтті жұмыс істеуінің негізгі элементі болып табылады. Бұл зерттеудің мақсаты ұйымдық жетістікке жетудегі негізгі рөлін анықтау үшін кәсіпорындағы персонал қызметінің мәні мен маңыздылығын талдау болып табылады. Зерттеу персоналды басқару стратегияларының кәсіпорынның өнімділігіне, тиімділігіне және бәсекеге қабілеттілігіне әсерін анықтауға бағытталған.

Әдіснамасы. Осы зерттеу мақсатына жету үшін талдау және жүйелеу тәсілдері қолданылады. Кадрларды іріктеу әдістері, оқу бағдарламаларының қызметкерлердің біліктілігін арттыруға және қызметкерлерді ынталандыру әдістерін бағалау. Бұл қызметкерлерді іріктеу, оқыту және ынталандыру процестерін оңтайландыруға әкелуі мүмкін.

Кілт сөздер: персонал, басқару, жалдау, іріктеу, оқыту, дамыту, ынталандыру.

Abstract

The purpose of the research. The activity of the staff is a key element of the successful functioning of any enterprise. The purpose of this study is to analyze the essence and significance of personnel activities in an enterprise in order to determine their main role in achieving organizational success. The research is aimed at identifying the impact of personnel management strategies on the productivity, efficiency and competitiveness of the enterprise.

Methodology. To achieve this research goal, approaches to analysis and systematization are used. A literature review is conducted on topics such as recruitment methods, the impact of training programs on staff development and evaluation of employee motivation methods. This can lead to the optimization of employee selection, training and motivation processes.

Keywords: personnel, management, hiring, recruitment, training, development, motivation.

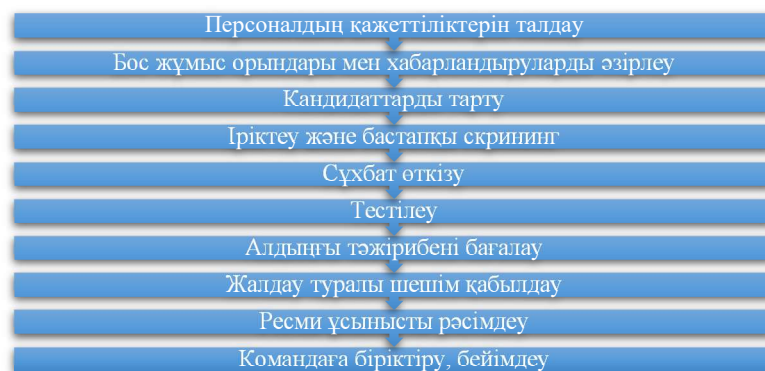
Кіріспе

Технологиялық инновациялар мен нарықтағы бәсекелестік сөзсіз болатын қазіргі бизнес әлемінде адам ресурстарын басқару мәселесі кәсіпорындардың тұрақты дамуының негізі болып табылады. Қалыптасқан экономикалық динамика қызметкерлердің кәсіпорындағы рөлінің маңыздылығын, оның саладағы позицияларын қалыптастыру мен нығайтудағы маңыздылығын көрсетеді. Персоналды кәсіби басқару кәсіпорынның табысты жұмыс істеуінің ажырамас бөлігі болып табылады. Алайда, іс жүзінде біз адам ресурстарын басқарудың тиімділігінің жеткіліксіздігі, айналымның жоғары деңгейі және компанияның жалпы стратегиялық мақсаттары үшін персонал қызметінің маңыздылығын түсінбеу сияқты мәселелерге тап боламыз. Қызметкерлер тек функцияны орындаушы ғана емес, корпоративті сәйкестікті қалыптастыратын, мәдениетті әкелетін және ұйымның жетістігін анықтайтын негізгі өзек. Ол дұрыс басқарумен гүлдейтін немесе ұйымдық құрылымның әлсіз буынына айналуы мүмкін актив. Персоналдың маңыздылығына көзқарас оның өндірістік

процестерге тікелей әсерін ғана емес, сонымен қатар әдеттегі міндеттерден тыс ұзақ мерзімді стратегияларды қалыптастыру қабілетін де қамтиды. Бәсекелестік бизнестің барлық салаларына тапқырлықпен енетін нарықтағы қарқынды өзгерістер жағдайында персоналды басқару проблемасының өзектілігі артып келеді. Ұйымдар өз қызметкерлерінің маңыздылығын түсіне отырып, ұзақ мерзімді перспективада бәсекеге қабілеттілік пен тұрақтылықты қамтамасыз ету үшін басқарудың инновациялық стратегияларын әзірлеуге және енгізуге тырысады. Адам ресурстарын басқару бойынша көптеген ғылыми еңбектер қызметкерлермен өзара әрекеттесудің қандай аспектілері кәсіпорынның жетістігі үшін маңызды болуы мүмкін екенін түсіну үшін маңызды түсініктер мен модельдерді ұсынады. Зерттеулер әртүрлі аспектілерге бағытталған, соның ішінде мотивациялық стратегиялар, оқыту жүйелері, және еңбек қатынастарын басқару.

Негізгі бөлім

Барлық кәсіпорындарда персонал қызметінің жұмысын қадағалайтын негізгі бөлім HR болып табылады. Берілген тақырап аясында Cynthia A. Lengnick-hall және Mark L.Lengnick-hall авторлары өздерінің “Strategic Human Resources Management: A review of the literature and proposed typology” еңбектерінде адам ресурстарын басқару стратегиясын кәсіпорынның жалпы бизнес стратегиясына бейімдеудің маңыздылығы туралы баяндаған. Бұл HR стратегиясын кәсіпорынның мақсаттары мен стратегиясына тікелей сәйкес келетін етіп құруды қамтиды. Бизнес стратегиясы мен адам ресурстарын басқару стратегиясын (HR стратегиясы) біріктіру кәсіпорынның табысты жұмыс істеуі мен мақсаттарына жетудің маңызды аспектісі болып табылады[1]. Тиімді интеграция HR тәжірибелерін бизнес стратегиясының талаптарына бейімдеуді талап етеді. Бұл кәсіпорынның ағымдағы және болашақ қажеттіліктерін қанағаттандыру үшін өнімділікті таңдау, оқыту, ынталандыру және басқару процестерін қайта қарауды қамтиды. Сонымен қатар, Kant S., Gelgelo W.J, Kero C.A авторлары өздерінің еңбектерінде HR стратегиясын кәсіпорынның жалпы стратегиясымен тығыз біріктірудің маңыздылығын көрсетті. Осы стратегиялар арасындағы сәйкестіктің жоғары деңгейінде ұйымдар өнімділіктің жоғары көрсеткіштерін көрсетеді деп баяндады. Авторлардың баяндаған стратегиялары қатарына кіретін мәселелердің бірі қызметкерлердің негізгі құзыреттері мен дағдыларын тиімді басқару болып табылады [2]. Қызметкерлердің негізгі құзыреттері мен дағдыларын тиімді басқару ұйымның жұмысына тікелей әсер етеді. Дағдылар мен қабілеттердің бизнес талаптарымен дұрыс үйлесуін қамтамасыз ету жақсы нәтижелерге қол жеткізуге ықпал етеді. Бұл мәселеге ықпал ететін негізгі принциптер мен тәжірибелер көрсетілген[3]:Құзыреттерді талдау. Кәсіпорынның стратегиялық мақсаттарына жету үшін қажетті негізгі құзыреттерді егжей-тегжейлі талдау. Бұған техникалық дағдылар да, коммуникация, көшбасшылық және уақытты басқару сияқты жұмсақ дағдылар да кіреді. Екіншіден,кәсіптік оқыту және дамыту.Қызметкерлердің құзыреттілігін дамытуға және нығайтуға бағытталған оқыту және дамыту бағдарламаларын жасау. Үшіншіден, құзыретті матрицалар және бағалау.Қызметкерлердің ағымдағы құзыреттілік деңгейін бағалау үшін құзыреттілік матрицалары мен бағалау жүйелерін пайдалану. Бұл жұмыс орындарын бағалауды, ассессмент орталықтарын және басқа бағалау әдістерін қамтуы мүмкін.Қызметкерлерің құзыреттері мен дағдыларын тиімді басқару үшін кәсіпорынға кадрларды іріктеу үрдісін жақсарту қажет.



Сурет 1- Қызметкерлерді жалдау және іріктеу үрдісінің кезеңдері.
[Ескерту: автормен [3] әдебиет негізінде құрылған]

Берілген кезеңдерді талдайтын болсақ, алғашқы кезең персоналдың қажеттіліктерін талдау болып табылады. Әр лауазым үшін жұмыс орындары мен құзыреттілік пен дағдыларға қойылатын талаптарды анықтау. Келесі, берілген вакансияның сипаттамасын, қандай кандидат керектігін бейнелеп, вакансия сипаттамасы дайындалады. Вакансия сипаттамасын қазіргі заман талабына сай headhunter, linkedin сайттары мен әр кәсіпорын өзінің әлеуметтік желісіне және ресми сайтына салады. Келесі, скринингтен кейін кандидаттарды іріктеу үрдісіне шақырады. Іріктеу үрдістерінің мынандай түрлері бар: әңгімелесу: құрылымдық және топтық сұхбаттар; тестілеу: психометриялық және кәсіби тесттер; ассессмент-орталықтар: топтық жаттығулар; ойындар; түйіндеме мен портфолио талдау [4]. Бұл әдістердің еңбек әлеуетінің сапасына әсері оларды қолданудың дұрыстығына, бос орынға сәйкестігіне және кандидаттарды әңгімелесу мен бағалауды жүргізетін адамдардың құзыреттілігіне байланысты.

Нәтижелерді талдау

Зерттеу нәтижесінде кәсіпорында персонал қызметінің маңыздылығына арттыруға әсер ететін факторлар: адам ресурстарын басқару стратегияларын әзірлеу және жүзеге асыру, соның ішінде жалдау, оқыту, дамыту, мотивация, және қызметкерлерді жұмыстан шығару. Әдебиеттік шолу мен зерттеу нәтижесінде осындай нәтижелерді ұсына аламын: персонал қызметінің өнімділікке әсері: кәсіпқойлықтың жоғары деңгейі және персонал қызметінің тиімділігі кәсіпорынның жалпы өнімділігінің жоғарылауымен тікелей байланысты. Ұйымдастырушылық мәдениетті қалыптастырудағы персоналды басқарудың рөлі: персоналды жүйелі басқару салауатты ұйымдастырушылық мәдениетті қалыптастыруға және қолдауға ықпал етеді, жалпы мақсаттарға қол жеткізуге ықпал етеді. Бұл нәтижелер кәсіпорынның жалпы стратегиялық мақсаттарына жету үшін персоналды басқарудың теңдестірілген тәсілінің маңыздылығын көрсетеді.

Қорытынды

Қазіргі бизнесте персоналдың рөлі барған сайын стратегиялық және кәсіпорынның сәтті жұмыс істеуінің ажырамас бөлігіне айналууда. Адам ресурстарын басқарудың тиімді стратегияларын дамыту ұйымдық мақсаттарға жетудің маңызды құрамдас бөлігіне айналады. Тұтастай алғанда, кәсіпорындағы қызметкерлердің табысты қызметі оның бәсекеге қабілеттілігін және тез өзгертін ортада бейімделу қабілетін анықтайтын стратегиялық фактор болып табылады. Адами ресурстарды басқару ұйымның қазіргі қажеттіліктеріне жауап беріп қана қоймайды, сонымен қатар тұрақтылық пен инновациялық дамуға жағдай жасай отырып, оның болашағын белсенді түрде қалыптастырады.

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JEL Classification: N4

Enhancing Personnel Efficiency in Enterprises: Strategies for Optimal Performance

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ABSTRACT

Modern enterprises face an ever-changing technological environment. The introduction of new technologies requires staff to quickly master new skills. Effective strategies for training and supporting staff in these conditions become key to successful operations. Also, employees of modern enterprises expect more from their jobs, including opportunities for professional and personal growth. The development of effective strategies for motivating and satisfying staff is becoming a problem of paramount importance. Many enterprises face the problem of heterogeneity in the productivity of their staff. This may be caused by different skill levels, motivation, or insufficient evaluation and feedback mechanisms. The article should consider strategies aimed at equalizing productivity and encouraging all employees to achieve optimal results.

The purpose of this study is to identify optimal strategies that contribute to improving the efficiency of personnel in enterprises. While working towards this goal, the article also aims to provide practical recommendations for managers and executives that can be used to optimize business processes.

The value of research. Research on this topic can provide businesses with valuable strategies to improve their competitiveness. Effective staff is a key resource in the fight against competitors, and research can highlight methods that will achieve optimal performance.

Methodology: The study is based on a comparative analysis of existing HR management strategies, including methods of motivation, training and employee development. Innovative technologies that can be implemented to improve work processes are also being considered.

Keywords: staff efficiency, personnel management, labor productivity, employee motivation, staff training and development, innovations in business management, optimization of business processes, human resource management strategies.

АҢДАТПА

Қазіргі заманғы кәсіпорындар үнемі өзгеріп отыратын технологиялық ортаға тап болады. Жаңа технологияларды енгізу қызметкерлерден жаңа дағдыларды тез меңгеруді талап етеді. Осы жағдайларда қызметкерлерді оқыту мен қолдаудың тиімді стратегиялары табысты қызметтің кілті болып табылады. Сонымен қатар, қазіргі заманғы кәсіпорындардың қызметкерлері кәсіби және жеке өсу мүмкіндіктерін қоса алғанда, өз жұмысынан көбірек күтеді. Қызметкерлерді ынталандыру мен қанағаттандырудың тиімді стратегияларын әзірлеу маңызды мәселеге айналады. Көптеген кәсіпорындар өз қызметкерлерінің еңбек өнімділігінің гетерогенділігі проблемасына тап болады. Бұған әртүрлі біліктілік деңгейлері,

мотивация немесе бағалау мен кері байланыс механизмдерінің жеткіліксіздігі себеп болуы мүмкін. Мақалада өнімділікті теңестіруге және барлық қызметкерлерді оңтайлы нәтижелерге қол жеткізуге ынталандыруға бағытталған стратегиялар қарастырылуы керек. *Зерттеудің мақсаты.* Кәсіпорындарда Персоналдың тиімділігін арттыруға ықпал ететін оңтайлы стратегияларды анықтау. Осы мақсатқа жету үшін жұмыс істей отырып, мақала сонымен қатар бизнес-процестерді оңтайландыру үшін пайдаланылуы мүмкін жоғары деңгейдегі менеджерлер мен топ-менеджерлерге практикалық ұсыныстар беруге бағытталған.

Зерттеудің құндылығы. Осы тақырып бойынша зерттеулер бизнеске олардың бәсекеге қабілеттілігін арттырудың құнды стратегияларын ұсына алады. Тиімді қызметкерлер бәсекелестермен күресудің негізгі ресурсы болып табылады және зерттеулер оңтайлы өнімділікке қол жеткізетін әдістерді анықтай алады.

Әдіснама: зерттеу қызметкерлерді ынталандыру, оқыту және дамыту әдістерін қоса алғанда, персоналды басқарудың қолданыстағы стратегияларын салыстырмалы талдауға негізделген. Жұмыс процестерін жақсарту үшін енгізілуі мүмкін Инновациялық технологиялар да қарастырылуда.

Кілт сөздер: персоналдың тиімділігі, персоналды басқару, еңбек өнімділігі, қызметкерлерді ынталандыру, қызметкерлерді оқыту және дамыту, бизнесті басқарудағы инновациялар, бизнес-процестерді оңтайландыру, адам ресурстарын басқару стратегиялары.

АННОТАЦИЯ

Современные предприятия сталкиваются с постоянно меняющейся технологической средой. Внедрение новых технологий требует от персонала быстрого овладения новыми навыками. Эффективные стратегии обучения и поддержки персонала в этих условиях становятся ключом к успешной деятельности. Кроме того, сотрудники современных предприятий ожидают от своей работы большего, включая возможности для профессионального и личностного роста. Разработка эффективных стратегий мотивации и удовлетворения потребностей персонала становится проблемой первостепенной важности. Многие предприятия сталкиваются с проблемой неоднородности производительности труда своих сотрудников. Это может быть вызвано разным уровнем квалификации, мотивацией или недостаточными механизмами оценки и обратной связи. В статье следует рассмотреть стратегии, направленные на выравнивание производительности и поощрение всех сотрудников к достижению оптимальных результатов.

Цель исследования. Выявление оптимальных стратегий, способствующих повышению эффективности персонала на предприятиях. Работая над достижением этой цели, статья также направлена на то, чтобы дать практические рекомендации для менеджеров и топ-менеджеров высшего звена, которые могут быть использованы для оптимизации бизнес-процессов.

Ценность исследований. Исследования по этой теме могут предоставить предприятиям ценные стратегии повышения их конкурентоспособности. Эффективный персонал является ключевым ресурсом в борьбе с конкурентами, и исследования могут выявить методы, которые позволят достичь оптимальной производительности.

Методология: Исследование основано на сравнительном анализе существующих стратегий управления персоналом, включая методы мотивации, обучения и развития сотрудников. Также рассматриваются инновационные технологии, которые могут быть внедрены для улучшения рабочих процессов.

Ключевые слова: эффективность персонала, управление персоналом, производительность труда, мотивация сотрудников, обучение и развитие персонала, инновации в управлении бизнесом, оптимизация бизнес-процессов, стратегии управления человеческими ресурсами.

I

INTRODUCTION

The efficiency of an enterprise is a key indicator of its success in modern business. The ability to effectively manage resources, processes and personnel becomes a determining factor in achieving a competitive advantage. In a dynamic market and a rapidly changing economic environment, efficiency becomes a necessity that allows an enterprise to adapt, innovate and maximize its potential to meet customer needs and achieve sustainable growth. This topic provides an opportunity to explore more deeply the strategies and factors affecting the overall efficiency of enterprises in the modern business environment.

Staff efficiency is a key success factor for any enterprise. Here are a few aspects that highlight the importance of staff effectiveness:

1. Productivity: Effective staff are able to maximize their skills and resources, which leads to an increase in the overall productivity of the enterprise.
2. Quality of products or services: Highly effective employees contribute to improving the quality of products or services provided, which can have a positive impact on the reputation of the enterprise.
3. Saving resources: Efficient use of labor resources and optimized business processes help the company save time and money.

In general, the efficiency of personnel becomes a strategic advantage, ensuring the sustainability and successful development of the enterprise in the long term.

The effectiveness of the staff depends on various components, including:

- Recruiting and selection: High-quality recruitment of employees who meet the requirements and values of the company plays a key role in the formation of effective personnel.
- Training and development: Continuous training and development of employees, adapted to the needs of the business, contributes to the improvement of their qualifications and professionalism.
- Performance management: A performance assessment and management system, including setting clear goals, feedback and motivation, contributes to achieving high results.
- Leadership and Management: High-quality leadership, which includes motivation, effective communication and leadership skills, creates a favorable atmosphere for effective work.

These components are interrelated and together form the fundamental elements of personnel efficiency in the enterprise.

THE MAIN PART

The role of leadership in influencing staff performance cannot be overestimated. Leaders play a key role in shaping the working atmosphere, motivating employees and achieving the company's goals.

Leaders are a source of motivation for their subordinates. The ability to inspire and mobilize a team to achieve common goals increases energy and work efficiency. Also, the leader, by defining clear goals and vision, sets the course for the team. This helps employees navigate and focus on key tasks. Leaders are able to create performance management systems, including task setting, performance monitoring, and feedback, which is important for continuous performance improvement. A conscious leader supports the development of skills and qualities of his team.

Providing employee training and development contributes to improving overall efficiency. Leaders with a high level of emotional intelligence can effectively manage relationships in a team, increasing the level of communication and cooperation. A leader who knows how to effectively manage conflicts is able to resolve misunderstandings in the team, preventing a negative impact on productivity. By demonstrating proactive behavior and providing an example of high responsibility, leaders inspire employees to take such actions, increasing the overall level of efficiency. The leader creates a corporate culture in which cooperation, innovation and the desire for continuous improvement are valued, which has a positive effect on work efficiency. Clear communication plays a fundamental role in improving the efficiency of productivity in the enterprise. Clarity in communication helps clarify expectations about tasks, goals, and performance standards. This reduces the possibility of misunderstandings and errors in the execution of tasks. Clearly defined goals and associated expectations create motivation for employees. Understanding how their contribution affects the overall goals of the enterprise increases the level of engagement and responsibility. Communication plays a key role in project management. Clarity in expressing tasks, deadlines, and roles is important for effective collaboration and achieving project goals. Regular and clear feedback helps to improve performance. Employees, receiving information about their work, can make adjustments and strive for continuous improvement. Communication plays an important role in conflict resolution. Clear presentation of points of view and transparency in explaining the situation reduce the likelihood of conflicts and contribute to their effective resolution. Clear communication in the learning process allows employees to better assimilate new knowledge and skills, which leads to increased efficiency in work tasks. Communication contributes to the formation of a common vision and common goal in the team. Overall, clear communication creates the foundation for effective collaboration and promotes high productivity, minimizing the risk of misunderstandings, mistakes and conflicts.

Leadership style has a significant impact on employee motivation and, consequently, on overall performance. Different leadership styles can affect employee motivation in different ways. Here are a few basic leadership styles and their impact on motivation:

- ❖ Transformational Leadership: This style focuses on inspiring and motivating employees through creating a bright vision and encouraging innovation. Transformational leaders can stimulate employees to strive for outstanding results, which increases their motivation.
- ❖ Relationship Leadership: This style focuses on developing positive relationships with employees. The leader creates a supportive atmosphere, pays attention to individual needs and motives, which helps to improve motivation.
- ❖ Democratic leadership: In this case, the leader ensures the participation of employees in the decision-making process. This approach can increase motivation through a sense of belonging and participation in the life of the organization.
- ❖ Autocratic leadership: This style involves decision-making by the head without the broad participation of employees. Motivation may be based on fear of punishment or the desire for rewards for following instructions.

It is important to note that the effectiveness of leadership styles may depend on the specific situation and characteristics of the team. The best results are often achieved by combined approaches, when the leader applies different styles depending on the context and needs of his team. Employee engagement is a measure of the degree to which employees feel belonging to their work, they are motivated and ready to invest additional efforts to achieve the overall goals of the enterprise. The high level of staff engagement is directly related to the effectiveness of the staff.

Here are a few aspects that demonstrate the importance of employee engagement in achieving high productivity:

-Motivation:

The employees involved are usually more motivated, as they see the meaning in their work and feel that their efforts are important to achieve the goals of the enterprise.

-Performance:

Engaged employees are often more productive because they are willing to put more effort and energy into their work. They strive for high results and are happy to take on additional tasks.

-Quality of work:

Employees who are involved in their work are more responsible and careful in performing their duties. This often leads to an improvement in the quality of products or services provided.

-Resistance to stress:

Engaged employees usually cope better with stress and uncertainty, as they see their contribution and feel supported in the organization.

-Reduced staff turnover:

Organizations with a high level of staff engagement often face lower staff turnover. Employees who feel connected to the company are less likely to look for other jobs.

Involved employees are more likely to be present and less likely to miss work hours, which also has a positive effect on overall productivity. Ensuring a high level of staff engagement is a strategic priority for companies seeking to improve staff performance and achieve long-term success.

Creating a positive work environment is a key factor for increasing productivity and improving the overall well-being of employees. Here are some strategies that can be used to achieve this goal:

- ✓ Transparent communication: Ensure open and transparent communication between management and employees. Share information about the company's goals, strategies, and performance.
- ✓ Creating a comfortable workspace: Provide ergonomic workplaces, comfortable rest areas, and a stimulating atmosphere to make employees feel comfortable and inspired.

A strong employer-employee relationship based on mutual respect, trust and a sense of belonging plays a key role in increasing productivity and enhancing overall well-being in the organization.

Here are some strategies that can help build such a relationship:

Open and transparent communication: Establish an open communication channel between management and employees. Regular meetings, newsletters and other means of communication will help to improve mutual understanding.

- Employee development support: Provide employees with opportunities for professional and personal development. Training, mentoring programs, and other forms of support will help employees feel that their growth is a priority for the company.
- Remuneration and recognition: Recognize the achievements of employees and reward their efforts. This can be both financial compensation and public recognition for successful projects or personal achievements.
- Creating team events: Organize events aimed at strengthening ties in the team. Team building, corporate events and extracurricular activities contribute to the formation of a sense of unity.

The interconnection of these strategies creates a favorable atmosphere in which employees feel recognized, protected and involved in a common goal, which ultimately contributes to their productivity.

ANALYSIS OF RESULT

As a result, a study and review of the literature, an analysis of factors affecting the effectiveness of staff work:

- Studying the impact of corporate culture on motivation and productivity.
- Assessment of the role of leadership in the formation of effective teams.
- Research on the impact of work-life balance on overall productivity.

Evaluation of performance management methods:

- Analysis of performance management systems and their impact on achieving business goals.
- Research on the effectiveness of employee evaluation and reward methods.
- Analysis of the impact of feedback and employee development programs on productivity improvement.

These lines of research can provide valuable information about which strategies are really effective for improving employee productivity in enterprises.

CONCLUSION

Improving the efficiency of personnel at enterprises is an integral part of a successful business strategy. In the course of the study, various optimal productivity strategies were considered that affect the productivity of work and the overall success of the company.

One of the key factors identified during the analysis is the impact of corporate culture on employee motivation and engagement. Enterprises that successfully integrate values, transparency and mutual respect into their culture are marked not only by increased work efficiency, but also by a higher degree of staff satisfaction.

All of the above strategies can serve as a starting point for business leaders seeking effective human resources management and optimal productivity in their enterprises. Taking into account the variability of the modern business world, constant attention to the improvement and adaptation of strategies becomes the key to a successful enterprise and its key resource – human capital.

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МРНТИ: 06.77.64

JEL CLASSIFICATION: J64

ГЕНДЕРЛІК ТЕҢСІЗДІК АСПЕКТІЛЕРІН БАҒАЛАУ

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АНДАТПА

Зерттеу мақсаты – Қазақстан Республикасындағы гендерлік теңсіздіктерді бағалау және гендерлік теңсіздікке кешенді талдау жүргізу.

Әдіснамасы – зерттеу жүргізу барсында сапалық-сандық әдістер қолданылды және статистикалық талдау жасалынды. Елдегі гендерлік теңсіздіктің себептері мен айырмашылықтарға әсер ететін факторлар анықталынды. Қоғамдық пікір мен гендерлік мәселелер туралы түсініктерді анықтау үшін қоғам өкілдерімен сауалнама жүргізілді. Осы туындаған мәселелерді шешу үшін ұсыныстар көрсетілді. Мақала гендерлік теңгерімсіздік туралы жан-жақты түсінік беретін қоғамдық өмірдің бірнеше саласын қамтиды.

Зерттеу маңыздылығы - гендерлік теңгерімсіздік туралы жан-жақты түсінік беретін қоғамдық өмірдің бірнеше салаларын қамтиды. Талдау мен саясатты әзірлеудің кеңдігін барынша арттыру үшін жан-жақты талдау жүргізу. Мақалада тек қана мәселелерді анықтауға ғана емес, сонымен бірге сондай-ақ жағдайларды жақсарту бойынша нақты стратегиялар мен шараларды ұсыну туралы.

Кілт сөздер – гендерлік теңсіздік, Қазақстан, білім, еңбек нарығы, саясат, әлеуметтік рөлдер, теңдік, жетілдіру стратегиялары.

ЗЕРТТЕУДІҢ НЕГІЗГІ БӨЛІМІ:

Гендерлік теңсіздік мәселесі қазіргі қоғамның маңызды және күрделі аспектілерінің бірі болып табылады, ол назар аударуды және талдау мен шешуге жүйелі көзқарасты талап етеді. Әртүрлі елдерде, соның ішінде Қазақстанда да гендерлік теңсіздік әлеуметтік прогресс пен дамудың қиындығы болып қала береді. Бұл тақырып ғалымдардың, белсенділердің және саясаткерлердің назарын аударды, себебі ол әділеттіліктің, адам құқықтарының және теңдіктің негізгі принциптеріне қатысты.

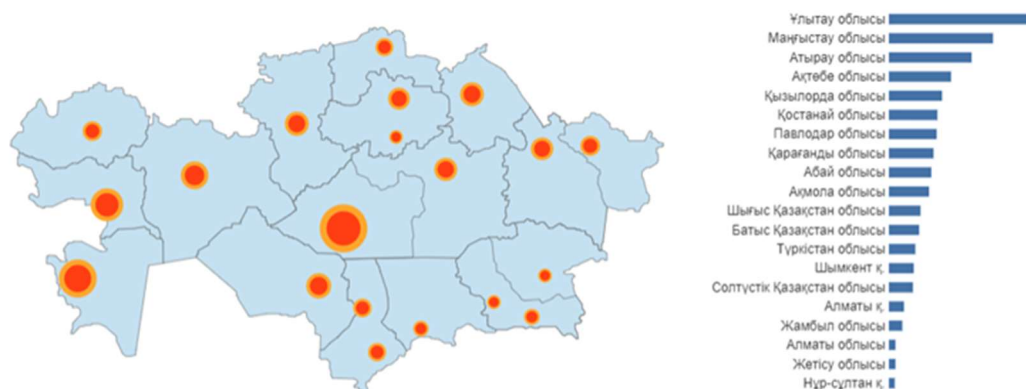
Гендерлік теңсіздік қоғамның білім беру, денсаулық сақтау, еңбек нарығы және саясат сияқты әртүрлі салаларына еніп, миллиондаған адамдардың өміріне әсер етеді. Бұл тақырыпты қарастырудың маңыздылығы қоғамның өз құрылымдарындағы теңсіздіктерді зерттеуде ғана емес, сонымен қатар бұл теңсіздіктердің әлеуметтік әл-ауқат пен экономикалық өсуге әсерін түсінуде.

Бұл зерттеудің авторлары Қазақстандағы гендерлік теңсіздіктің ауқымы мен сипатын жақсырақ түсінуге, сондай-ақ осы құбылыстардың себептері мен салдарын анықтауға тырысады. Олар объективті деректер мен ағымдағы жағдайды кеңінен талдау негізінде жағдайды жақсарту бойынша нақты ұсыныстар мен стратегияларды әзірлеуге бағытталған.

Шет елдік авторлар гендерлік теңсіздікті кешенді көзқарасты қажет ететін жүйелі мәселе ретінде қабылдайды. Олар гендерлік теңсіздікпен күресу әділеттілік шарасы ғана емес, тұрақты болашаққа салынған инвестиция деп санайды. Гендерлік теңсіздік қазіргі қоғамда, оның ішінде Қазақстанда да өзекті және күрделі мәселе болып қала береді. Өмірдің әртүрлі салаларында олар білімге, денсаулық сақтауға, саясатқа қатысуға және еңбек нарығындағы мүмкіндіктер теңдігіне қол жеткізуде көрінетін теңсіздіктерге тап болады.

Әртүрлі салалардағы жетістіктерге қарамастан, гендерлік теңсіздік әлеуметтік прогреске қиындық туғызуын жалғастыруда(Блау,2022).

Экономикадағы гендерлік теңсіздік еңбек нарығына, жалақыға және кәсіби мүмкіндіктерге әсер ететін әлеуметтік динамиканың құрамдас бөлігі болып табылады. Көптеген елдердегі сияқты Қазақстанда да экономикалық салада мұқият талдауды қажет ететін бірқатар елеулі гендерлік айырмашылықтар бар.



Сурет 1 – Қазақстандағы жалақының таралуы 2023 жылғы

Ескерту:(Қазақстан Республикасы Стратегиялық жоспарлау және реформалар агенттігінің Ұлттық Статистика Бюросы,2022) әдебиет негізінде автормен құрастырылған

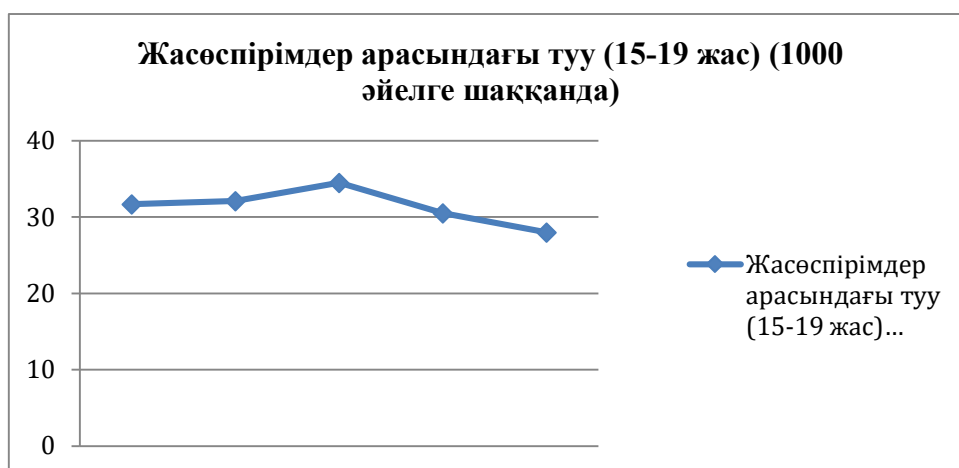
Экономикадағы гендерлік теңсіздікпен күрес мақсатты әрекетті талап етеді. Бұл жұмысшылардың тең мүмкіндіктері мен құқықтарын қорғауды қамтамасыз ететін заңнаманы күшейту, сондай-ақ әйелдердің кәсіби дамуын қолдау және еңбек қатынастарындағы стереотиптерді жою бағдарламаларын енгізуді қамтиды. Қазақстандағы гендерлік теңсіздікті бағалау үшін сауалнама жүргізілді. Сауалнамаға 18 жасқа толған 67 адам қатысты. Төменде сауалнама нәтижелері көрсетілген.

Кесте 1 – Сауалнама нәтижелері

Сұрақтары:	Жауаптары:
1. Сіздің жынысыңыз:	Ерлер: 45% Әйел: 55%
2. Еліміздегі гендерлік теңсіздік деңгейін қалай бағалайсыз?	Өте жоғары: 15% Жоғары: 30% Орташа: 35% Төмен: 15% Өте төмен: 5%
3. Сіздің ойыңызша, қоғамда ерлер мен әйелдер қандай рөл атқаруы керек деген стереотиптер бар ма?	Иә: 80% Жоқ: 15% Жауап беру қиын: 5%
4. Жұмыс пен мансап саласындағы ерлер мен әйелдердің мүмкіндік теңдігін қалай бағалайсыз?	Өте төмен: 10% Төмен: 20% Орташа: 30% Жоғары: 30% Өте жоғары: 10%

5. Сіздің ойыңызша, гендерлік зорлық-зомбылық біздің елімізде проблема болып табылады ма?	Иә: 75% Жоқ: 15% Жауап беру қиын: 10%
6. Еліміздегі әйелдердің саясаттағы өкілдігін қалай бағалайсыз?	Өте төмен: 20% Төмен: 30% Орташа: 30% Жоғары: 15% Өте жоғары: 5%
7. Біздің елде ерлер мен әйелдердің жалақысында айырмашылық бар деп ойлайсыз ба?	Иә: 70% Жоқ: 20% Жауап беру қиын: 10%

Сауалнама нәтижесінде елімізде теңсіздіктің бар екендігі анықталды онымен күресу үшін түрлі іс-шаралар жүргізілуі керек деп есептеймін.



Сурет 2 – Жасөспірімдер арасындағы туу көрсеткіштері, 2023 жылдағы Ескерту: (Қазақстан Республикасы Стратегиялық жоспарлау және реформалар агенттігінің Ұлттық Статистика Бюросы, 2022) әдебиет негізінде автормен құрастырылған

Жасөспірім аналар көбінесе мәртебесіне байланысты білім алу және жұмыс мүмкіндіктері шектеулі болады. Бұл біліктілік деңгейін төмендетіп, жалақысы жоғары кәсіптерге қол жеткізуді шектеуі мүмкін (Уолби, 2012).

Корреляциялық-регрессиялық талдау жасалынды. Ол үшін ерлер мен әйелдердің жалақысына әсер ететін 6 фактор таңдалынып алынды. Сол факторлардың 2 еуі ең кіші квадраттар әдісі арқылы таңдалынып алынған болатын. Төменде модель көрсетілді.

	Коэффициент	Стандартты кате	t-статистика	p-мәні	
const	27,3186	9,0639	-3,012	0,0118	**
X1	-3,61048	1,14451	3,155	0,0092	***
X6	63,8934e-4	9,28783e-3	3,0068	0,000022	***

Тәуелді айн. орташасы	11,928	Тәуелді айн. ст. ауытқуы	6,933356
Қалдықтар кв қосын.	88,73	Модельдің ст. қатесі	2,840144
R-квадрат	0,858	Түзетілген R-квадрат	0,832199
F(2,11)	33,236	P мәні (F)	0,000022
Лог.сенімділік	-32,79	Акаике критерийі	71,58194
Шварц критерийі	73,499	Хеннана-Куинна критерийі	71,40447

Сурет 3 – Gretl бағдарламасындағы регрессиялық модель

Ескерту:(Қазақстан Республикасы Стратегиялық жоспарлау және реформалар агенттігінің Ұлттық Статистика Бюросы,2022) әдебиет негізінде автормен құрастырылған

$$\text{Әйелдер жалақысы} = 27,3 - 3,6 X_1 + 63,8 X_6$$

Осы теңдеуге сүйене отырып, қорытынды жасайтын болсақ, әйелдердің жалақысы 3,6 пайызға төмендейді егер X_1 факторы елдегі гендерлік теңсіздік деңгейі артатын болса 1 пайызға. Келесі фактор елдегі денсаулық сақтау деңгейі 1 теңгеге артатын болса, 63,8 долларға әйелдердің жалақысы артады.

Отбасы міндеттерін және бала күтімін бөлудегі теңсіздік әйелдердің кәсіби мүмкіндіктеріне айтарлықтай әсер етіп, олардың мағыналы жұмысқа қол жеткізуін шектейді. Гендерлік теңсіздікті шешуге бағытталған тиімді заңдар мен саясаттардың болмауы теңсіздікті күшейтіп, кемсітушілікке жол ашуы мүмкін. Дәстүрлі гендерлік рөлдер мен стереотиптер қоғамдағы әрбір жыныстың әлеуметтік мінез-құлқы, мүмкіндіктері мен рөлдері туралы күтуді қалыптастыра алады. Бұл өмірдің әртүрлі салаларында кемсітушілік пен теңсіздікке әкелуі мүмкін. Әйелдердің білім алуына қолжетімділіктің жоқтығы немесе олардың белгілі бір оқу салаларында орналасуы мансаптық мүмкіндіктерді шектеп, жалақыға әсер етуі мүмкін. Ерлер мен әйелдердің жалақысындағы айырмашылықтар еңбек нарығындағы теңсіздіктен, жұмысқа қабылдауда және мансаптық өсуде тең мүмкіндіктердің жоқтығынан болуы мүмкін. Отбасы міндеттерін және бала күтімін бөлудегі теңсіздік әйелдердің кәсіби мүмкіндіктеріне айтарлықтай әсер етіп, олардың мағыналы жұмысқа қол жеткізуін шектейді. Гендерлік теңсіздікті шешуге бағытталған тиімді заңдар мен саясаттардың болмауы теңсіздікті күшейтіп, кемсітушілікке жол ашуы мүмкін. Гендерлік зорлық-зомбылық пен кемсітушілік теңсіздік құрбандарының денсаулығына, әл-ауқатына және мүмкіндіктеріне ұзақ мерзімді әсер етуі мүмкін. Әйелдердің саясатқа және шешім қабылдауға шектеулі қатысуы да гендерлік теңсіздікті қалыптастыратын факторлар болып табылады. Ақпараттық ағындар, соның ішінде жарнама және БАҚ өкілдері гендерлік стереотиптердің қалыптасуы мен нығаюында рөл атқара алады. Экономикадағы ресурстар мен мүмкіндіктерді біркелкі бөлу әйелдердің экономикалық тәуелсіздікке қол жеткізуіне кедергілер тудыруы мүмкін. Жаһандық үрдістер мен технологиялық өзгерістер еңбек нарығына әсер етіп, жаңа мүмкіндіктер туғызады, сонымен қатар белгілі бір топтар, соның ішінде әйелдер үшін тәуекелдерді арттырады. Осы факторларды түсіну және оларды еңсеру стратегияларын әзірлеу гендерлік теңсіздікпен күресу және неғұрлым әділетті қоғам құрудағы негізгі қадамдар болып табылады. Гендерлік теңсіздік жүйелі мәселе ретінде:

Экономикадағы гендерлік теңсіздік – қоғамның және жалпы экономиканың дамуын шектейтін, тамыры тереңде жатқан жүйелі проблема. Мәселені зерттеу факторлардың күрделі желісін, соның ішінде әлеуметтік-мәдени көзқарастарды, құрылымдық кедергілерді және тең емес экономикалық мүмкіндіктерді ашты. Көп деңгейлі тәсілдің қажеттілігі: Экономикадағы гендерлік теңсіздікті шешу мемлекеттік саясат, корпоративтік мәдениет және қоғамдық пікір деңгейіндегі әрекеттерді қамтитын кешенді, көп деңгейлі тәсілді талап етеді. Мемлекеттік қолдаудың мәні: Экономикада гендерлік теңдік үшін жағдай жасауда мемлекеттік бағдарламалар мен саясаттар шешуші рөл атқарады. Кемсітушілікті жоюға, білім беру мен жұмысқа орналасуда тең мүмкіндіктерді қамтамасыз етуге, әйелдер кәсіпкерлігін дамытуға бағытталған тиімді шараларды әзірлеу және жүзеге асыру маңызды. Білім беру мен жұмысқа орналасуда тең мүмкіндіктерді қамтамасыз ету: Әйелдердің білімге және кәсіптік білім алуға қолжетімділігін арттыру, сондай-ақ мансаптық өсу жолындағы бар кедергілерді жою экономикадағы гендерлік теңдікке қол жеткізу жолындағы маңызды қадамдар болып табылады. Әйелдер кәсіпкерлігін ынталандыру: Әйелдер кәсіпкерлігін қаржылық ресурстармен қамтамасыз ету, оқыту және

кеңес беру арқылы қолдау әйелдердің бизнестегі өкілдігін арттыруға көмектеседі және экономикалық өсуді ынталандырады. Мәдени өзгерістер және хабардарлық: Әйелдер мен ерлердің қоғамдағы және экономикадағы рөлдеріне қатысты мәдени стереотиптер мен теріс пікірді білім беру, БАҚ және қоғамдық науқандар арқылы еңсеру қажет. Тең мүмкіндікті жұмыс ортасын құру: Жұмыс ортасын жақсарту және жұмыс пен өмірдің тепе-теңдігін қамтамасыз ету бойынша шараларды жүзеге асыру барлығына мансаптық өсу мен даму үшін тең мүмкіндіктер жасауға көмектеседі.

Тұтастай алғанда, экономикадағы гендерлік теңсіздік мәселесін шешу мемлекет, бизнес және тұтастай қоғам тарапынан келісілген күш-жігерді қажет етеді. Инклюзивтілікке, теңдікке және әділеттілікке негізделген тәсіл оның барлық қатысушылары үшін неғұрлым тұрақты және гүлденген экономиканың дамуына ықпал етеді.

ҚОРЫТЫНДЫ:

Жүргізілген талдаулар мен есептеулерге сүйене отырып, келесідей қорытындылар мен ұсыныстар жасауға болады: Қорытындылай келе, гендерлік теңсіздік қоғам өмірінің барлық салаларын қамтитын маңызды мәселе болып қала береді. Теңдік үшін күрестегі елеулі күш-жігерге қарамастан, қоғам алдында тұрған міндеттер үнемі назар аударуды және күш-жігерді қажет етеді. Гендерлік теңсіздіктің әсері еңбек нарығына, білім беру, денсаулық сақтау және саяси салаларға таралып, жалпы елдің дамуына кері әсерін тигізеді. Жұмыс әлемінде гендерлік теңсіздік жалақыдағы айырмашылықтардан, жоғары білікті жұмыс орындарына қол жеткізуден және кәсіби өсуден көрінеді. Бұл ерлер мен әйелдерге тең емес мүмкіндіктер туғызып, адам әлеуетін толық пайдалануға кедергі келтіріп, экономикалық прогресті тежейді. Білім беру саласында гендерлік кедергілерді еңсеру маңызды. Екі жыныстың да бірдей білім алуы қоғамның интеллектуалдық ресурстарын дамытудың және айырмашылықтарға төзімді қоғамды қалыптастырудың негізі болып табылады. Гендерлік стереотиптер денсаулықты іздейтін мінез-құлыққа және әлеуметтік әл-ауқатқа әсер ететін қажетті қызметтерді алуға әсер етуі мүмкін. Тиімді шаралар гендерлік алшақтықты азайтып қана қоймай, тұрақты әлеуметтік-экономикалық дамуға ықпал ете алады. Ұсыныстар айта кететін болсам: еңбек саласындағы теңдік бағдарламаларын іске асыру, отбасы саясатын жетілдіру, білім беруде тең мүмкіндіктер жасау, заңнама мен жалақының ашықтығын нығайту. Экономикадағы гендерлік теңсіздікті зерттеу әйелдердің жұмыс күшіне қолжетімділігі мен мүмкіндіктеріне әсер ететін көптеген факторларды анықтады. Бұл факторларға құрылымдық кедергілер, мәдени бейімділіктер, тең емес білім беру мүмкіндіктері және ресурстарға қолжетімділік жатады. Экономикадағы гендерлік теңсіздік проблемасын шешу тәсілдері көп деңгейлі болуы және мемлекеттік саясат деңгейінде де, ұйымдар мен жалпы қоғам деңгейінде де әрекеттерді қамтуы тиіс. Ұсыныстарды толығырақ қамтып кететін болсам: Экономикада гендерлік теңдікке қол жеткізу үшін кешенді көзқарас пен барлық мүдделі тараптардың бірлескен күш-жігерді қажет етеді.

- кемсітуді жоюға және еңбек және кәсіпкерлік саласында әйелдерге тең мүмкіндіктер жасауға бағытталған мемлекеттік бағдарламалар мен заңнамалық актілерді әзірлеу және іске асыру.

- әйелдердің жоғары білікті жұмыс орындарына және басшылық лауазымдарға қол жеткізуіне тең мүмкіндіктерді қамтамасыз ету үшін әйелдердің білімі мен біліктілігін арттыруға жәрдемдесу.

- әйелдердің бизнестегі өкілдігін арттыруға көмектесетін және экономикалық өсуді ынталандыратын қаржылық қолдау, кеңес беру және оқыту арқылы әйелдердің кәсіпкерлік бастамаларын қолдау.

- білім беру бағдарламалары, БАҚ және қоғамдық науқандар арқылы әйелдердің экономикадағы рөлі туралы хабардар болу және мәдени стереотиптерді өзгерту.

- әйелдер үшін мансаптық өсу мен дамуда тең мүмкіндіктерді қамтамасыз ету үшін жұмыс ортасын және жұмыс пен өмір балансын жақсарту бойынша шараларды жүзеге асыру.

Осы шараларды жүзеге асыру үшін бірлесіп жұмыс істеу гендерлік теңдік пен әлеуметтік әділеттілік қағидаттарына негізделген әділ және гүлденген қоғам құруға көмектеседі деп есейтеймін.

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IRSTI: 06.39.31

UDC: 334.012.6:338.23

Improving the competitiveness of SMEs in the Republic of Kazakhstan with the use of artificial intelligence technologies

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Abstract

In the modern world, where competition is constantly increasing, small and medium-sized businesses (SMBs) face numerous challenges such as limited resources, lack of information, difficulties in accessing markets, and more. In this context, the use of new technologies, such as artificial intelligence (AI), can be the key to enhancing the competitiveness of SMBs. The aim of this research is to explore the potential application of AI technologies to enhance the competitiveness of SMBs in the Republic of Kazakhstan. To achieve this goal, the following methods were set: Analysis of literature sources, Examination of statistical data, Analysis of case studies on the implementation of AI solutions in SMBs.

The study revealed that SMBs development is hindered by factors such as limited resources, lack of information, difficulties in accessing markets, and more. Global experience shows that AI technologies can effectively address many SMB challenges. AI solutions can help automate routine tasks, improve data analytics, personalize marketing, optimize production, and enhance customer service. Nevertheless, the implementation of AI solutions in SMBs in Kazakhstan is associated with various barriers, including a lack of information about AI technologies, high costs of AI solutions, staff unpreparedness for working with AI, and the absence of government support.

Based on the conducted research, it can be concluded that AI technologies have significant potential for enhancing the competitiveness of SMBs in Kazakhstan.

Keywords: small and medium-sized businesses, competitiveness of business, artificial intelligence, technology, Republic of Kazakhstan.

Introduction

In the context of globalization and rapid technological advancement, competitiveness is a key factor for success in any business. This is particularly relevant for small and medium-sized businesses (SMBs), which play a crucial role in the economy of Kazakhstan. Thus, SMEs play a significant role in driving economic growth and fostering innovation, particularly in emerging industries and sectors [1].

Artificial Intelligence (AI) constitutes a set of technologies that can help SMBs enhance their competitiveness. AI can be utilized for automating tasks, optimizing processes, personalizing

offerings for clients, and generating innovative ideas [2]. AI-driven analytics tools can help SMEs extract valuable insights from their data, enabling better decision-making processes [3].

There is a growing interest in AI in Kazakhstan, with the government [4] taking measures to support the development and implementation of AI across various economic sectors. However, SMBs in Kazakhstan still do not fully capitalize on the opportunities presented by AI [5]. Therefore, this study tries to investigate the impact of AI on the competitiveness of SMEs. This research holds both theoretical and practical value. The theoretical value lies in the exploration of the potential of AI to enhance the competitiveness of SMBs. The practical value lies in the formulation of scientifically grounded recommendations for the selection and implementation of AI solutions in SMBs in Kazakhstan.

The goal of this research is to develop scientifically grounded recommendations for enhancing the competitiveness of SMBs in Kazakhstan through the application of artificial intelligence technologies and identify challenges associated with the implementation of AI in SMBs in Kazakhstan.

Literature Review

In the contemporary business landscape, small and medium-sized enterprises (SMEs) encounter heightened competition, necessitating the adoption of innovative tools such as artificial intelligence (AI) technologies for survival and growth [6].

AI offers several advantages to enhance SME competitiveness. It streamlines routine tasks, personalizes offerings based on customer preferences, provides 24/7 customer support through chatbots, aids in new product development, and optimizes business processes to cut operational costs.

Table 1. Comparative characteristics of AI in different countries

Region	Benefits of AI for SMEs	Examples of AI Usage	Challenges of AI Implementation	Government Support
USA	- Task automation (accounting, marketing) - - Personalization of offers - Improved customer service	- Intuit: automation of accounting and taxes – Amazon[7]: personalization of offers - Salesforce: automation of customer relationship management	- High cost of AI solutions - Shortage of qualified personnel - Cybersecurity concerns	- Tax breaks - Grants for research and development - AI training programs
China	- Market and competitor data analysis - Pricing and inventory management optimization - New product and service development	- Alibaba[8]: personalization of offers - Tencent: customer data analysis - Baidu: development of self-driving cars	- Insufficient access to financing - Weak intellectual property protection - Limited data availability	- Government investments in AI - Creation of AI incubators and accelerators - Support for AI startup development
UK	- Automation of routine tasks - Increased labor productivity - Cost reduction	- Sage: inventory management automation[9] - Xero: accounting automation - GoCardless: payment automation	- Distrust of AI among SME owners - Difficulty integrating AI with existing systems - Lack of awareness of AI benefits	- Providing subsidies for AI implementation - SME consulting support - Basic AI training
Germany	- Improved customer service quality - Supply chain management enhancement - Innovative business model development	- SAP: cloud AI solutions – Siemens[10]: use of AI in manufacturing - Bosch: use of AI in product development	- High cost of AI solutions - Shortage of AI specialists - Regulatory restrictions	- Investments in AI research - Creation of AI competence centers - Support for AI startups
Singapore	- Enabling environment for AI implementation - Access to advanced AI technologies - Development of AI skills among employees	- Government Technology Agency: development of AI [11] solutions for SMEs - AI Singapore: support for AI research and development - SkillsFuture Singapore: AI training programs	- Limited domestic market - Competition from large international companies - Regulatory uncertainty	- Government grants for AI implementation - Tax breaks for AI companies - Creation of AI infrastructure

Examples of AI usage in SMEs include leveraging accounting automation tools like "1C: Accounting," implementing AI systems in online stores for personalized product

recommendations, employing chatbots for customer service, and using AI to analyze customer data for innovative offerings [6].

First and foremost, the introduction of an AI system on the Kazakhstan Labor Exchange provides [15] effective solutions for job seekers in finding employment and assists employers in personnel selection. This example illustrates the practical application of AI in addressing tasks related to personnel recruitment, which can be crucial for Kazakhstani companies aiming to optimize human resources management processes.

Additionally, providing access to the YandexGPT API for Kazakhstan [16] companies and incorporating support for the Kazakh language in the Alice voice assistant highlight diverse aspects of AI usage in business applications and everyday life. This can offer Kazakhstani enterprises the opportunity to integrate cutting-edge technologies into their products and services, thereby enhancing customer interactions. Another aspect pertains to the expansion of language support in Yandex Cloud, with the inclusion of the Uzbek language [17]. This not only emphasizes the importance of cultural adaptation of technologies but also provides broader opportunities for Kazakhstani companies operating in the Uzbek market. The startup Solai [18], which developed an AI dispatcher for intra-city delivery logistics, presents an innovative solution that can significantly improve the efficiency of logistics for small and medium-sized enterprises in Kazakhstan. Its success in the market can serve as an example for other companies seeking to reduce operational costs and enhance service quality.

Despite these benefits, AI implementation in SMEs presents challenges, including a lack of awareness among SME owners, limited resources, implementation complexity, and cybersecurity concerns.

Government support can stimulate AI adoption in SMEs through subsidies, grants, AI incubators, accelerators, and training programs. In conclusion, AI holds immense potential for boosting SME competitiveness. To fully harness AI benefits in Kazakhstan, there's a need to increase awareness, ensure accessibility of AI solutions, develop AI talent, and ensure cybersecurity.

With collaborative efforts from the state, businesses, and the AI community, SMEs in Kazakhstan can drive economic growth and innovation [8].

Materials and methods

To explore the impact of artificial intelligence (AI) on the competitiveness of small and medium-sized enterprises (SMEs) in Kazakhstan, the study employs a Comparative-Analytical method. Representative objects from various industries incorporating AI are selected. The study analyzes publicly available information, examines practical cases of AI implementation, and identifies key points and outcomes.

The study assesses the influence of AI on competitiveness by examining changes in key business indicators. A comparison is made between the results of SMEs utilizing AI and those not implementing such technologies. The success factors and challenges for SMEs in the process of adopting and using AI were identified.

Results and discussion

As a result of the study on the impact of Artificial Intelligence (AI) on businesses in Kazakhstan, significant transformations across various industries have identified. Presented below are the generalized findings from the research, encompassing diverse aspects of AI technology implementation in the region:

Table 2. Comparative analysis of using AI in 2023-2024.

Technology	Year of Implementation	Goal	Results
AI on the Electronic Labor Exchange	2024	Improve job matching and resume selection	Reduced job search time, reduced recruitment costs
YandexGPT API	2023	Expand AI capabilities for businesses	Increased work efficiency, optimized business processes
Kazakh Language Support in Alice	2023	Increase AI accessibility	Improved user experience, expanded audience
Uzbek Speech Recognition in Yandex Cloud	2023	Expand geographic support	Adapt AI to regional languages
Solai	2022	Optimize logistics routes	Reduce operating costs, improve service quality
AI in ITIL Processes at Kazteleport	2021	Optimize ITIL processes	Reduced number of requests, reduced processing time, increased customer satisfaction

Artificial Intelligence in Kazakhstan brings significant innovations to various business sectors, positively impacting efficiency and performance.

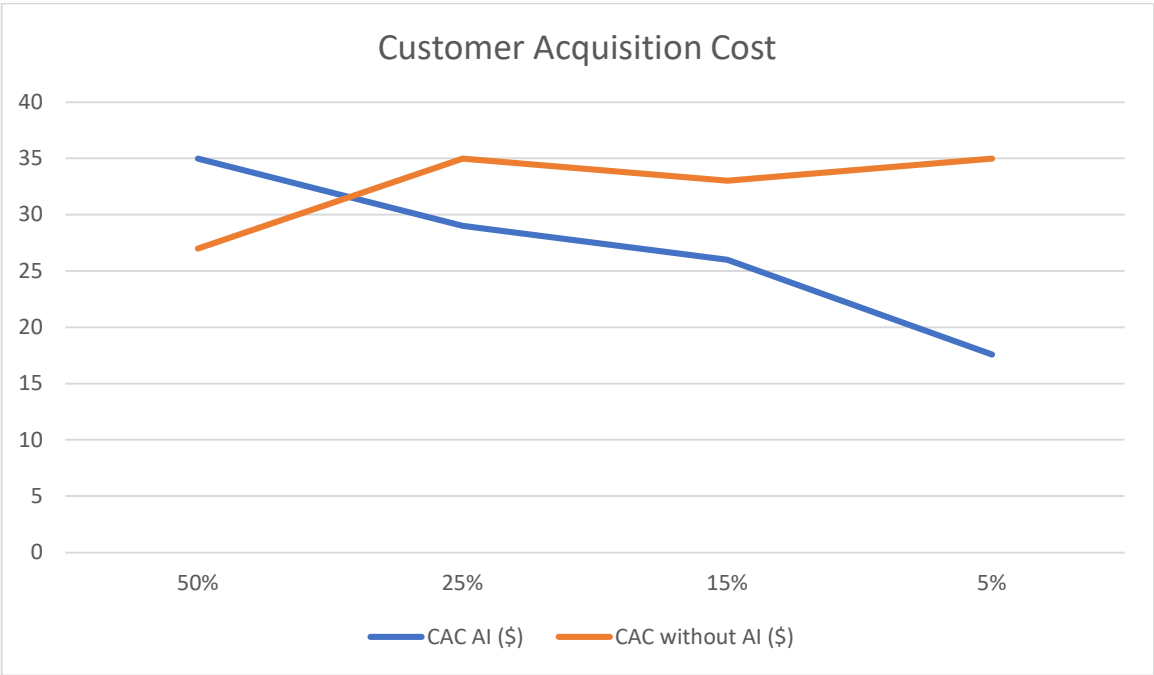


Figure 1 - Chart of the change in the cost of attracting a client for 2023.

In the context of the contemporary development of artificial intelligence (AI) technologies in Kazakhstan and Central Asia, these articles provide valuable practical examples of implementation and potential benefits for various sectors of the economy. They emphasize that countries like the United States, Japan, the United Kingdom, and China are successfully investing

in AI research and development, aiming to become global leaders in the field.

The articles highlight key aspects of AI implementation in Kazakhstan. For instance, the use of artificial intelligence on the Kazakhstan Labor Exchange simplifies the recruitment process, significantly optimizing personnel management for local companies. The access to YandexGPT API for Kazakhstani companies and the support for the Kazakh language in the Alice voice assistant expand the possibilities of integrating cutting-edge technologies into various business sectors and everyday life.

The showcased examples of successful startups, such as Solai, demonstrate that the implementation of AI dispatchers can effectively enhance the efficiency of small and medium enterprises in Kazakhstan. This confirms the potential of AI not only for improving business processes but also for attracting investments into innovative startups.

However, despite the evident prospects, challenges such as the need for qualified AI professionals should be considered. The projected growth in demand for roles like data analysts and system data developers underscores the importance of developing educational programs and strategies to prepare a skilled workforce.

It is crucial to note that the articles address the social aspects of AI implementation, such as improving the quality of life for urban residents. This includes enhancing conditions for people with disabilities and optimizing the transportation system. Nevertheless, for the maximum success of AI implementation, concerted efforts from the government, businesses, and society are necessary.

In conclusion, the discussion provides a balanced view of the potential and challenges of AI implementation in Kazakhstan, emphasizing the importance of a comprehensive and balanced approach to achieve maximum benefits from this innovative technology.

Conclusion

Amidst the active integration of artificial intelligence into business and daily life in Kazakhstan, the analysis of the discussed articles reveals both prospects and challenges in this transformative process. Key developments in employment, language technologies, and logistics underscore the potential of AI to enhance business processes and service quality. However, the successful implementation of these initiatives requires a skilled workforce, emphasizing the relevance of training professionals in the fields of data analytics and development.

Kazakhstan stands at the forefront of adopting AI technologies in its economy, which could serve as a pivotal factor for achieving sustainable growth in the near future. A balanced approach, bringing together the efforts of the government, businesses, and society, is essential for successful adaptation and maximizing the benefits of innovative technologies.

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Political Studies

ВИЗНАЧЕННЯ КОНЦЕПЦІЇ ЦИФРОВОЇ КРАЇНИ ТА ЦИФРОВОГО УРЯДУ

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У сучасному швидкоплинному світі цифровізація стала ключовим аспектом будь-якого суспільства, революціонізуючи способи спілкування, навчання, доступу до медичної допомоги та ведення бізнесу, державного та публічного управління. Такі еволюційні зміни у трактуванні ролі інформації та інформаційних технологій в розвитку сучасного суспільства дають нам підґрунтя для кращого розуміння сучасних цифровізаційних процесів, які відбуваються у соціумі [1].

Усі розвинені країни успішно впроваджують цифрові трансформації та розвивають інноваційні технології, а відтак в Україні одним із пріоритетів теж є реформування та розвиток цифрової держави та інтеграції цифрових технологій у різні аспекти суспільства, що призводить до трансформації в тому, як люди та організації функціонують і адаптуються в технологічному ландшафті, що швидко змінюється [2]. Завдяки збільшенню доступності цифрових технологій дані можуть миттєво обмінюватися по всьому світу, підвищуючи ефективність і стимулюючи інновації. Від хмарних обчислень до штучного інтелекту, прикладів цифрових технологій багато, кожна з них відіграє ключову роль у формуванні сучасного світу. Прийняття цих досягнень необхідне як для окремих осіб так і для державних інституцій, щоб залишатися конкурентоспроможними та актуальними в сучасному цифровому суспільстві, долаючи географічні кордони.

Варто звернути увагу на результативність реалізації Міністерством цифрової трансформації стратегії цифровізації державного управління на всіх рівнях. Різні ключові галузі суспільства зазнали значних змін внаслідок цифровізації, вплинувши на сфери комунікації, освіти, охорони здоров'я та бізнесу з використанням технологічних досягнень та у сфері державного управління. Канали комунікації перейшли до миттєвих месенджерів, відеодзвінків і платформ соціальних мереж, полегшуючи міжнародне спілкування через інтернет і цифрові платформи.

Для реалізації даних змін Президент України В. Зеленський анонсував проект «Держава у смартфоні», який повинен підняти рейтинг України як розвинутої, прозорої, легкої для ведення бізнесу та життя людей держави. Ця програма є компонентом електронного урядування та повинна спростити комунікацію між громадянином та державою [3].

Концепція цифрової країни являє собою сучасний і перспективний підхід до управління, суспільства та інфраструктури, що використовує цифрові технології для підвищення ефективності, доступності та результативності діяльності уряду, державних послуг та залучення громадян. Цифрова країна - це не лише впровадження технологій, а й культурні та структурні зміни в бік прозорості, ефективності та інклюзивності в управлінні та суспільстві. Вона має на меті використати силу цифрових інновацій для створення більш пов'язаного, сталого та стійкого суспільства.

Концепція цифрової країни охоплює різні виміри, а зокрема: а) цифровий уряд (врядування) - використання цифрових технологій для модернізації урядових операцій,

підвищення ефективності державного сектору та спрощення бюрократичних процесів. Сюди входить оцифрування урядових документів, використання електронних посвідчень особи для громадян та надання онлайн-платформ для надання державних послуг; б) послуги електронного уряду - надання державних послуг через цифрові платформи, що дозволяє громадянам отримати доступ до державних послуг онлайн, таких як сплата податків, подання заявок на отримання дозволів, отримання медичної або освітньої інформації. Це покращує доступність і зручність для населення; в) цифрова економіка - заохочення зростання цифрової економіки через політику підтримки інновацій, цифрового підприємництва та розвитку цифрових навичок серед населення. Це включає сприяння розвитку екосистеми стартапів, цифрового банкінгу та електронної комерції; г) цифрова інфраструктура - розвиток надійної цифрової інфраструктури, такої як високошвидкісний доступ до Інтернету, цифрові платіжні системи та безпечні кіберсередовища, для підтримки функціонування цифрового суспільства та економіки; д) цифрове громадянство - підвищення ролі громадян у цифровій країні шляхом забезпечення доступу до цифрової грамотності та інтернет-послуг, заохочення громадянської активності в Інтернеті та захисту цифрових прав і конфіденційності; е) розумні міста - впровадження технологій "розумних міст", які використовують дані та цифрові технології для більш ефективного управління міськими територіями, покращуючи все - від дорожнього руху та громадського транспорту до використання енергії та моніторингу навколишнього середовища; ж) кібербезпека та захист даних - впровадження ефективних заходів кібербезпеки та законів про захист даних для забезпечення цифрової інфраструктури країни та захисту особистої інформації громадян від кіберзагроз і зловживань.

Що стосується цифрового врядування, то воно являє собою фундаментальну зміну в тому, як уряди працюють і взаємодіють з громадянами, підкреслюючи роль цифрових технологій у підвищенні ефективності, прозорості та участі громадян у державному управлінні [4].

Цифрове врядування передбачає використання цифрових технологій для реформування роботи державного сектору та надання послуг громадянам і бізнесу. Йдеться про трансформацію як внутрішньої роботи уряду (наприклад, адміністрування, закупівлі та людські ресурси), так і послуг, що надаються назовні (наприклад, ліцензування, подача податкової звітності та соціальні послуги), за допомогою цифрових засобів. Реалізація стратегій цифрового врядування часто включає розробку цифрових платформ, онлайн-сервісів і мобільних додатків для полегшення доступу до державних послуг та інформації. Ключовими компонентами цифрового врядування є: а) цифрові платформи та послуги, які слугують єдиним вікном для доступу до різних послуг, значно зменшуючи потребу у фізичній взаємодії та паперовому документообігу. Ці платформи можуть обробляти заявки, платежі та запити, пов'язані з державними послугами; б) системи цифрової ідентифікації які мають вирішальне значення для перевірки особи громадян в Інтернеті, дозволяючи їм отримувати доступ до послуг ефективно та безпечно. Це можуть бути цифрові посвідчення особи або програми електронного резидентства для фізичних та юридичних осіб; в) відкриті дані та прозорість, які роблять урядові дані доступними для громадськості. Ініціативи з відкритих даних дозволяють громадянам отримати доступ до інформації про діяльність уряду, витрати та процеси прийняття рішень, що сприяє підвищенню підзвітності та довіри; г) Цифрова участь та залучення, які сприяють більшій участі громадян в управлінні через онлайн-консультації, механізми зворотного зв'язку та соціальні мережі. Ці платформи дозволяють урядам збирати інформацію від громадян, залучати їх до процесів прийняття рішень та інформувати їх про політику та ініціативи; д) інфраструктура електронного урядування, яка включає в себе технічну основу, необхідну для цифрового врядування, таку як центри обробки даних, хмарні обчислювальні ресурси та безпечну мережеву інфраструктуру. Вона забезпечує надійність, доступність і безпеку цифрових послуг.

Цифрове врядування - це не просто оцифрування існуючих послуг, а переосмислення та перепроєктування процесів для повного використання цифрових можливостей. Це трансформаційний підхід, який вимагає відданості, інвестицій та співпраці на всіх рівнях влади і суспільства для реалізації його повного потенціалу.

Електронні державні послуги - це цифрова трансформація державних послуг, коли урядові операції стають доступними громадянам, бізнесу та іншим державним установам через онлайн-платформи. Цей цифровий зсув має на меті підвищити доступність, ефективність та якість державних послуг, використовуючи технології для задоволення мінливих потреб суспільства. Ключовими аспектами, перевагами та викликами електронного уряду є: а) надання різних державних послуг через Інтернет, таких як подача податкових декларацій, заявок на соціальне забезпечення, реєстрація бізнесу та послуги з ліцензування. Мета полягає в тому, щоб забезпечити зручний, ефективний і зрозумілий користувачеві досвід роботи в Інтернеті; б) цифрові канали комунікації, такі як веб-сайти, портали та соціальні мережі для спілкування з громадянами, пропонуючи актуальну інформацію про політику, послуги та ініціативи. Ці канали підтримують двосторонній зв'язок, дозволяючи громадянам надсилати запити, відгуки та брати участь у публічних обговореннях; в) інтегровані цифрові платформи, які об'єднують різні державні відомства та установи, сприяючи безперешкодному обміну даними та наданню послуг. Така інтеграція може значно підвищити швидкість і узгодженість надання державних послуг; г) мобільний уряд (m-Government), де через масове розповсюдження смартфонів багато послуг електронного уряду поширюються через різноманітні додатки та оптимізовані для мобільних пристроїв веб-сайти для доступу до послуг на ходу. Такий підхід підвищує доступність і зручність державних послуг; д) електронна участь громадян в управлінні, полегшуючи проведення онлайн-консультацій, опитувань та громадських форумів. Інструменти е-участі дозволяють громадянам робити свій внесок у процеси прийняття рішень, посилюючи демократичну взаємодію та розвиток політики.

Послуги електронного урядування полегшують людям доступ до державних послуг незалежно від їхнього місцезнаходження або часових обмежень, що значно полегшує доступ до них для тих, хто проживає у віддалених районах або має проблеми з мобільністю. Завдяки автоматизації процесів і зменшенню потреби в паперовому документообігу, електронні урядові послуги можуть надаватися швидше і з меншими витратами. Онлайн-доступ до урядових операцій і процесів прийняття рішень підвищує підзвітність і прозорість, зміцнюючи довіру між урядом і громадянами. Цифрові платформи можуть надавати персоналізовані, зручні для користувача послуги, підвищуючи загальну якість державних послуг та рівень задоволеності ними.

Розвиток послуг електронного урядування - це безперервний процес, рушійною силою якого є технологічний прогрес та зміна очікувань громадян. Вирішуючи ці проблеми та зосереджуючись на потребах населення, уряди можуть використати можливості цифрових технологій для створення більш оперативних, ефективних та інклюзивних державних послуг.

Безперечно, що впровадження електронного урядування має певні переваги серед яких впорядкування державних процесів, скорочуючи час і витрати, пов'язані з традиційними бюрократичними процедурами що дозволяє ефективніше розподіляти ресурси та швидше надавати послуги. Також, сюди можна віднести підвищення прозорості уряду та допомагає зменшити корупцію та підвищити підзвітність, сприяючи зміцненню довіри між урядом та громадськістю. Цифрові платформи роблять державні послуги доступними для ширшої аудиторії, в тому числі для віддалених або недостатньо охоплених послугами груп населення, покращуючи інклюзивність, а це в свою чергу сприяє більш прямій та змістовній взаємодії з громадянами, забезпечуючи зворотний зв'язок у режимі реального часу та участь у процесах врядування.

Попри всі позитиви електронного врядування, ми маємо подолати певні виклики та проблеми, зокрема забезпечення рівного доступу до цифрових послуг для всіх громадян, незалежно від їхнього соціально-економічного статусу. Необхідно докласти зусиль для подолання цифрового розриву шляхом надання доступу до Інтернету та навчання цифровій грамотності. Оскільки уряди оцифровують все більше послуг, вони також повинні посилити заходи кібербезпеки і закони про захист даних, щоб захистити конфіденційну інформацію і зберегти довіру громадськості. Ініціативи з цифрового врядування мають бути сталими та адаптованими до мінливих технологій і потреб громадян. Це вимагає постійних інвестицій, інновацій та політичної підтримки.

Впровадження цифрової трансформації в державі або державному секторі має вирішальне значення для підвищення ефективності, доступності та якості державних послуг. Цей процес передбачає інтеграцію цифрових технологій в усі сфери державного управління, що призводить до значних змін у наданні послуг та взаємодії громадян з урядом. Важливість впровадження цифрової трансформації в державі полягає в тому, що вона здатна докорінно змінити способи надання державних послуг та взаємодії громадян з урядом. Незважаючи на такі виклики, як цифрові розриви, проблеми конфіденційності, необхідність значних інвестицій та культурних змін, переваги цифрової трансформації для державного управління є очевидними. Вона призводить до більш ефективної, прозорої та інклюзивної роботи уряду, що в кінцевому підсумку сприяє підвищенню якості життя для всіх громадян.

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Legal Sciences

Review of legislation on labor and health safety of employees in Georgia

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Abstract. The right to life and health of employees is a fundamental right. The purpose is to assess the current legislation in Georgia and evaluate problematic aspects related to the safety and protection of individuals employed in the field of laboratory medicine.

Key words: Laboratory Health and Safety, Georgian law.

The relevance of issues related to occupational health and safety in the field of laboratory medicine is not well appreciated on a global scale. As a result of recent events, a thorough examination was conducted to determine the significance of implementing a comprehensive management methodology for occupational health and safety in the laboratory medicine sector. The goal is to effectively address the health and safety of employees and create a secure working environment, thereby minimizing potential risks associated with laboratory work.

In countries worldwide, including Georgia, ensuring the safety and health of workers holds a priority status. This is because a secure working environment is crucial for the efficient functioning of the labor market, contributing to the overall well-being, economic growth, and development of the country.

Labor cooperation is a specific socio-legal relationship where the rights to life and health of the worker represent fundamental rights, guaranteed by the Constitution of Georgia as well as various international agreements. The freedom of labor is ensured, granting everyone the right to freely choose their occupation. The safety regulations for employment and other labor rights are established by the organic law of Georgia.¹

In terms of economic, social, and cultural rights, the international pact that serves as an essential document for Georgia, the participating state authorities acknowledge the rights of each individual to have fair and equitable working conditions. This includes having both legal and accessible rights, ensuring the existence of safe and healthy working conditions.²

As you pointed out, the safety and protection of labor and health have become a globally relevant theme, and significant changes have been introduced in Georgia's Labor Code in recent years.

As of 2013, Georgia initiated reforms and, as a result, began to actively engage in the main requests of the European Union in the field of labor legislation.³ In 2014, Georgia signed an association agreement with the European Union, committing to align its existing labor legislation more closely with European standards.⁴ Under this agreement, Georgia has undertaken various legislative changes, and on February 19, 2019, passed the organic law "On Labor Safety," which

¹ Constitution of Georgia, Article 26, Paragraph 1

² International Covenant on Economic, Social, and Cultural Rights, Article 7(b)

³ Emerson M., Kovziridze T., Integration between the European Union and Georgia: What, Why, and How?, Second Edition, Tbilisi, 2018, 11.

⁴ Article 354 Association Agreement between Georgia, of the one part, and the European Union and the European Atomic Energy Community and their Member States, of the other part, 2014.

<https://matsne.gov.ge/document/view/2496959>

plays a crucial role in ensuring the safety and health of workers in the workplace. The regulations in this law aim to provide maximum protection for the life and health of employees and create a safe and healthy working environment. The Labor Code obliges the employer to ensure the maximum protection of life and health, as well as to create safe working conditions. In summary, these legal changes demonstrate Georgia's commitment to meeting European standards in labor safety and health protection.⁵

In the conditions of the COVID-19 pandemic, it has been emphasized once again that the protection of the rights of employees cannot be ensured solely through legal norms. It is essential for both employers and employees to be familiar with and recognize the significance, existence, and requirements of the mentioned rights and protection. The solution to this issue lies in implementing preventive measures proactively. Specifically, it is crucial for individuals working in the field of laboratory medicine to be acquainted with both occupational safety and health regulations and subsequent protocols for their effective implementation.

In workplace relationships, the employer has a paramount position in terms of authority. In the legal framework of occupational safety and health, there is a significant emphasis on ensuring the safety of the employee in comparison to the employer.⁶ The regulatory framework of public employment relationships attempts to uphold the principle of justice and equality in the employer-employee relationship. The legal regulation, under the principles of fairness and equal treatment, seeks to protect both the employer and the employee.⁷

The main legal act regulating labor relations in Georgia is the Labor Code of Georgia, which comprehensively governs employment matters and work-related relationships on the territory of Georgia and its adjacent waters. If such relationships are not specifically regulated by other special laws, the provisions of the Labor Code apply to ensure the comprehensive regulation of labor-related issues in the country.

According to the Labor Code of Georgia, labor relations involve the performance of work by the employee for the employer in accordance with the terms defined in the employment contract. Labor relations are based on the principles of mutual respect and cooperation between the parties, with the employer having the obligation to provide the necessary conditions for the employee to fulfill their job responsibilities. The employment contract may not specify norms that deviate from the legally established standards, ensuring the protection of the rights and interests of the employee. Additionally, labor relations cannot be subject to other norms that contradict the employee's legal status and rights.

Normative acts regarding employment relationships are determined by the regulations of the Government of Georgia and the orders of the Minister of Internal Affairs of Georgia, which cover the rules and regulations related to labor, health, and social protection.

According to the labor legislation of Georgia, the rights and obligations of the employee in the field of labor protection, which covers both occupational safety and public regulations, are detailed. In this context, compliance with safety standards is mandatory, and employees need to be informed for the prevention of accidents.

According to the "Labor Code" of Georgia, an employee is obliged to ensure maximum safety and health protection for both life and health in the workplace. The employee should fully comply with the requirements related to the job, and they are responsible for the prevention of occupational hazards, taking into account health and safety regulations, and covering the necessary costs for mandatory medical examinations.⁸

⁵ Labor Code of Georgia, Article 45, subsection 1.

⁶ Adeishvili L., Kereselidze D., Draft Labor Code of Georgia and some basic principles of labor law of continental European countries, Review of Georgian Law No. 1, Volume 6, Tbilisi, 2003, 10.

⁷ Judgment of the Supreme Court of Georgia on April 28, 2010 in case No. 864-1150-09.

⁸ Organic Law, Labor Code, Article 45.

The right to life and health of the employee represents a fundamental right enshrined in the Constitution of Georgia and various international acts. The right to work entails the obligation to ensure the rights of the employees, and those responsible for occupational safety must be maximally concerned with the protection of employees' lives and health. In the initial stage, the regulations of the "Occupational Safety and Health" under Georgia's law would have focused solely on activities that contribute to ensuring maximum safety and health in the workplace.

The adoption of the "Occupational Safety and Health" law is crucial for regulating labor relations and protecting the rights of employees in the country. Its purpose is to ensure the safety and health of employees in the workplace, addressing issues such as occupational accidents, their prevention, and coping with professional diseases and unforeseen circumstances.

According to the law, "Occupational Safety and Health" aims to define the general principles for regulating labor relations and preventing and coping with occupational accidents, unforeseen circumstances, and professional diseases. The law focuses on the safety and health of employees in the workplace, protecting their rights through the provision of information, consultation, and participation in decision-making processes. It also addresses the prevention of accidents, the provision of education and training, and the protection of employees' health and well-being. Additionally, the law establishes the rights and responsibilities of state bodies, employers, employees, representatives, and other entities involved in ensuring occupational safety and health.⁹

The "Occupational Safety and Health" law in Georgia provides detailed regulations regarding the rights and responsibilities of employers and employees. Employers are obligated to ensure maximum compliance with the rules of occupational safety and health, conduct preventive measures, regularly monitor the workplace conditions, provide necessary safety equipment and facilities to employees, collaborate with specialists in occupational safety and health, and take measures to protect the health and well-being of employees. Employees have the right to refuse to perform work that may pose a danger to their life and health. They can also be appointed as representatives, facilitating communication with employers. In addition to these rights, the law outlines obligations for both employers and employees to ensure compliance with occupational safety standards and preventive measures.¹⁰

According to the legislation of Georgia on "Occupational Safety and Health," an employer is required to have a accredited specialist in occupational safety and health who assists in the implementation of legally defined requirements. This includes creating necessary documents related to compliance with labor safety norms, performing inspections of occupational activities, and collaborating with the Ministry of Internally Displaced Persons from the Occupied Territories, Labor, Health, and Social Affairs in the field of occupational safety and health. The Service of Occupational Safety and Health of the Ministry is responsible for the supervision and control of compliance with occupational safety regulations. The service has the authority to inspect the workplaces of employees at any time, during both day and night shifts. The inspector may specify various administrative measures for the employer for the purpose of compliance with regulatory requirements, including warnings, fines, and suspension of work processes.

The job of an Occupational Safety Specialist is to ensure the timely implementation of all safety measures, assess risks, and manage control mechanisms. Additionally, they are responsible for creating documents for risk assessment and an occupational safety plan, which should guide the designated personnel in fulfilling their duties. The function of the specialist is to integrate each employee into the occupational safety system and distribute tasks in a way that ensures the system

⁹ Organic Law of Georgia on Labor Safety, Article 1.

¹⁰ Articles 3-11 of the Organic Law of Georgia on labor safety.

operates efficiently. Their tasks involve planning and executing all preventive measures related to occupational safety and providing periodic assessments of information on regulatory changes in the field. The Occupational Safety Specialist should be an intermediary between the employer and the employees. Through their work, they should protect the interests of both parties. It's noteworthy that the obligations of the employee under occupational safety issues do not exempt them from the principle of responsibility. This means that failure to fulfill certain duties by the employee does not imply liberation from the employer's responsibility. Occupational safety control by the employee should precisely represent the employer's responsibilities. In summary, the specialist's role is to accurately represent the interests of both the employer and the employee in the context of occupational safety issues. The fact that an employee has not fulfilled certain responsibilities does not imply exemption from the employer's liability, as the control of occupational safety fulfillment by the employee precisely determines the employer's responsibilities.

During the performance of the Labor Inspection Service's activities, it is governed by the following key normative acts: the Constitution of Georgia, international agreements of Georgia, the Organic Law of Georgia- the Labor Code, the Organic Law of Georgia on Occupational Safety, the Law of Georgia on Public Service, the Law of Georgia on Labor Inspection, and other legal and sub-legal acts of Georgia. These normative acts collectively establish the legal framework and guidelines for the functioning and responsibilities of the Labor Inspection Service. The activities of the service are aligned with the principles and regulations outlined in these acts, ensuring adherence to legal standards and procedures in the field of labor and occupational safety in Georgia.

The Labour Inspection Service of the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia, has been involved in the implementation of the "On the Purpose of Passing Over General Preventive Activities in the Field of Public Health" as defined in the Decree No. 36 of February 21, 2013, issued by the Government of Georgia. This decree outlines changes related to the determination of the minimum hourly wage for medical professionals (doctors and nurses) working in the field of public health as part of the general preventive program.

conclusion

In this process, it is crucial to be well-versed and informed about the directives of the European Union (EU) in the field of labor, as well as how they are utilized in national jurisdictions of EU member states. Despite the correct and timely implementation of directives related to labor safety according to the "On Occupational Safety" law, and as a result of the 2020 labor reform, it is essential to strengthen the mandate of the Labour Inspection and ensure effective enforcement of the aforementioned legislation.

Despite the progress in implementing the directives, there is a need to pay attention to the control and implementation mechanisms, especially in terms of training and education. Additionally, the analysis of issues related to occupational safety for workers should remain a priority. However, considering the potential lack of knowledge among workers about their rights in the field of occupational safety, the value of penalties imposed for violations of labor safety regulations is often less than the costs associated with compliance. Thus, there is a need to balance the enforcement mechanisms to ensure both effective implementation and the protection of workers rights.

Despite the legislative and structural changes, issues related to workers rights in the field of occupational safety remain problematic. Workers may not prioritize their rights due to concerns about job security, and, in some cases, the fear of unemployment may outweigh their concern for social and economic well-being. Daily challenges in the medical field in Georgia highlight the

importance of professional education and awareness in the areas of occupational safety and health. Currently, there is limited literature specifically addressing professional health and safety in the medical field in Georgia. As such, further research and exploration are necessary to expand knowledge in this critical area.

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Pedagogical Sciences

СОВРЕМЕННЫЕ МЕТОДЫ ОБРАЗОВАНИЯ. ИНКЛЮЗИВНОЕ ОБРАЗОВАНИЕ

MODERN EDUCATION METHODS. INCLUSIVE EDUCATION

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Аннотация: Данная статья рассматривает инклюзивное образование, как один из передовых методов, способствующих эффективному и современному обучению детей с особыми образовательными потребностями в контексте современного и быстро меняющегося образовательного ландшафта. Приведены примеры реализации принципов инклюзивного образования в разных странах и в разных школах, в том числе рассмотрены основные вопросы реализации инклюзивного образования в республике Казахстан. Рассмотрены примеры реализации инклюзивного обучения в структуре действующего школьного образования в нашей стране, выделены основные принципы на основе которых формируется понятие инклюзивного образования. Определены задачи и цели инклюзивного образования. Основным выводом является то, что инклюзивное образование может способствовать созданию равноправного и справедливого образовательного процесса, учитывающего интересы всех детей, в том числе детей с особыми образовательными потребностями.

Ключевые слова: Инклюзивное образование, особые образовательные потребности, безбарьерная среда, образовательный ландшафт

Abstract: This article considers inclusive education as one of the best practices promoting effective and modern education of children with special educational needs in the context of modern and rapidly changing educational landscape. Examples of implementation of the principles of inclusive education in different countries and in different schools are given, including the main issues of implementation of inclusive education in the Republic of Kazakhstan. Examples of realization of inclusive education in the structure of current school education in our country are considered, the main principles on the basis of which the concept of inclusive education is formed are highlighted. The tasks and goals of inclusive education are defined. The main conclusion is that inclusive education can contribute to the creation of an equal and fair educational process that takes into account the interests of all children, including children with special educational needs.

Key words: Inclusive education, special educational needs, barrier-free environment, educational landscape

Современный мир характеризуется стремительным прогрессом в совершенно разных областях и вопросы образования занимают одно из основных мест в этом процессе. Внедрение и применение современных образовательных методов и технологий сегодня становится одним из основных ответов на вызовы современного общества. Одним из

основных и широко обсуждаемых методов является инклюзивное образование, метод, направленный на улучшение инфраструктуры школы и создание благоприятных условий для обучающихся с особыми образовательными потребностями.

Современные подходы в образовании, различные методики, тенденции, в том числе вопросы инклюзивного образования стали объектом изучения многих ученых в таких научных областях как педагогика, психология, социология и медицина. Диссертационные исследования Акуловой О.В., Антонова О.В., Панковой Т.А., Савиновой Н.А., Хаперской А.А., Хомутцовой Н.А. отражают вопросы современного инклюзивного образования. Как и многие другие эти ученые внесли большой вклад в определение принципов инклюзивного образования и изучение его практик.

Образование — это непрерывный процесс воспитания и обучения, осуществляемый в целях нравственного, интеллектуального, культурного, физического развития и формирования профессиональной компетентности личности ученика. (Рисунок 1)

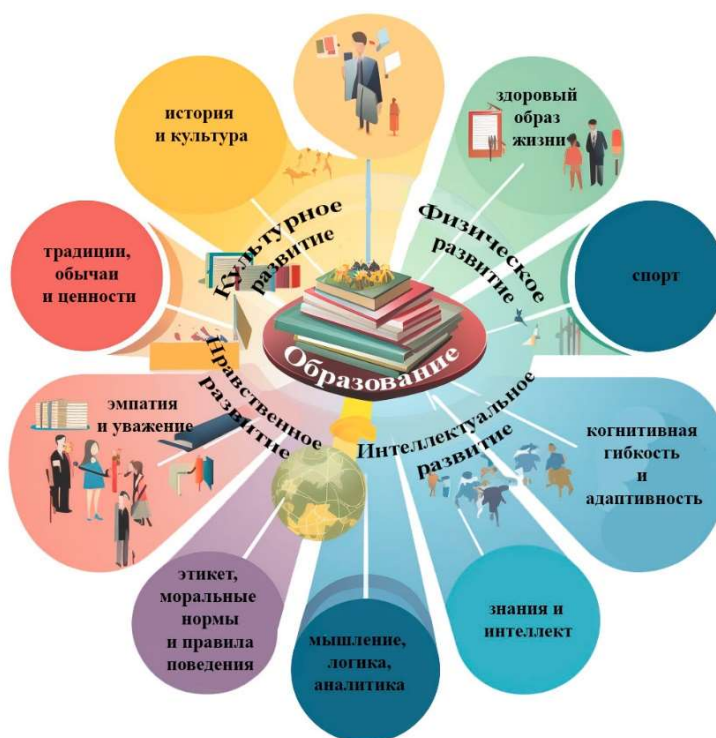


Рисунок 1. Образовательный процесс

Принципы гуманизма сегодня составляют основу развития современной системы образования. Инклюзивное образование подразумевает раннее выявление отклонений в развитии, учет образовательных потребностей особых детей, а также создание комфортных условий для формирования всесторонне развитой личности ребенка. На сегодняшний день можно с уверенностью говорить о том, что время, когда общество было настроено враждебно на обучение детей с ОВЗ в обычных школах и классах уже прошло, и настрой стал сменяться толерантностью. Становится очевидным увеличение количества детей и подростков, имеющих разнообразные отклонения в физическом, психическом и соматическом развитии.

Структура школьного образования Казахстана направлена на организацию системы воспитания и обучения учеников в возрасте с 6 (7) до 17 (18) лет и отражает основополагающие принципы функционирования целостной системы образования. Структура школьного образования включает три уровня: начальное, основное среднее и общее среднее. Каждый из уровней имеет свое целевое назначение.

В целях обеспечения гибкости, мобильности и эффективности структуры школы допускается самостоятельность каждого уровня образования:

- I ступень - начальная школа - начальное образование (1-4 (5) классы);
- II ступень - основная школа - основное общее образование (5-9 классы);
- III ступень - старшая школа, общее среднее образование (10-11(12) классы). (Рисунок 2)

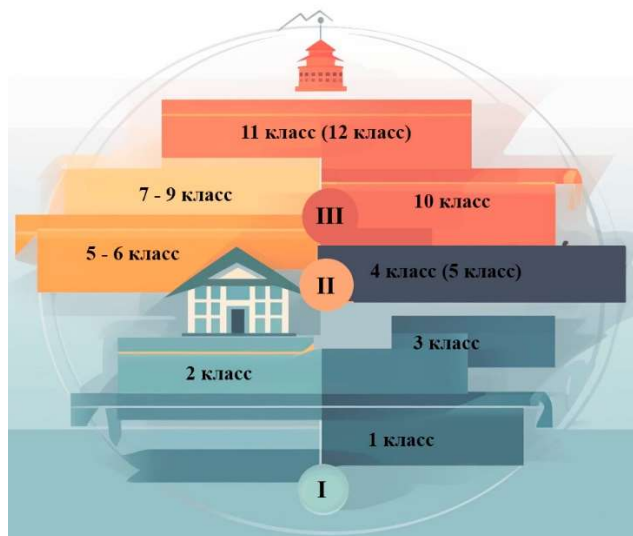


Рисунок 2. Структура общеобразовательной школы

В стандартном понимании состав помещений общеобразовательных учреждений должен содержать учебную и общешкольную группы, а также дифференцироваться на функциональные группы. Однако, следует отметить, что структура школьного здания может изменяться в зависимости от норм, бюджета, требований общества к образованию, а также архитектурных решений автора. Кроме этого важными являются вопросы обеспечения безопасности, функциональности объекта, создания комфортных условий для школьников и преподавателей. Таким образом можно определить ряд основных зон в современной школе (рисунок 3):

1. Административный блок, который включает в себя администрацию в стандартном понимании (кабинеты директора и заместителей), секретариат, канцелярия, помещения для учителей (учительские);
2. Учебный блок: стандартные классы для проведения уроков с современным оснащением, лаборатории для проведения опытных работ и исследований по различным наукам;
3. Методический блок, который как правило включает в себя библиотеку с читальными залами, компьютерные классы с доступом к образовательным ресурсам;
4. Спортивный блок, включающий основной спортивный зал, гимнастический и легкоатлетический залы, бассейн (при наличии), раздевалки и душевые к ним;
5. Общественный блок, который включает столовую с кухней, вестибюли, холлы, коридоры и лестницы, которые обеспечивают вертикальные и горизонтальные коммуникации в современной школе;
6. Техническая зона, включающая помещения для технических служб, обслуживание и хранение технического оборудования;
7. Медицинский блок: кабинет для оказания первой помощи, изолятор.

Сегодня каждому человеку важно знать такие понятия как особые образовательные потребности, инклюзивное образование, безбарьерная среда. Зачастую родители сталкиваются с тем, что в одном классе с их ребенком учится такой «особый ребенок», и это не беда, это повод научить наших детей понимать и принимать своих «особых»

одноклассников. Но кроме самих детей и их родителей важную роль в учебном процессе занимает учитель. Учитель – это первый помощник наших детей в школе. В контексте реализации инклюзивного образования в школах Республики Казахстан, задачей архитектора становится создание удобного и комфортного пространства, учитывающего потребности образовательного процесса. Школьное здание должно создаваться, учитывая основные современные принципы проектирования, такие как безопасность, экологичность, энергоэффективность, а также современная школа должна уметь трансформироваться или адаптироваться к современным методам или технологиям образовательного процесса.



Рисунок 3. Схема определения основных зон современной общеобразовательной школы.

«Инклюзивное образование – обеспечение равного доступа к образованию для всех обучающихся с учетом разнообразия особых образовательных потребностей и индивидуальных возможностей.» [1]

Несмотря на то, что сам термин «инклюзивное образование» считается достаточно молодым и современным, следует отметить что обучение детей с особыми образовательными потребностями имеет свою историю. «В России специальное образование детей с ограниченными возможностями здоровья и инвалидностью имеет почти 200-летнюю историю. В 1806 году в городе Павловске возле Санкт-Петербурга было открыто первое учебно-воспитательное учреждение (опытное училище) для 12 глухонемых детей, в 1807 году – образовательное учреждение для слепых детей. Специальное образование, как государственная система обучения детей с отклонениями, стало развиваться только после 1918 года. Создавались школы для детей глухонемых, тугоухих, слепых, слабовидящих и умственно отсталых. В 1950-е гг. началось обучение детей с нарушением опорно-двигательного аппарата и тяжелыми нарушениями речи. В 1990-х годах начали появляться первые экспериментальные школы, которые принимали на обучение детей с ОВЗ и инвалидностью. Однако только после 2012 года, когда были внесены изменения в закон об образовании, у таких детей появилась возможность получения образования независимо от состояния здоровья.» [1]

Основу инклюзивного образования сегодня составляют следующие постулаты (рисунок 4):

- отношение социума к детям с особыми образовательными потребностями. Говоря простыми словами общество должно рассматривать и признавать равными всех участников образовательного процесса;
- вовлеченность детей с ОВЗ в общественную жизнь класса или школы в целом, участие детей с особыми образовательными потребностями в общешкольных мероприятиях (не только учебных, но и внеаудиторного характера);

- применение современных педагогических методик, учитывающих возможности и потребности детей с ОВЗ;
- улучшение доступности образовательных учреждений;
- участие и помощь государственных структур в реализации программ инклюзивного образования;
- обеспечение конституционного права каждого ребенка на образование;
- развитие общественных ценностей в процессе образования: обучение принципам взаимопомощи и взаимоподдержки. [2]



Рисунок 4. Схема инклюзивного образования.

На сегодняшний день право на получение качественного образования гарантировано каждому ребёнку Конституцией Республики Казахстан. Предполагается что образование должно помогать детям не только всесторонне развиваться, но и адаптироваться и социализироваться в общественной жизни и в обществе в целом. «В первую очередь это касается детей с ограниченными возможностями. Казахстан в 2008 году стал участником международной Конвенции по защите прав инвалидов. Инклюзивное обучение — обязательная составляющая этого документа.

Инклюзивное образование, как отмечалось ранее, это специальная система дошкольного и школьного воспитания и обучения, которая предполагает вовлечение в процесс на равных правах детей, не требующих психофизиологической помощи, и тех, кому она необходима. Простыми словами, это школа, где в одном классе обучаются дети-инвалиды и дети, у которых не наблюдается отклонений психосоматического характера.» [3]

Ежегодно в мире количество детей с ограниченными возможностями и особыми потребностями растет. В 2023 году согласно статистических данных, в Республике Казахстан их количество составило 162 000, или 3% от общего числа детей. Получение среднего образования и освоение обязательной программы - это задача как для детей, так и для их родителей, а также для педагогов общеобразовательных школ, и для всего общества в целом. Одной из основных задач инклюзивного образования, помимо освоения общеобязательного стандарта образования, является социализация детей-инвалидов.

Кроме основной группы детей с ОВЗ, к детям с особыми образовательными потребностями, относят также представителей других языковых и культурных групп, религий, тех, кто проживает в сельской местности, тех, которые принадлежат к маргинальным группам. Такие

дети также могут нуждаться в особом подходе, когда речь заходит об образовании или социализации. Еще недавно дети, имеющие проблемы со здоровьем, относились в категорию неполноценных. Как правило, таких детей родители отдавали в специализированные школы коррекционного формата — в интернаты. Сегодня ситуация в Казахстане изменилась. Возникает вопрос о создании «школ нового типа», где все дети, независимо от своих физиологических или психологических возможностей получили бы достойное образование. Сегодня, речь идет скорее о готовности педагогов к такому типу обучения детей, но в дальнейшем, должны быть созданы сами «школы нового типа», в которых будут учтены все потребности детей с ограниченными возможностями с точки зрения архитектурно-планировочного решения. Говоря на языке архитектуры, школы, реализующие программу инклюзивного обучения должны строиться с учётом различных стандартов. В таких школах необходимо предусматривать помещения и зоны, обеспечивающие комфорт и доступность для всех учеников, в том числе для учащихся с особыми образовательными потребностями. Можно выделить ряд зон из которых будет состоять комфортная школа (рисунок 5):

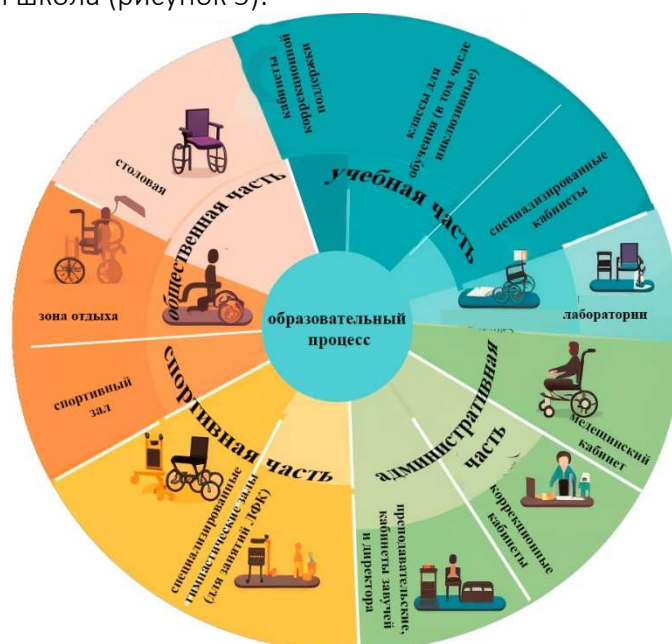


Рисунок 5. Модель инклюзивной школы.

- инклюзивные классы - это просторные учебные помещения, которые оборудованы с учётом потребностей различных групп обучающихся (специальной мебелью и техническими средствами (в том числе аудио и видео оборудованием для реализации различных методов обучения);
- специализированные лаборатории или учебные площадки также должны быть оборудованы с учётом потребностей детей-инвалидов;
- физкультурный зал и спортивные площадки будут включать себя не только обычный школьный спортзал в стандартном понимании, но и специализированные залы и площадки для спортивных игр и занятий лечебной физкультурой для детей с особыми возможностями здоровья. Такие помещения окажут помощь в реализации навыков общения с обычными детьми и физического развития для детей с ОВЗ;
- кабинеты специалистов - должны быть предусмотрены для детей с особыми образовательными потребностями. Такие кабинеты следует оборудовать для проведения индивидуальных занятий или различных консультаций с учётом методов работы таких специалистов как психологи, логопеды и другие эксперты в области обучения и

реабилитации детей с ОВЗ. Эти кабинеты следует располагать в непосредственной функциональной взаимосвязи с инклюзивными классами;

- медицинский кабинет - остаётся обязательным при проектировании любого образовательного учреждения, но в школах, работающих с детьми-инвалидами становится важным звеном даже в процессе образования. Такой кабинет должен быть оборудован всем необходимым для оказания первой медицинской помощи и должен находиться в центральной части школьного здания с беспрепятственным и равноудалённым доступом для всех обучающихся;

- социальные и общественные зоны такие как столовые или зоны отдыха должны будут быть доступными и равноудалёнными для всех участников учебного процесса, в том числе для групп обучающихся, которые имеют когнитивные или мобильные ограничения. Такие пространства помогут в процессе социализации обучающихся, обеспечивая возможность общения между разными группами учеников;

- помещения для администрации и управления будут включать в себя кабинеты руководства и персонала, обеспечивающего учебный процесс, а также комнаты для встреч и проведения различных консультаций родителей с узкими специалистами.

В целом такая школа должна быть спроектирована компактно, обеспечивая комфорт в процессе обучения разным группам учеников, вне зависимости от их особых потребностей. В странах Запада сегодня существует несколько технологий позволяющих детям с ограниченными возможностями здоровья (ОВЗ) взаимодействовать с обычными школьниками:

- **Расширение доступа к образованию.** Эта технология позволяет принимать решение о получении или неполучении общего школьного образования самому лицу с ограниченными возможностями или его опекунам. При таком подходе государственные формы образования в целом не претерпевают каких-то сложных изменений.

- **Мэйнстриминг.** Это форма развития, которая не предполагает обучения детей с ОВЗ в обычной школе, она подразумевает развитие социальных контактов и ограничивается участием детей с ОВЗ в праздничных мероприятиях или совместном проведении досуга с детьми со стандартным психологическим развитием.

- **Интеграция.** Эта технология не предполагает изменений в системе образования или разработку других особых образовательных программ для детей с ОВЗ. При использовании в обучении технологии интеграции проводится коррекционная работа и психологическая поддержка детей с ОВЗ, которая позволяет им на одном уровне с обычными детьми осваивать учебный материал.

- **Инклюзия.** Эта технология предполагает включение детей-инвалидов в общеобразовательную систему в стандартном её понимании путём применения различных педагогических методик, подбора материально-технической базы, изучения определённых задач и полноценного обучения детей с ОВЗ на одном уровне с детьми со стандартным психологическим развитием.

Метод инклюзивного образования, по мнению большинства, является наиболее гуманным. Среди примеров реализации инклюзивного образования, следует выделить программы, реализуемые в Великобритании. В Англии около 22% всех несовершеннолетних детей, это школьники, которые имеют особые образовательные потребности. Все дети имеют право посещать обычные общеобразовательные школы, и лишь те, у кого тяжёлые формы нарушений, получают рекомендацию учиться в специальных учебных центрах.

1. «В Британии все ступени образования (дошкольное, начальная школа и средняя) взаимосвязаны — это единый учебный конгломерат. Поэтому психологи и педагоги с ранних лет предоставляют консультации и наблюдают за особенными детьми, формируют у них необходимые навыки и умения. Эта тенденция распространяется и на старшую школу.

2. Школы Англии, в которых реализована программа инклюзивного образования, поддерживаются государством — им выделяют ассигнования. Проводится подготовка специалистов.

3. Дети с ОВ учатся в обычных классах наравне с другими учениками. Учителя контролируют, чтобы не возникало деления детей на более или менее развитых, с плохим или хорошим здоровьем, умственно зрелых и отстающих в развитии.

4. Школы предоставляют детям-инвалидам по необходимости ассистента, создают индивидуальную образовательную программу, выдают приспособления и средства, которые защищают их от запугиваний и преследований.» [3]

Следует отметить, что в Казахстане инклюзивное образование, это явление молодое. Это направление в современном образовании будет развиваться, учитывая особые потребности каждого ребенка в образовании. Меняется общество, меняется сознание, меняется и система образования и если раньше система образования предполагала, что в центре образовательного процесса находится учитель, то сегодня в центре находится ученик, а учитель в свою очередь сопровождает процесс обучения детей и направляет их. На сегодняшний день в нашей стране еще мало разработаны механизмы реализации инклюзивного образования. На мой взгляд, особое внимание следует уделить подготовке педагогов в первую очередь, а затем, следует пересмотреть стандарты проектирования школьных зданий. Реализация программы инклюзивного образования зависит от вклада каждого участника: ученика, учителя, родителя, и всех тех, кто будет сопровождать процесс обучения.

Реализация социальной политики в вопросах гуманизации общества, а также в сфере развития системы образования будет обуславливать поиски путей совершенствования и организации образовательных процессов, изменения содержания, методик обучения и воспитания детей с особыми образовательными потребностями. Процессы изменения подходов к обучению, подбор новых методик работы с детьми с особыми образовательными потребностями будут направлены на формирование всесторонне развитой, активной, социальной личности, обладающей навыками социально-адаптивного поведения. Одним из путей реализации социальной политики станет инклюзивное образование, которое будет выступать средством или инструментом социальной реабилитации как самого ребёнка с ОВЗ, так и всей его семьи. Одной из задач инклюзивного образования можно выделить создание устойчивого комфортного микроклимата, который будет способствовать развитию ребёнка. Следует отметить что реализация инклюзивного образования - это не только подбор методик, образовательных программ, правильных подходов к детям с ОВЗ, создание комфортных психологических условий для ребёнка с ограниченными возможностями здоровья, но и создание технических условий и свободного доступа для детей-инвалидов в образовательные учреждения.

В заключении следует отметить, что инклюзивное образование является одним из ключевых компонентов создания справедливого и равноправного общества, в котором каждый будет иметь равные права. Важно определить значение инклюзивного образования в современном обществе. В контексте всеобщего прогресса, глобализации и быстроменяющегося образовательного ландшафта нельзя преуменьшать роль и значение образования. Инклюзивное образование, как одно из современных направлений, позволяет создавать образовательную среду, способствующую всестороннему развитию всех обучающихся, вне зависимости от индивидуальных возможностей и особенностей здоровья учеников. Различные современные методы обучения, в том числе интерактивные, современные технологии и подходы направлены на всестороннее развитие и социализацию учеников, имеющих особые образовательные потребности. Все это подчеркивает важность и актуальность адаптации современных образовательных систем и программ к требованиям и

нуждам общества. Внедряя принципы инклюзивного образования в обычные процессы обучения детей каждый обучающийся получит возможность быть социально адаптированным, и в целом общество получит большее количество грамотных адаптированных и социализированных специалистов, что в конечном счёте позволит поддерживать и развивать процессы глобализации и технологического прогресса. Одним из основополагающих принципов инклюзивного образования является вовлечение всех участников образовательного процесса (учеников, в том числе имеющих особые образовательные потребности, педагогов и администрацию школ, родителей) в создание успешной инклюзивной образовательной среды, в различные процессы внешкольного обучения, а также организацию и проведение различных мероприятий.

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ФРАЗЕОЛОГИЗМДЕРДІ МЕҢГЕРТУДЕ КЕЗДЕСЕТІН ҚИЫНДЫҚТАР ЖӘНЕ ОЛАРДЫ ШЕШУДІҢ ЖОЛДАРЫ

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Аңдатпа. Мақалада фразеологизмдерді меңгертуде кездесетін қиындықтар және оларды шешудің жолдары қарастырылады. Тұрақты сөз тіркестерімен жүргізілетін жұмыс түрлері мен тапсырмалар тіл үйренушілер тарапынан туындайтын түрлі қиындықтарды шешуге көмектеседі.

Түйін сөздер: тұрақты сөз тіркестері, фразеологизмдерді меңгерту, жұмыс түрлері, әдіс-тәсілдер, мәселені шешу, қиындық, тапсырмалар.

Әр маман өз саласына қатысты кәсіби сөздермен қатар тұрақты сөз тіркестерін, мақал-мәтелдерді де ана тілінде дұрыс, орынды қолдануға мән беруі қажет. Бұл мектеп оқушысына да, жоғарғы оқу орнының студенттеріне де қатысты. Тұрақты сөз тіркестерінің мағынасын түсінбестен қолдану дағдыға айналып барады, бұл ұлттық ерекшелігіміз бен тіліміздің қадір-қасиетін жоғалтуға әкеледі, талғампаздықпен қолданылып жүрген айшықты тілдік бірліктердің көркемдік қуатын төмендетеді.

Қазақ тілі сабағында студенттерге фразеологизмдерді меңгертуде төмендегідей қиындықтардың кездесетінін атап көрсетуге болады:

1. Фразеологизм құрамындағы кейбір мағынасы күңгірт сөздердің мағынасын түсінбеуі;
2. Фразеологизм құрамындағы сөздің орнын басқа сөзбен алмастырып қолдануы;
3. Фразеологизм құрамындағы сөздердің символдық мәнін түсінбеуі;
4. Фразеологизмнің ана тіліндегі қолданысын бұзып, шұбарлап сөйлеуі;
5. Фразеологизмдерді контексте дұрыс қолдана алмауы.

Тіл экологиясы сақталуы қажет дейміз. Тіл тазалығы, тіл экологиясы дегеніміз - бұл әдеби тіл нормасын сақтау, қазақ тілінің мүмкіндігін дұрыс пайдалана білу, ана тіліміздегі қолданыстарға басқа тілдің сөздерін қосып орынсыз шұбарламау.

Қазіргі кезде сөйлемнің грамматикалық тәртібін бұза сөйлеу, тұрақты сөз тіркестерінің мағынасын түсінбестен орынсыз қолдану, басқа да нормадан ауытқулар жиі кездесіп жатады. Тіл үйренушілердің тұрақты сөз тіркестерінің мағынасын түсініп, орынды қолдануы, жөнсіз пайдалана бермеуі, сөйлемдерді дұрыс құрастыра білуі қажет.

Сондықтан жоғарыдағы мәселелерді шешу мақсатында мынадай жұмыс түрлерін орындатып, тапсырмалар берген дұрыс деп ойлаймыз.

1. Фразеологизмдердің контексте қандай мағынада жұмсалып тұрғанын айтып қана қоймай, олардың семантикасына, этимологиясына шолу жасатамыз, ол үшін сөздіктермен жұмыс жүргізілуі қажет. Тіл үйренушілер фразеологизм құрамындағы кейбір мағынасы күңгірт сөздердің мағынасын түсінбейді. Мысалы: Халық оның көшбасшылық қызметіне қылау түсірмеді. Осы сөйлемдегі «қылау» сөзін біреу білсе, екіншісі біле бермейді. Сол себепті оны қатыстырып сөйлем құрастыруға қиналады. Ол үшін «Қазақ тілінің түсіндірме сөздігі» бойынша тұрақты сөз тіркестері құрамында кездесетін мағынасы түсініксіз сөздердің мағынасын түсініп алған жөн. Мысалы, «қылау түсірмеу» деген тұрақты сөз тіркесіндегі

«қылау» сөзі бірнеше мағынада жұмсалады: Қылау I. 1. Ұшқындап түскен ұлпа қар; 2. Ауысп. шашқа, сақал-мұртқа түсе бастаған ақ.

Қылау II. 1. Керексіз, босқа жатқан кішкентай нәрсе. 2. Ауысп. бөтен ой, жат

пікір. Қылау III. Пышақ, қанжар, қылыш сияқты өткір құралдарды қайрағанда жүзінде қалатын уақ бүршік. Қылау IV. Мал төлінде, әсіресе жас бұзауда кездесетін жұқпалы індет, ауру [1,555 б.]

Сонда «қылау түсірмеу» қорғау деген мағынаны білдіреді, яғни сөйлемде халық оның көшбасшылық қызметін «бөтен ой, жат пікірден» қорғады деген мағынада жұмсалып тұр.

Сабақ барысында студенттер үшін түсіндірме сөздік, фразеологиялық сөздіктермен қатар, этимологиялық сөздікті де қолданып, кейбір тұрақты сөз тіркестерінің шығу төркініне талдау жасату қызықты болмақ. Мысалы, «сағы сыну» тіркесінің мағынасын түсіндіру қиынға соғады, «Қазақ тілінің фразеологиялық сөздігінен» қандай мағына білдіретінін студенттердің өздеріне тапқызамыз, яғни бұл тіркес ренжіді, беті қайтты, мойып қалды, көңілі қайтты деген мағынаны береді [2,595 б.].

Сондай-ақ, тұрақты сөз тіркесінің шығу төркініне назар аудартамыз, этимологиялық сөздікте: «сағы сыну» деген тұрақты сөз тіркесінің құрамындағы «сақ» - түркі сөзі, сақ//сай – «жебе», «садақ оғы» деген мағынаны сақтап қалған, бұдан «жебесі сынды» деген ұғымды түсінуге болады, біздің жауынгер ата-бабамыздың түсінігінде «қаруынан айырылу» - «қарсы тұра алмау», «жігерін жоғалту» деген мағынаны білдірген [3,271 б.].

2. Сонымен қатар келесі тапсырма студенттердің тұрақты тіркестерді болашақта орынды қолдана білуіне көмектеседі. Тұрақты тіркестердің «дұрыс» және «дұрыс емес» нұсқалары беріледі. Екеуі де тілімізде қолданыста жүр, «Қазақ тілінің фразеологиялық сөздігін» қолдану арқылы «дұрыс» не «бұрыс» екенін ажыратады. Ол үшін тұрақты тіркестің құрамындағы сөздердің орнын өзгертуге, басқа сөздермен (синонимдерімен) ауыстыруға келмейтінін айтып, тұрақты тіркес мағынасын түсіндіру қажет.

Дұрыс қолданыс көздің жауын алады. Дұрыс емес қолданыс көздің құртын жеді.

а. Мұртын балта кеспейді - мұртын балта шаппайды.

ә. Ет жүрегім қан болды – ет жүрегім қан жылады.

б. Құлаққа ілу - құлаққа қыстыру.

в. Жанын орамалға түйді - жанын шүберекке түйді.

3.«Сөздік қорапша» әдісін пайдаланып, келесі тапсырманы ұсынуға болады. Қорапшадан берілген тұрақты тіркестердің құрамындағы артық сөзді алып тастайды және тұрақты сөз тіркесінің мағынасын түсіндіреді, сөйлем құрастырып айтады.

Аузына құм толү құйылу - сөйлемей

Ақ түйенің биенің қарны жарылған күн - молшылық заман

Иненің көзінен жүзінен өткендей - жылпос, сүйкімді, нәзік

Тірідей жерге тығылу кіру - ұялу

Жүрегінің бүйрегінің түгі бар - батыр

Айрандай сүттей ұйып отырған - тату

Аюдың терісіндей өтіндей - қасиетті мирас зат туралы

4. Тұрақты сөз тіркестеріне бірнеше сөйлем беріледі. Студенттер контекстегі қате қолданылып тұрған тұрақты сөз тіркестерінің мағынасын түсіндіріп, неліктен дұрыс қолданылмай тұрғанын және оның орнын басқа қандай тұрақты сөз тіркесімен ауыстыру қажет екенін анықтайды.

А.Тай шаптырым жерден бір күшік шыға келді. «Тай шаптырым жер» - алыс қашықтықты көрсететін тұрақты тіркес, ал алыс жерден күшікті көру мүмкін емес, сондықтан мұнда «таяқ тастам жер» деген тұрақты сөз тіркесін қолданған дұрыс.

Ә.Төрге бес биенің сабасындай ер азамат жайғасыпты. Сол сияқты «бес биенің сабасындай» тіркесі толық әйелдерге қатысты айтылатын тіркес болғандықтан, ер азаматқа «екі иығы еңгезердей» деген тұрақты тіркес қолдаланылады.

Б.Жүрегі қарайған жігіттер ғой шетінен мықты, батыр. Мұнда «жүрегі қараю» қарны ашу деген мағынаны білдіреді, сондықтан контексте дұрыс қолданылып тұрған жоқ. Оның орнына «жүрегінің түгі бар» деген тұрақты тіркесті қолданған дұрыс.

В. Біз дәм-тұзымыз жарасқан тату-тәтті құрбылар едік. Контексте «дәм-тұзы жарасқан» тату-тәтті деген мағынаны білдіргенімен, ерлі-зайыптыларға қатысты айтылады. Ал құрбылардың татулығын көрсету үшін «тонның ішкі бауындай» деген тұрақты сөз тіркесі қолданылады. [4, 110 б.].

Келесі мәселе - фразеологизмнің ана тіліндегі қолданысын бұзып айту, шұбарлау мәселесі. Мысалы: Ол құлаққа лапша іліп, ақшасын алып кетті. Мұнда «лапша ілу» деген қолданыстың орнына ана тілімізде бұрыннан қолданылып жүрген «түлкі бұлтаққа салу» деген тұрақты сөз тіркесін пайдаланған дұрыс болады. Сол сияқты келесі қолданыстардың орнына «сан соқтырып кету», «бет пердесін ашу» деген қазақ тіліндегі тамаша баламасын қолданған жөн:

Ол досын лақтырып кетті. - Ол досын сан соқтырып кетті.

Оны судың бетіне шығару керек. - Оның бет пердесін ашу керек.

Жұртқа сіңіп, құлақтарына үйір болған, мағынасы халыққа түсінікті сөздерді жаңа сөздермен алмастыра қолдану әсіресе жастардың арасында варваризм, сленг, жаргон сөздерді қосып сөйлеу жиі кездесіп жатады. Мысалы, соңғы уақытта қораға кірді, құлақтан тепті, жыңды киім, шашып тастады, крышасы бар, картопты жарды, сағыздай созылды деген қолданыстар белең алып, тіпті жастар арасында қолдану сәнге айналып барады десек те болады.

Тіл тазалығын сақтау үшін жергілікті тіл ерекшеліктерін (диалект), көнерген сөздер, бейәдеби сөздер, варваризм, сленг, жаргон сөздерді қолданудан қашқан дұрыс. Сөйлеуші ойын жұртшылыққа жеткізу барысында әдеби нормаларды ұстанғаны абзал. Ана тіліндегі әдеби баламасы бола тұра, басқа тілдерден енген сөздерді ретсіз қолдану, талғамсыз тұтыну тілдің тазалығын бұзатын факторларға жатады.

Олай болса, оқытушының мақсаты - бұл мәселеге арнайы көңіл бөліп, түзету, студент, оқушылардың тіл мәдениетін жетілдіріп, көркем, анық, түсінікті сөйлей білуге үйрету.

Жоғарыда берілген жұмыс түрлері мен тапсырмалар тіл үйренушілер тарапынан туындайтын түрлі қиындықтарды шешуге көмектесері анық.

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CLASSIFICATION OF INTEGRATED CONTROL METHODS IN THE CONTEXT OF ENGLISH LANGUAGE TEACHING

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The article examines the importance of integrated control in English language teaching with an emphasis on improving the effectiveness of the educational process. The article analyzes the main advantages of integrated control, such as the complexity of assessment, measurement of communication skills, and the possibility of error correction in real time. The methods of integrated control, such as the formative and summative approach, as well as the use of projects, discussions and portfolios, are also highlighted. The article emphasizes the importance of integrated control in the formation of independent work skills and creative thinking of students.

Keywords: *integrated control, English language teaching, efficiency, formative control, summative control, communication skills, projects, portfolio.*

Integrated control in English language teaching is an approach that combines various methods of assessing and verifying students' knowledge within a single learning process. This approach is aimed at creating a more complete and comprehensive view of the level of language proficiency of students. Unlike traditional methods such as tests and exams, integrated control includes a variety of assessment forms such as projects, discussions, role-playing games and portfolios.

The purpose of integrated control is not only to measure the level of students' knowledge, but also to assess their ability to apply this knowledge in practice, especially in real situations of communication in English. This approach promotes the development of communication skills, creative thinking and the ability to apply the acquired knowledge in various contexts. Integrated monitoring provides a deeper and more comprehensive understanding of the level of students' language competence, as well as supports a more effective learning and assessment process within the framework of an educational program for learning English.

The classification of integrated control methods in the context of English language teaching includes a variety of approaches aimed at a comprehensive assessment of the level of students' language competence. The formative control carried out in the learning process is one of the categories. This type of control includes evaluating students during classes, as well as using role-playing games and discussions to assess their ability to apply knowledge in real situations of communication in English. Formative control in the context of English language teaching is an assessment method introduced into the learning process for continuous monitoring and support of student success. It focuses on real-time skill development, providing feedback and adjustments throughout the learning process. As part of the formative control, a systematic assessment of students' knowledge and skills is carried out at each stage of training [1].

An important part of formative control is assessment during classes, which allows teachers to monitor the academic progress of students. Role-playing games and discussions are also included in this control method, providing an opportunity to assess the level of language competence in real communication situations. Formative control is aimed not only at identifying weaknesses in students' knowledge, but also at focusing on the learning process. This method helps to create an atmosphere of interaction, support and continuous improvement, encouraging students to actively participate in the learning process and develop their language skills in a more dynamic way.

Summative control is an assessment method focused on the final assessment of students' knowledge and skills based on the results of a certain period of study. This type of control is aimed at forming a generalized idea of the level of mastering the educational material and the ability to apply it. In the context of English language teaching, summative control includes traditional methods such as exams and tests, as well as more non-traditional forms of assessment, such as project work and research. Traditional exams and tests provide an opportunity to measure the overall level of language acquisition, testing both theoretical knowledge and practical skills. These methods of summative control assess the level of students' preparation for certain standards and criteria.

At the same time, summative control also includes more creative forms of assessment, such as design work and research. These methods allow students to apply their knowledge in specific contexts and demonstrate the ability to use English in various fields of communication and activity. Thus, summative control in English language teaching is a key stage in assessing the overall success of students at the end of a certain period of study, providing a comprehensive assessment of their language competencies.

The Portfolio in English Language Teaching is a systematic collection of student's works, projects and achievements designed to track and demonstrate their language progress and competencies. This assessment method covers a longer-term perspective, allowing students not only to submit their work, but also to illustrate their language growth in dynamics. The portfolio includes a variety of elements such as essays, projects, video and audio recordings, translations and other linguistic creative works. This versatile approach to documenting students' language development provides a more complete picture of their abilities and achievements [2].

One of the key aspects of the portfolio is the ability of students to assess their own progress and participation in learning. The process of collecting and systematizing materials for a portfolio allows students to consciously track their progress, identify areas for improvement and focus on their development in terms of language. The Portfolio is a powerful tool in assessing students' language progress, providing a more individualized and comprehensive view of their language competencies and achievements in the context of English language learning. Thus, the classification of integrated control methods in English language teaching includes formative and summative control, as well as the use of a portfolio, providing a deeper and more comprehensive assessment of students' language skills [3].

Integrated control in English language teaching is closely interrelated with the use of various teaching methods, forming an integrated approach to the assessment and development of students' language skills. The communicative method plays an important role in this context, where the emphasis is on the development of oral and written communication. Monologue and dialogue assignments become part of the integrated control, allowing students to evaluate their ability to express their thoughts and interact in English. The communicative method in teaching English is a pedagogical strategy that focuses on the development of students' communication skills. At the center of this method is the understanding of language as a means of communication, and not just a system of grammatical rules. The main purpose of the communicative approach is to teach students how to use language in real communication situations [4].

The structure of lessons based on the communicative method is usually focused on creating contexts for communication. Students are involved in dialogues, discussions, role-playing games and other communicative tasks that stimulate the active use of language to convey information, express their thoughts and interact with others.

An important aspect of the communicative method is to pay attention to practical skills such as listening, speaking, reading and writing. The teaching materials used in this method are usually aimed at creating realistic communication scenarios to encourage students to put their language knowledge into practice. The communicative method also emphasizes the importance of context and cultural aspects in language learning. Students are given the opportunity not only to master linguistic skills, but also to understand the socio-cultural features of linguistic communication [5].

The project method in the context of English language teaching is an innovative and effective approach aimed at involving students in active and creative activities. The main idea of this method is to provide students with the opportunity to apply their language skills in real situations by developing and implementing their own projects. Using the project method, students can create multimedia presentations, write and stage mini-plays, conduct research on a topic related to language, as well as participate in group projects aimed at solving specific tasks. These projects can be linked to real-world scenarios of using the English language, which contributes to a deeper understanding and successful mastering of language material [6].

In the process of implementing projects, students face real language challenges, such as searching and analyzing information, communicating within a group, creating texts, presenting results, etc. These tasks require students to apply the skills of reading, writing, speaking and listening comprehension, which makes the project method a comprehensive means of developing language competencies. In addition, the project method supports the development of other key skills such as collaboration, creativity, independence and problem solving skills. This approach to teaching English contributes to deeper learning of the material and prepares students for the effective use of English in real life situations [7].

Technologies in English language teaching are a key component of the modern educational process, transforming teaching methods and enriching the learning experience of students. The use of online resources has become an integral part of learning, providing wide access to educational materials, interactive exercises and language applications. Automated assessment and feedback systems are also being actively implemented in English language teaching, providing more effective monitoring of student progress and an adaptive approach to individual needs. Such systems allow teachers to evaluate students' language skills faster and more accurately, and students to receive feedback and recommendations for further improvement.

Virtual classrooms and online platforms for teaching English create unique opportunities for global interaction between students and teachers. Virtual classrooms equipped with video conferencing facilities and interactive whiteboards allow lessons to be conducted in real time, despite geographical distances [8].

Mobile apps and games are also being actively introduced into the learning process, making learning more fun and interactive. With their help, students can develop language skills in a playful way by participating in assignments, quizzes and communicating with other students. Thus, integrated control and teaching methods in English language teaching interact, ensuring the comprehensive and effective development of students' language competencies. The combination of communication methods, design work and the use of modern technologies creates a stable platform for learning and assessment at various stages of the educational process.

The advantages of integrated control in English language teaching are manifested in the fact that this assessment method provides a more comprehensive and in-depth assessment of students' language skills. Unlike traditional forms of control, the integrated approach makes it

possible to evaluate not only grammatical accuracy and vocabulary, but also the ability of students to apply their knowledge in real language situations. One of the key advantages of integrated control is its ability to measure communication skills. Tasks that include dialogues, role-playing games and other forms of communication allow students to evaluate their ability to interact effectively in English. This is especially important in the context of language learning as a communication tool [9].

Another advantage is the variety of assessment methods. Formative control includes assessment in the learning process, which allows you to quickly adjust the learning process and ensure an individualized approach to each student. Summative control, in turn, provides an overall assessment of students' achievements at a certain stage of learning. Integrated control also contributes to the development of students' independent work skills and creative thinking. Projects, discussions and portfolios stimulate the active participation of students in the educational process, which contributes to a deeper and more sustainable assimilation of the material. In general, integrated control in English language teaching provides a more complete and adapted measurement of students' language progress, promotes the development of communicative and creative skills, and creates conditions for an individual and flexible approach to each student.

Integrated monitoring plays a key role in improving the effectiveness of English language teaching by providing an integrated and comprehensive assessment method that promotes a deeper understanding of students' language skills. This approach not only measures knowledge of grammar and vocabulary, but also focuses on the practical application of the acquired knowledge in various communication situations. The importance of integrated control is manifested in its ability to assess students' communication skills. Tasks involving dialogues, discussions and other forms of communication allow students to measure their ability to interact effectively in English, which is consistent with modern language learning requirements [10].

Integrated monitoring helps to improve feedback and error correction in real time. Formative control in the learning process allows teachers to respond quickly to students' difficulties by providing individualized recommendations and support for more effective learning of the material. This method of control also contributes to the development of students' independent and creative thinking skills. Projects, discussions and portfolios encourage active participation in the learning process, which not only deepens language understanding, but also develops critical thinking and the ability to apply knowledge in various contexts. Thus, the importance of integrated control in improving the effectiveness of English language teaching is manifested in its ability to evaluate not only theoretical knowledge, but also the practical application of the language, ensuring deeper, purposeful and sustainable language development of students.

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ƏDƏBİYYAT TƏLİMİNDƏ ƏNƏNƏVİ VƏ FƏAL/İTERAKTİV TƏLİM METODLARININ QARŞILIQLI ƏLAQƏDƏ TƏTBİQİ YOLLARI

Bağirova Gülay Şahsuvar qızı

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Ötən əsrin sonlarından etibarən bütün dünyada, eləcə də Azərbaycanda təhsilə yeni baxışlar meydana gəldi. Təlimdə interaktivlik müəlim-şagird arasındakı qarşılıqlı aktiv əlaqə kimi qiymətləndirilir. Tədqiqatlar göstərmişdir ki, bu gün təlim zamanı istifadə olunan interaktiv metodların bir çoxu biliyi qavrama prosesini daha sadə edərək şagirdlərdə təlim materiallarını təhlil etməyə, verilmiş tapşırıqları müstəqil şəkildə çevik işləməyə, öz yaradıcı yanaşmalarını şərh etməyə, həyatı biliklər əldə etməyə, sinifdə konstruktiv münasibətlər qurmağa, bərabərhüquqlu müəllim-şagird əməkdaşlığını yaratmağa imkan verir. Fəal təlimdə istifadə edilən iş üsullarının sayı 500-dən çoxdur, hazırda ölkəmizdə bu iş üsullarından 50-dən çoxu tətbiq olunmaqdadır. Fikrimizcə, bəzi iş üsullarını zənginləşdirmək və təzə elmi çalarla təkmilləşdirmək lazımdır, çünki zaman keçdikcə dövrün tələbinə uyğun olaraq təhsilin məzmununda baş verən dəyişikliklər və yeniliklər yeni təlim metod və üsulların meydana çıxmasını zəruri edir. Bugünlərdə inkişaf etmiş ölkələrin ümumtəhsil məktəblərində yeni təlim üsullarından, daha səmərəli metod, priyom, vasitələrdən [4] istifadə olunur.

Məlumdur ki, şagirdlərin ədəbiyyat fənnindən əldə etdiyi biliklər onların əxlaqi tərbiyəsini formalaşdırdığı kimi, bədii estetik zövqlərini də inkişaf etdirir. Son dövrlərdə olduğu kimi, hazırda ümumtəhsil məktəblərində ədəbiyyat təlimində bədii nümunələrin əyləncəli, eyni zamanda, emosional tərzdə öyrənilməsinə xidmət edən iş üsulları tətbiq olunmaqdadır. Müəllim ədəbiyyat dərslərində bədii sözün qüdrətini şagirdlərə aşılamaq üçün əsərin məzmununa və janr xüsusiyyətlərinə uyğun gələn iş üsullarını uğurla seçilməli, metodik məharətlə tətbiq etməlidir.

Təlim prosesində ənənəvi təlim metodlarından istifadə isə ötən əsrdə aktual idi və zamanın tələblərinə uyğun olaraq uğurla tətbiq olunurdu. İndiki mərhələdə, demək olar ki, bu iş üsullarından istifadə olunmur. Bəzi tədqiqatçıların fikrincə, ənənəvi təlim metodları bu gün şagirdlərin marağını təmin etməyən, onlarda çevik iştirak fəallığını stimullaşdırmayan metodlardır. Fikrimizcə, bu yanaşma tərzı doğru deyil, çünki ənənəvi təlimin də mühüm uğurlu cəhətləri vardır. Məsələn, bəzi ənənəvi təlim metodları, xüsusilə, evristik metodun tətbiqi zamanı şagirdləri düşündürən suallar verilir. Bu cəhətləri nəzərə alaraq, bəzi metodist alimlər də düşünür ki, təlim prosesində, həmçinin ədəbiyyat təlimində də ənənəvi və fəal/interaktiv təlim metodlarının qarşılıqlı əlaqəsi mümkün və faydalı ola bilər.

Fikrimizcə, induktiv dərslərdə klassik poeziyanın tədrisində müəllimin giriş sözünə ehtiyac vardır və müəllim müəyyən həcmdə, yəni, şagirdlərin yaş və bilik səviyyəsini, dərketmə qabiliyyətlərini nəzərə almaqla mövzuya uyğun məlumatyönlü izahlar verməli, müəllimin istiqamətverici şərhlərindən sonra şagirdlərə yeni bilikləri müstəqil şəkildə əldə etməsi üçün imkanlar yaradılmalıdır. Aydın ki, bu prosesin təşkili bir növ ənənəvi təlimlə bağlıdır, belə ki görkəmli metodist alim, Camal Əhmədovun qeyd etdiyi kimi, ötən əsrdə ədəbiyyat təlimində sistemlilik və ardıcılıq prinsipinin gözlənilməsi mühüm şərtlərdən biri idi, yəni, müəllim düşünülmüş və planlı bir tərzdə öyrəndiyi materialı sistemə salaraq, ardıcıl şəkildə şagirdlərə ötürməli idi [2, s.88]. Görkəmli alimin firkinə istinad edərək deyə bilərik ki, bu gün də ədəbiyyat təlimində bəzi dərslərdə buna ehtiyac vardır.

Yeni tədris proqramı əsasında hazırlanmış VIII sinif ədəbiyyat dərslində ilk dəfə olaraq əruz vəznə haqqında şagirdlərin yaş və qavrama səviyyəsi nəzərə alınaraq aydın nəzəri məlumat verilmiş və dərslərdə bu vəznə aid bir çox bədii nümunələr yer almışdır: məsələn, əruzun rəməl bəhrində yazılmış İmadəddin Nəsiminin “Ağrımaz” və Məhəmməd Füzulinin “Söz” qəzəli, xəfif bəhrində Seyid Əzim Şirvaninin “Qafqaz müsəlmanlarına xitab” şeiri, həzəc bəhrində M.Ə.Sabirin “Əkinçi” satirası, həzəcin dördtəfiləli növündə yazılan M.Hadinin “Türkün nəğməsi” şeiri və b. Tədqiqatlar göstərir ki, induktiv dərslərdə bu kimi mövzuların tədrisi zamanı yeni təlim texnologiyaları tətbiq olunarkən şagirdlər bəzi çətinliklərlə üzləşir. Fikrimizcə, əruz vəznə çox mürəkkəb, çox çətin bir sahə olduğu üçün ümumtəhsil məktəblərində tədris zamanı fəal təlimdə irəli sürülən müddəalara (bilikləri müstəqil şəkildə əldə etmə) zidd olan, lakin ənənəvi təlimə geniş istifadə olunan müəllimin sözü iş üsulunun tətbiqinə ehtiyac vardır. Bir sözlə, əruz vəznində olan bədii nümunələrin tədrisi zamanı meydana çıxan ciddi problemləri ənənə və təcrübəyə əsaslanaraq aradan qaldırmaq mümkündür.

Düşünürük ki, orta məktəbdə əruz vəznəli şeirlərin məzmunu və təhlili üzərində iş aparılması müəllimdən sərəştəlik tələb edir, müəllim bu dərslərə ciddi hazırlaşmalıdır. Nümunə olaraq, X sinifdə Füzulinin “Məni candan usandırdı...” qəzəli I saat tədris olunarkən müəllim motivasiya mərhələsində ənənəvi təlim metodlarından olan müəllimin şərhə iş üsulunu tətbiq edə bilər. O, əvvəlcədən əruz vəznə haqqında elmi-metodik ədəbiyyatlara nəzər yetirərək şagirdlərə bu vəznin xarakterik xüsusiyyətləri haqqında qısa həcmdə mühüm nəzəri məlumatları yenidən şagirdlərin nəzərinə çatdırmalıdır. Əruz vəzninin hər bir bəhrinin bir neçə növünün olduğunu düşünsək, fikrimizcə, müəllim, düzgün səsləndirmə üçün, ilk növbədə, bu qəzəlin ikiböhlümlü bütöv həzəc növündə olduğunu özü üçün müəyyən etməlidir (məfAilün/ məfAilün). Nəzərə almaq lazımdır ki, X sinifdə oxuyan şagirdlərə də klassik şeirin məzmunu və ideyasının qavranılması müstəqil mütaliə yolu ilə də çətindir. Buna görə də, motivasiya mərhələsində ənənəvi təlim metodu olan yaradıcı oxunun tətbiqi (yəni müəllimin nümunə ifası) də çox lazımlı və faydalı ola bilər. Fikrimizcə, müəllimin yaradıcı oxusundan alınan emosional təsir şagirdlərdə sənətkarın şeirdə ifadə etdiyi bədii fikrin mahiyyəti haqqında aydın təsəvvür yaradar və bu işə şagirdlərdə estetik hiss və əxlaqi tərbiyə aşılanması nöqtəyindən nəzərdən faydalı ola bilər.

Şəbi-hicran (məfAilün) yanar canım (məfAilün),

tökər qan çeş (məfAilün) mi-giryanım (məfAilün) (M.Füzuli).

Göründüyü kimi, bu ölçülü misraların fikir axarı ləngərlidir, müəllim oxu prosesində bunu diqqətdə saxlamalıdır. Bundan sonra tədqiqatın aparılması mərhələsində şagirdlərə şeiri müvafiq qaydalara uyğun oxumasına şərait yaradılmalıdır. Müəllim üçün nəzərdə tutulmuş metodik vəsaitlərdə tədqiqatın aparılması mərhələsində (bu tipli mövzuların tədrisi üçün) tam fərqli sanki təhlil dərslərində istifadə olunan sual və tapşırıqları xatırladan nümunələr təqdim olunmuşdur. Lakin fikrimizcə, tədqiqatın aparılması mərhələsində (müəllimin motivasiya mərhələsində qeyd etdiyi təlimata əsasən) qəzəlin düzgün səsləndirilməsinə xidmət edən tapşırıqlar verilə bilər və ya şagirdlər ifa üçün çalışa bilər. Çünki məzmunun mənimsənilməsinə həsr olunmuş dərslərdə əsərin oxusu mütləq həyata keçirilməlidir ki, şagirdlərə əsərin məzmunu aydın olsun. Şeirin əruz vəzninin bəhrlərinin tələblərinə uyğun şəkildə oxusu şagirdlərdə sözün, şeirin qüdrətini anlamasına və təlimi nəticəyə müsbət təsir edə bilər. Ehtimal edilir ki, müəllimin giriş sözü və ifadəli oxusu vasitəsilə şagirdlər əruz vəzninin nəzəri fəlsəfəsini qismən də olsa dərk edərək bu vəznin poetik imkanlarından mənəvi zövq ala bilərlər, nəticədə, onlar əsərin məzmununu başa düşəcək, növbəti təhlilə həsr olunmuş dərslərdə şagirdlər daha çox fəallıq göstərə biləcəklər.

Ənənəvi təlimdəki kitab üzərində iş üsulu ilə fəal təlimdə istifadə olunan İNSERT iş üsulu dərslərin tədqiqatın aparılması mərhələsində və ya yaradıcı tətbiqetmə mərhələsində birgə tətbiq oluna bilər. Əvvəlcə İNSERT cədvəlinə əsasən şagirdlər şeir üzərində işarələr qoya bilər (“V”- bilirəm; “-”- ziddiyyətli informasiya; “+”-yeni informasiya; “?”-aydın deyil). İlk üç şərti işarə üzərində iş aparıldıqdan sonra kitab üzərində iş üsulu tətbiq oluna bilər. Bu zaman bədii

nümunələrdə mənası aydın olmayan ərəb-fars mənşəli sözləri şagirdlər dərslərdə verilmiş lüğətdən istifadə edərək sərbəst şəkildə taparsa, nəticədə, dərslər daha maraqlı və yaddaqalan olacaq. İfadələr tapılarkən müəllim çalışmalıdır ki, şagirdlər ayrı-ayrı ifadələrin geniş şərhinə yol verilməsin, əks təqdirdə, qəzəlin tədrisindən alınan ümumi təsir zəif ola bilər.

Qeyd olunanlara əsasən demək olar ki, ümumtəhsil məktəblərində ədəbiyyat təlimində ənənəvi və fəal/interaktiv təlim metodlarının qarşılıqlı əlaqədə tətbiqi təlimi nəticəyə müsbət təsir göstərə bilər. Bu problem növbəti illərdə nəşr olunacaq müəllim üçün metodik vəsaitdə nəzərə alınmalıdır. Bunun üçün, ilk növbədə, bəzi təlimat və göstərişlər müəyyənləşdirilməli və təcrübədə yoxlanılmalıdır.

Açar sözlər: təlim metodları, tədqiqatçılıq, interaktiv təlim, fəal təlim, üsullar, vəzn

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Müasir Fransız dili leksikasında söz yaradıcılığının inkişafı. Morfoloji yolla söz yaradıcılığı

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ABSTRACT

Morphological transliteration plays an important role in modern French. Unlike lexicosemantic correction of words, new words are created according to existing patterns in the language by adding morphological suffixes. As a result, existing words in the language become new words, both from the point of view of meaning and from the phonetic and morphological point of view, thanks to the addition of suffixes. In modern French, new words are formed morphologically by simultaneously adding suffixes to existing words. In order to determine the direction in which the productivity of noun-forming suffixes develops, among all old and new words, words formed by adding suffixes were selected. At the next stage, the productivity of each of the suffixes involved in the formation of old and new nouns was considered separately. The results of the analysis are explained below.

Key Words: fruitful suffix, investigation, intra-linguistic, colloquialism, modern French, lexicostylistic, group every day, life work tools.

GİRİŞ:

Müasir fransız dilində morfoloji yolla sözdüzəltmə mühüm rol oynayır. Leksik-semantik yolla sözdüzəltmədən fərqli olaraq morfoloji yolla sözdüzəldici şəkilçilərin artırılması ilə dildəki mövcud modellər üzrə yeni sözlər düzəldilir. Nəticə etibarilə dildəki mövcud sözlər şəkilçilərin artırılması nəticəsində həm məna, həm də fonetik-morfoloji baxımdan yeni sözlərə son şəkilçilərin(süffikslərin), eyni zamanda artırılması yolu ilə düzəldilir.

Le contenu essentiel: İsim düzəldən şəkilçilər içərisində -eur(-ateur)-iteur) şəkilçisi ən məhsuldar şəkilçidir. Bu şəkilçi iş görəni, yaxud iş aləti mənasını ifadə edir. Araşdırmalar nəticəsində məlum olmuşdur ki, köhnəlməkdə olan isimlər içərisində -318, yeni yaranan isimlər içərisində isə +317 isim həmin şəkilçi ilə bitir. İntralingvistik amillərin təsiri ilə əmələ gələn yeni sözlər: veilleur (celui qui est de garde), devoreur, euse (personne qui dévore: un dévoreur de livres), démarcheur, euse (qui fait du démarchage), objecteur (celui qui fait des objections), paradeur (celui qui aime parader), plisseur, euse (personne qui plisse), houspilleur, euse (celui qui aime à houspiller-malmener en faisant des reproches), bruiteur (personne qui effectue le bruitage), carambouilleur (escroc qui achète sans payer et revend en comptant), voyeur (personne qui se plaît à regarder un spectacle obscene sans être vue). Burada həmçinin loru danışq dilindən gəlmiş sözlər də vardır: pédaleur - euse (fam.) suiveur fam.), chialeur, euse (pop), chourineur (arg), trimardeur (arg.), dépendeur-euse (fam.)

Yeni gələn sözlərin əsas hissəsi, şübhəsiz ki, ekstralingvistik amillərin, yəni elmin, texnikanın, kənd təsərrüfatının, ictimai-siyasi həyatın, və s. sahələrin inkişafı ilə əlaqədar yaranan isimlər təşkil edir. Bu qəbildən olan isimlərə aşağıdakı sözləri göstərmək olar: avionneur (constructeur de cellules d'avions), apésanteur (état dans lequel les effets de la pesanteur sont anhillés), aspirateur (nom donné à divers appareils dont le rôle est gaspiller les fluides et les poussières), calculateur (machine de calcul utilisant les cartes et les bandes perforées ou les

rubans magnétiques), décodeur (dispositif sur un ordinateur électronique permettant de décoder les informations en machine), désensibilisateur (produit diminuant la sensibilité d'une émulsion photographique), intercepteur (avion de chasse très rapide, spécialement conçu pour supposer, en les attaquant, aux excursions d'appareils ennemis).

-ation şəkilçisi

2. Müasir Fransız dilində morfoloji yolla söz yaradıcılığı

Hərəkət və hərəkətin nəticəsini bildirən isim düzəldən şəkilçilər içərisində -ation ən məhsuldar şəkilçidir. Bu şəkilçinin – sion, - ssion, -xion kimi qrafik variantları və həmçinin ifadə etdiyi hərəkətin dəyişdirici və icbar mənalara malik olduğu -isation və -ification formaları da vardır. -Ation şəkilçisi fel köklərinə artırılaraq yalnız qadın cinsli isimlər düzəldir. Qeyd etmək lazımdır ki, -ation şəkilçisinin köməyiylə əsasən ictimai-siyasi həyata aid terminlər yaranır. Bundan əlavə, o hərəkəti doğuran vasitə anlayışını və həmçinin də hərəkət prosesini ifadə edə bilər. Bu səbəbdən də - ation şəkilçisi ilə qurtaran isimlər qrupunda dinamik proseslər fəal surətdə baş verir. Ex: structuration, programmation, automation, démilitarisation, syndicalisation, nationalisation, décolonisation, collctivisation, etc.

-age şəkilçisi

Əsasən kişi cinsli isimlər yaradan **-age** şəkilçisi müasir fransız dilində ən məhsuldar şəkilçilərdən biridir. Hərəkət mənasını ifadə edən – age şəkilçisi bəzən ümumi cəmlilik mənasını da ifadə edə bilər. Bu şəkilçinin iştirakı ilə yaranmış isimlər, adətən, sənayenin, kənd təsərrüfatının müxtəlif sahələrinə aid olan anlayışları ifadə edir.

-Age - şəkilçisi eyni zamanda müasir fransız dilində baş verən dinamik proseslərdə fəal iştirak edir.

-Age - şəkilçisi təkcə müəyyən bir leksik-üslubi qrup sözlər ilə bağlı olmayıb, həm də geniş işlənmə dairəsinə malikdir. Belə ki, gündəlik həyatın müxtəlif sahələri ilə bağlı sözlərin içərisində bu şəkliyi ilə yaranmış sözlərin sayı az deyildir. Bunlara misal olaraq köhnəlməkdə olan isimlərdən: farinage (droit que lon paye au meunier pour le blé moulu), avenage (impot feodal, qui se payait en avoine), abeillage (droit des seigneurs sur les abeilles et les ruches de leurs vassaux), jalage (droit en vertu duquel le seigneur prélevait un certain nombre de points sur chaque piece de vin vendue au detail dans sa seigneurie), valétage (service de valet), fournage (ce que l'on paye au fournier pour le cuisson du pain, ce que lon payait au seigneur pour le four banal), quillage (droit que les navires payent dans les ports de France, la premiere fois qu'ils y entrent) kimi sözləri göstərmək olar.

Bu şəkilçinin **-iss-** ünsürü - artırılan variantı da vardır. Ex: bleuisseage, clissage, améris-sage, alunissage, convertissage etc.

-ier-ère şəkilçisi

Bu şəkilçilər ismə artırıldıqda iş görən subyekt, növ və eləcə də müxtəlif əmək vasitələri mənalərini bildirir. Faktik materialların təhlilinə əsaslanaraq demək olar ki, **-ier, ère** şəkilçisi ilə bitən isimlər qrupunda baş verən dinamik proseslərdə ekstralingvistik amillərin təsiri dilin daxili quruluşundan, onun işlənməsindən doğan intralingvistik amillərin təsirinə nisbətən güclü şəkildə özünü göstərir. Ex: dizainier, cigalier, robinier, cornier, limmetier, sterculier, charbonnier, petrolier, poulrier, jantier, carrotier, bouquetier etc.

Bu şəkilçinin **-ière** variantı da mövcuddur. Əsasən qadın cinsli isimlər yaradır: Ex: épissière, cloutière, offcière, jardinière, dentellière, cigalière, roselière, fruitière, cornière, routièr etc.

-er şəkilçisi

Bu şəkilçi sözə qoşularaq müxtəlif mənalarda işlənir: subyekt, canlı və bitki növlərinin adlarını və həmçinin hərəkət bildirir.

İsimləşmiş hərəkət bildirənlər: juger(l action de juger), penser (poète, pensée) doubler, double (action de faire deux à droite ou deux à gauche, relie par une ligne, droite conduisant

perpendiculairement d'une piste à l'autre), user (usage, durée de l'emploi), imager, hommager, avoyer, user, dispatcher, débucher, tomber, grimper. Etc.

-ère variantı

İsmlərə artırılaraq bitki, canlı növləri, ərazi və müxtəlif əşya bildirən – ère şəkilçisi məhsuldarlığı azalmaqla olan isim düzəldən şəkilçilərdəndir. Ex: lavatère, peltigère, moyère, coraillère, pignère hetorecère etc.

-(e) ment şəkilçisi

Müasir fransız dili söz yaradıcılığı sistemində ən məhsuldar şəkilçilərdən biri olan – (e) **ment** şəkilçisi əsasən I və II qrup fellərinə artırılaraq hərəkət bildirən kişi cinsli ismlər yaradır. Ex: dévêtissement, ténement, arrentement, billonement, encirement, calmement, envirenment, déjoutement, blémissement, ensoleillement, débranchement etc.

-isme şəkilçisi

Müasir fransız dilinin söz yaradıcılığı sistemində ən məhsuldar şəkilçilərdən biridir. Ümumi və xüsusi ismlərdən ictimai-siyasi, incəsənət, idman, tibb, ictimai-siyasi kişi cinsli ismlər yaradır. Ex: entilibrisme, dialogisme, figurisme, janotisme, marianisme, anarchisme, syndicalisme, centralisme, pacifisme, colonialisme, révisionnisme, marxisme, léninisme, atlantisme etc.

-ie şəkilçisi

Sifətlərə və ismlərə artırılan **-ie** şəkilçisi qadın cinsli ismlər düzəldir. Bu şəkilçinin köməyiylə düzələn ismlər, adətən, hal, vəziyyət, müəyyən xəstəlik, mənəvi keyfiyyət, münasibət və növ bildirir. Məsələn: eutocie (accouchement normal), épistasie (dominance dun gene sur tout autre gene), fatrasie (genre littéraire du Moyen Age qui consiste en un ensemble de pièces satiriques), paraphrasie (trouble du langage constitué par la substitution des mots les uns aux autres), cryoclastie (fractionnement des roches par les alternances de gel de dégel), discourtoisie (manque de courtoisie), rickettsie (genre de microorganismes intermédiaires entre les virus et les bactéries, agents de certaines maladies contagieuses).

-et, ette şəkilçisi

Əsasən kiçildici mənası olan-et, -ette şəkilçisi məhsuldarlığı azalmaqla olan şəkilçilərdəndir. Ex: jambelet, claquet, blochet, bichet, coqueret, superette, camionnette, chenillette, mitraillette, chargette, gaillette, affichette, gaillette etc.

-ee şəkilçisi

İsmlərə əlavə olunaraq çoxluluq, müəyyən tutum, ölçü, zaman, hərəkət bildirən və qadın cinsli ismlər yaradan-et şəkilçisinin məhsuldarlığı da azalmağa doğru meyl göstərir. Bu şəkilçinin köməyiylə düzələn ismlər qrupunda köhnələrək ümumişlək leksikadan çıxan sözlərin sayı (-194), yeni gələn sözlərin sayından çoxdur. Faktlara diqqət edək. Köhnələrək ümumişlək leksikadan çıxan sözlər:

Dînée (repas et dépense qu'on fait à dîner en voyageant; lieu où l'on dîne), verrée (contenu d'un verre), fourchée (quantité de foin, de paille qu'on peut enlever d'un coup de fourche).

-eés variantı

Şəkilçinin bu variantı botanika, biologiya və zoologiya terminlərinin yaradılması üçün işlədilir.

-ité, eté, té şəkilçisi

Əsasən sifətlərə, sifətlərdən əmələ gəlmiş ismlərə və eyni zamanda latın dilindən alınmış bəzi sözlərə artırılaraq qadın cinsli ismlər yaradan-ité şəkilçisinin məhsuldarlığı da azalmağa doğru meyl göstərir. Bu şəkilçi artırıldığı ismlərə müəyyən keyfiyyət, hal, vəziyyət bildirmək mənalərini verərək mücərrəd anlayışlar ifadə edir. Ex: innavigabilité, locomobilité, perpendicularité, immondicité, automaticité, commutativité, compétitivité, continentalité, distributivité. etc.

-iste şəkilçisi

Müasir fransız dilində **-iste** şəkilçisi məhsuldarlığı artmaqda olan şəkilçilərdəndir. Bu şəkilçi həm isimlərdə, həm də sifətlərdə söz yaradıcılığı proseslərində fəal iştirak edir. Ex: marxiste-léniniste, spartakiste, antispritualliste, feuillagiste, anesthésiste, bactériologiste, biochimiste, électrocardiologiste, génétiste, possibiliste, neurologiste, stomotologiste, académiste, proétionniste, scénariste. Etc.

-erie şəkilçisi

Artırıldığı sözlərə müəyyən əşyaların toplandığı, istehsal olunduğu, satıldığı yer, müəyyən bitkilərin bitdiyi və yaxud becərildiyi yer, eləcə də müəyyən hərəkət və keyfiyyətlərin (əksərən mənəvi) cəmliyi mənasını verir. **-Erie** şəkilçisi qadın cinsli isimlər yaradan və ümumiyyətlə götürüldükdə məhsuldar olan şəkilçilərdəndir. Ex:pêcherie,fauverie,ménagerie, beurrerie,biscotterie,créperie, paperasserie, billetterie,homarderie,pillierie, négrerie, pomperie, chandellerie, vionnerie,lustrerie. Etc.

-euse şəkilçisi

Qadın cinsli isimlər düzəldən **-euse** şəkilçisi müxtəlif (müəyyən iş görən, alət, maşın və s.) mənaları ifadə edir. **-Euse** şəkilçisi fransız dilində geniş yayılmış şəkilçilərdəndir. Əslində sifət düzəldən **-euse** şəkilçisi son illərdə inkişaf edərək isim düzəldən məhsuldar şəkilçiyə çevrilmişdir. Müqayisə üçün demək olar ki, **-euse** şəkilçisi ilə bitən isimlər qrupunda yeni qeyd olunan sözlərin sayı (+89 söz) köhnəlməkdə olan sözlərin sayından (-23 söz) təxminən dörd dəfə çoxdur. Ex: jaleuse, remueuse, licieuse, laboureuse, écrimeuse, visionneuse, trayeuse, détireuse, moisseneuse, niveuleuse, cinémitraillouse etc.

NƏTİCƏ

Fransız dilinin leksikasında əmələ gələn dəyişikliklər, təkmilləşmə və inkişaf prosesləri həm dilin daxili sistem-struktur quruluşundan doğan, həm də dildə yaranan dəyişikliklərin təkanverici qüvvəsi kimi özünü göstərən amillərin birgə təsiri ilə baş verir. Bu amillər eyni zamanda həm ölkə daxilində müxtəlif sosial qrupların arasında dilin ünsiyyət vasitəsi kimi fəallaşmasına, həm də başqa dillər ilə münasibət sahələrinin və intensivliyinin artmasına təsir göstərir.

Dilin zamanla ayaqlaşma bilmək qabiliyyəti onun dinamikliyi ilə, yəni köhnəlməkdə olan sözlərdən, onları ifadə edən anlayışlardan yaxa qurtararaq təmizlənməsində və eyni zamanda həyatın tələblərindən doğan yeni sözlərin gəlməsi hesabına zənginləşməsində və dilin lüğət tərkibinin "özəyini" təşkil edən sözlərin insan fəaliyyətinin müxtəlif sahələrində ünsiyyət prosesində hərtərəfli və fəal işlənməsi ilə müəyyənləşir. Beləliklə, dilin inkişafı həm ekstralingvistik, həm də intralingvistik amillərin qarşılıqlı təsiri şəraitində baş verir.

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Philological Sciences

Regarding the layer of borrowed geographical names in Kazakhstan

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Abstract: Geographical names, along with the fulfillment of the address function as a geographical mark, are a cultural value with cognitive and cumulative value, which deeply intake the traditions, consciousness and mind, as well as manifestations of the spiritual life of the people, who inhabited that locality.

Existence and world outlook, ethnic culture and spiritual life of any nation are always reflected in a certain geographical space and are the result of certain historical eras. All life activity, all the centuries-old cultural and spiritual wealth, first of all, are imprinted with a pattern in the native language of people of this locality, and turning into an invaluable treasure, passes from one generation to another. All this is an objective regularity, a common feature inherent to all languages in the world, therefore ancient geographical names are considered as a kind of historical monuments, since they, as heritage of past centuries, clearly show us the image of certain eras of history, conditions of the terrain, material and spiritual geographic culture of states and nations.

The existence of language is a process, which is closely related to the social life of the native speaker that cannot exist without each other. Lands and settlements, rivers and lakes, mountains and rocks - just like language, are interconnected with man, all objects in the surrounding space are born with the ethnic and civil history of people of this locality, fuses with that period and this natural integrity is more often manifested not in the historical information, but in the richness of the language. This is related to the fact that historical information for various reasons may not be preserved, or be not completely reliable while preserving, while language, its information, no matter how many centuries and eras will pass, regardless of uninterrupted replenishment, countless updates and renewals, will remain undoubted proof of previous eras.

The immense Kazakh steppe was inhabited and settled by tribes and clans with different languages and religious beliefs and traditions in different historical periods, and relations with neighboring countries have also been maintained since ancient times. The historical and social layers and stages of the development of geographical names in the Kazakh language can be differentiated in the following layers: *ancient Turkic (common Turkic) layer, a native Kazakh words and layer of borrowed words*. Undoubtedly, in the regional toponymy, the geographic, economic features of that region are imprinted in the footsteps of this connection. In this regard, the report includes the theme of the borrowed layer of toponyms that can be found on the Kazakh land.

Key words: ethnoculture, toponym, national toponymic space, toponymic system, etymology.

Atameken and the way of formation of land- water names which are in the minds of ethnic groups had been started since very long time. It is directly related to well-known people community. A.T. Kaidar considered that on the basis of science the word “**ethnos**” – it is that “born in the past” and has a common geographical environment, that is which is united in one’s own behavior, religion and language, common in traditions and customs, is a community of people who are in a state of self-realization, who are aware of their kinship, common surname, and who feel the integrity and in the gradual development they went through motherhood, fatherhood, generic, tribal, ethnic and national epochs, today it is a community of people who are independent” [1, 10].

This conclusion approved that the **nationality-ethnos** way to the present time is a long way: it means that there were many difficulties in their lives. There are spiritual and material wealth of life, lives, the life’s culture, and spiritual and material wealth of the people as a history, most important of which are the names of the earth and water, and its ancient layer is a wealth of people which is a secret of history. All of this is achieved and seemed through language. The history of the ethnos is less flexible changeable than the language history: it is extensively dependent on extralinguistics, economic, socio-political reasons, and has a significant impact on the language and ethnicity.

In every step of the history of the Kazakh steppes there were different tribes and people lived in different languages and religions, as well as relations with neighboring countries in the ancient times. All this is reflected in the language lexicon. According to the researchers’ opinion that the borrowed lexicon of the Kazakh language is mainly included in Arabic, Persian, Mongolian and Russian languages [2,133-156 pp.], and the names and structure of the proper noun in the Kazakh language lexicon are very diverse. T. Zhanuzakov said: “The Kazakh geographical terms have been translated from a different language. Toponyms made by the addition of these terms also meet in each region. There are also extensive terms and appeals that can be used in local languages, adding that they are from Arabic, Iranian, Mongolian and Russian, as it is typical of **Iranian languages**: *abat, sengir, dara, kent, shahar, darat, kala, dar, mar, shui, darya* and so on; from the **Arabic language**: *sair, rabat, hasar*; from Mongolian language: *aimak* (region), *arasan, aral* (island), *bakan*; from **Russian language**: *balka, selo, stolissa, stanissa, zaimka, ust*, and so on, indicates that words are involved in making land and water name words as an appellative [3,54-55pp.].

In the science of Kazakh language the relation of the Kazakh with Mongolian languages is considered in two different ways. First of all, it is obvious that the words borrowed directly from the Mongolian language in the Kazakh language, there were the reason for the two neighboring peoples’ centuries-old relationships. Also, in the XII century, the Mongols occupied Kazakhstan and Central Asia, and the influence of the Ulus and Orda dominated by Chinghiz dynasty since the XV century. Even Kazakh khanates, in the XVI-XVIII centuries, also known as one of the Mongols’ dynasties Jungarian Kalmyks, constantly attacked the Kazakh land [4, 146].

The search for Mongolian language borrowing from the Mongolian language not only by the Mongolian invasion, but also in the Turkic and Mongolian languages starts from the views of Turkish scholars of the XIII century. Sh. Sarybaev said about Swedish scientist I. Stralenberg, the Orientalist, ethnographer, famous scientist Shokan Valikhanov, about the relation of Turkic and Mongolian languages, using the term “Turkic-Mongolian conjugation” and also by comparing the Kazakh and Mongolian languages with two languages common lexicon: human body, food, family names, clothing, pets, wild animals, equipment, plant, nature and so on., defines thematic groups, including those that are a lot of appellative words on the basis for the create of names of lands and water [5: 141-176; 537-539 pp.].

“It is difficult to say that all the common language materials are from Turkic languages to Mongolian languages or vice versa, Mongolian languages have been borrowed into Turkic languages, so it is difficult to say that they are from one language to another. The reason is that the vocabulary normally changes, and the grammar structure of the language is much more stable. Non-kinship languages cannot be taken from one another in terms of suffix, connotation, adjective, verb, adjective, impersonal words. These are words that cannot be translated from one language into another. The rest of the words do not go beyond just a few words. Moreover, the preservation of many words similar to Mongolian in the composition of names of land, which has preserved the peculiarities of the ancient language, is another proof of the relation of Mongol and Turkic languages “[5, 539p.]. It is impossible to prove that the relationship with the lexical elements is common, in this connection Sh.Sarybaev: “The greatest fact proving the kinship of languages is the commonality in the grammatical construction of languages, there are used “as well as the suffixes” *-shy/shi, -lykh/lik, -la/le*; multi suffixes in Mongolian language *-nar* (akhnar-agalar (brother) т.б.) . He indicated: “But we believe that traditional, long-term ancient common lexicon would be more appropriate than the ancient language of the Turkic-Mongolian language rather than the words that have been replaced” (5,538).-539 p.].

The words borrowed from Mongolian-language into the Kazakh language mainly refer to administrative, dictatorships, as well as land-water names. The names of the land titles are varied, including the relief, wealth, etc. features and historical events. A.Abdrahmanov's works are widely known: *Tarbagatay* (Suyrly), *Kandagatay* (Buggyly), *Tolagay* (bas (head)), *Katonkaragai* (Katon-kayin), *Bayanauly* (Bayan ola-Bai tau (expensive mountain)), *Dolankara* (zheti tau (seven mountains)), *Zaysan* (zhaksy (good)), *Nura* (zhyra), *Mukhyr* (sholak, kyska (short)), *Korgalzhyyn* (korgasyn (lead)), *Kordai* (karly (snowy)), *Altai* (altyn tau (golden mountain)), *Nura* (lake, river), *Narynkol* (thin river), and so on., [6].

According to the comparative study of Turkic and Mongolian languages, researcher G. Sagidolda considered: “The number of tens of words in the modern Kazakh language goes to the Turkic-Mongolian commonwealth, some of which are interrelated with the Kazakh people (political, social, aggressive wars), it is known as borrowed words which is the language of different peoples. This phenomenon also relates to geographical names, which can be a specific category of words in the Kazakh language lexicon. There are given the facts that the **toponyms** (geographical names) are built on the basis of the existing words in the language, the question of the land-water names, its meaning, the reasons for its existence, that is, the history of the toponyms is bound up with language history [7,3p.].

On the formation of the toponymy of the known population it is known that the factors play a key role which include the geographical environment, ethnic composition in the territory, the outlook of the people, historical events, ethnos's religion living in definite territory, lifestyle, customs and traditions, farming, everyday life, and others. In this regard, G.Sagidolda summarized: “...the toposystems cannot be homogeneous that there was too much interference among different peoples for the present-day Kazakhstan and Mongolia territories who has experienced a number of historical events in the past”. He concluded that for the toponymy of Kazakhstan -it is typical of toponymy on the basis of substratum, common Turkic, in Kazakh language and as well as borrowed from various languages which are characteristic layering of all toponyms and Mongolian toponymy consists of pure Mongolian names, Tungus-Manchurian and borrowed names entered from Turkic languages” [7,74-75 pp.].

The geographical names of these elements are not only related to the elements that have been replaced by Arab and Persian languages, but also the result of the interaction with other languages. In this regard, G. Sagidolda's words, “If we look at the names of the Turkic-speaking topology and the pure Kazakh language, and also the pure Mongolian language in the Mongolian toponymy, we can conclude that the majority of these superficial toponymy is based on the

appellative lexis leading to the Turkic-Mongolian commonality" [7, 75p.]. In this connection, the two types of objects in the Kazakh and Mongolian toponyms, both of which have emerged in two different linguistic environments, have the same content of one another, each one individually serving as a toponym, and one of the same in terms of appellative lexis names are called *homogeneous type of toponymy*. "As we look deeper into such toponyms, we see that the emergence of appeal lexicon, the history of its development goes back to the Turkic-Mongolian commonwealth, and topoogenesis and historical significance lead to cultural historical ties between Turkic and Mongolian people. G.Sagidolda said: "By means of homogeneous toponyms, we can come across similar aspects of the lifestyle, outlook, everyday life, religious beliefs, customs and traditions and rituals of these two nation" [7,88-6.], and he included the common homogeneous geographical names in Kazakh-Mongolian toponymy: *Altynbulak / Altanbulag; Khargol / Karakol; Zost / Zhosaty / Zhezdy / Zest; Aigyryjon / Azragyn nuruu; Olenti / Olenti; Altyntau / Altan uul; Kokoba / Hohovoo; Bosaga tau / Bosgo uul; Shiderti / Choodoroot; Kabyrga tau / Havirga uul; Katynsu / Khatangol; Khantaui / Khaanuul; Karagandy / Kharganat; Karaulytobe / Kharuulynovoo; Altai / Altai; Tamysu / Tamirgol; Khantangri / Khantanger; Moilyty / Moilylt; Kiyakty / Khiygt*.

The history of the formation of homogeneous toponyms in the Kazakh and Mongolian sub-systems is related to the ancient culture of the Kazakh, Mongolian people and its history. The factors became the basis for common Kazakh and Mongolian toponyms which are the similarities in the landscape of two nations, the animal and the plant world, some common features of socio-economic, cultural life, etc. This is especially true because the source of living is based on nomadic livestock breeding; the number of homogeneous toponyms relative to this area is considerable.

Khan Tengri is the tallest peak of 6995 meters in the central part of the Tien Shan, at the border of the Republic of Kazakhstan and Kyrgyzstan. E. Koishybaev said about the origin of the name of the mountain: "One of the ancient Turkic tribes, the Tuva Turkic, also called the modern Sayan Mountains, Khan Tengri – "Sky (Heavenly) Mountain". And also he concluded: "From these states, we can say that Khan Tengri is the name of the ancient Turkic people «Sky (Heavenly) Mountain» [8, 233p.]. T. Zhanuzakov says that in the ancient Turkic language the word "blue", "sky", "god" was used in the *tangar / tengri* form, and in this means, *tener* is also used in the Mongolian language. In ancient times, Tengir was considered to be the "great god of ancient Turkic people". Their saint gods are written in the Orkhon monuments of the VIII-VIII centuries, about the name of their gods *Tengri (Taniri), Umai (Umai), Jer-Sub (land-water)*. T. Zhanuzakov considered that Klossan's word *tengir* included in *Khuin, Uisin epoch, and expressing his opinion about its "sky, "priesthood recognized as "blue", the name Khan Tengri* is in the meaning of words "The high mountain that stands in the skies over the heavens", "God of the heavenly god" [3,192-193 pp.]. The reason for supporting these statements is that the names are found in the territory of other Turkic peoples. In particular, there are given mountains called *Khan-Tigr* in Khakas, *Tigr-Tizi* in the south of Kuznes Alatau, between the Minusin and Kuznes valley, and there are lakes called *Teneri – "Blue Sky", "Teneri-airy" -"Heavenly (sky) trance"*. The meaning of the names of mountains and lakes "sky (heaven)", "blue", "God" are based on the beliefs of people of those times that arose from fire, sky, and nature.

Alatau is a mountain, the highest mountain, which lying down from the hill of Khan Tengri and extending to the end of Shymkent. In the ancient times, the Turkic people have always been called Alatau with the highest peak, the eternal ice and snowy snow. It is represented by *Kuzbass Alatau, Zhungarian Alatau, Ile Alatau, Kyrgyz Alatau and Tien Shan Alatau*. E. Koyshibayev believes that the meaning of this word "*ala*" does not refer to the "white and blue mixed color" in the Kazakh language, and that is more or less likely to be derived from *ulu* or *olo* (8,42p.). Therefore, Alatau has the meaning "great, the greatest, highest mountain" [3, 152p.].

Narynkol is a river in Raimbek district and a settlement on the banks of the river. T. Zhanuzakov said that other scientists keep the principles that *naryn* word is the first such name in the Mongolian language as *nariyan* “thin”, and in the second is kol “river”. Ya. Bichurin’s works include the following names were characterized by the following *uisyn* which were read from Chinese monuments: Dagan, Tarkhan, Chayan, Buri (bori), Aka, Zhosy, Aran, Shi, Soyis, Tau, Nor, Temir, Temirlik, Kungel, Naryn, Dolos, Talas, Karkara, Aksai, etc. indicates that everything will be used in the current language of titles [3,121-122pp.]. In Rayimbek district, the names of *Temirlik*, *Narynkol*, *Karkara*, *Aksai*, *Talas* have been preserved to this time and it is a great phenomenon without a doubt. According to this data, T. Zhanuzakov recognizes that the word *Naryn* is not only the “uisyn’s word” but it is also common word in Turkic language. In Yakut language *naryn* means “thin”, “gentle”, *Naryn sand* (Between the Volga-Ural River), *Naryn river* (In the upper stream of the Syr Darya, in Tuva), *Mountain of Naryn* (in Kyrgyzstan) and others. The second root “kol” of word *Narynkol* name is an ancient Turkic word in the meaning of “river, river spur, ravine”, it is found in the monument of Moin Chor. That’s why, the call *Naryn* is not only regarded as Mongolian, it is suggested to call as a common word at Turkic language unit. So, T. Zhanuzakov concluded that the name **Narynkol** has the meaning of “a thin river” which comes from an ancient time [3,121-122 pp.].

According to this data, it should be understood that the name of the river is set to its type, *Narynkol* is small, thin, not broad-wave river. The fact that the name appears in the Turkic languages is a manifestation of its existence, and the question of whether it is a purely Turkic language, whether it belongs to the Mongolian language, still needs to be identified. And it does not exclude co-existence between Turkic languages and Mongolian languages. In general, it seems that today it is very difficult to get a certain name in one of the languages of the same family.

Sharyn is a river in Uigur district, in the ancient Turkic language, *charan* means – “aryndy, taskyndy, ekpindy, karkyndy ozen” (“flowing, intense river”), *shar* – “zhyldam, tez, aryndy agys” (“fast, pressure flowing”) in Kyrgyz language, *sarga* - “aryndy, asau, tentek” in Mongolian language. Thus, the name of the river was commonly spoken in Turkic and Mongolian terms, meaning “intensive, flowing” [3,134]. It is obvious that this river was an indestructible past in an unforgettable name.

Thus, the Mongolian language range includes: *Khantengri*, *Kerbulak*, *Kastek*, *Egindy*, *Naryn*, *Narynkol*, *Karkara*, *Sharyn*, *Koshkar* and etc., it is observed that names are made in Kazakh and Mongolian languages, in some cases the ancient Turkic elements are intertwined, and their actual borders are still difficult to open. The reason for this is the fact that G. Sagidoldakyzы explained that it is a long-term trinity of Turkic and Mongolian people, common nomadic lifestyle based on livestock-breeding, territorial mixing and so on [7, 59 p.], because it is indisputable that the language of these peoples also has its own image. Such extralinguistic factors provided for the introduction, interchangeability, and transformation of linguistic elements from Mongolian languages into Turkic languages, from Turkic languages into Mongolian languages.

The oldest borrowed layer of Turkish dialects in Mongolian languages is parallel to the Turkic texts of the VIII-XII centuries, while the medieval Mongolian language is different. As a result of the close interaction between the Turkic and Mongolian people, the words from Turkic languages into Mongolia, from Mongolian languages into Turkic languages are transformed according to phonetic and grammatical laws of the receiving language, i.e., sound, individually, sometimes it is learned from a meaningful point of view. Land-water names are not far from this process.

The names in the Kazakh language create the main part of Kazakh toponymy, some of the appellative lexis and popular geographical terms that are the basis for the creation of these Kazakh names are the common lexis of Turkic and Mongolian languages. Besides, in the Kazakh toponymy there are many Mongolian layers of borrowed word names. Mongolian toponymy also contains

Turkic names; toponyms based on Turkic-Mongolian parallels, which are the Mongolian names, common Turkic-Mongolian geographical terms that participate in the nomination process.

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Interactive teaching methods at English classes

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Interactive teaching at the university level involves engaging students in active learning experiences rather than relying solely on traditional lecture formats. It can include discussions, group activities, case studies, simulations, peer teaching, and technology-enhanced methods to promote deeper understanding and critical thinking among students.

Interactive teaching methods include:

1. Discussion-Based Learning:

Encouraging open dialogue and debate among students on relevant topics.

2. Group Activities: Dividing students into small groups to solve problems, discuss concepts, or work on projects collaboratively.

3. Case Studies: Presenting real-life scenarios to analyze and discuss, applying theoretical knowledge to practical situations.

4. Simulations: Creating simulated environments or scenarios where students can apply theoretical concepts and see the outcomes of their decisions.

5. Peer Teaching: Students teach concepts to their peers, reinforcing their own understanding and fostering collaboration and communication skills.

6. Role-Playing: Assigning roles to students to act out scenarios or debates, encouraging empathy and critical thinking.

7. Technology Integration: Utilizing educational technology such as online platforms, multimedia presentations, or interactive simulations to enhance learning experiences.

8. Problem-Based Learning:

Presenting students with real-world problems to solve, fostering critical thinking and problem-solving skills.

9. Flipped Classroom: Assigning lectures or instructional materials for students to review outside of class, then using class time for discussion, activities, and application of concepts.

10. Gamification: Incorporating elements of games, such as points, levels, or rewards, to make learning more engaging and motivating.

These methods promote active participation, critical thinking, collaboration, and deeper understanding among students.

To teach students using interactive methods effectively, consider the following steps:

1. Set Clear Objectives: Define the learning outcomes you want to achieve with the interactive session.

2. Choose Appropriate Activities: Select activities that align with your objectives and cater to different learning styles and preferences.

3. Create a Safe Environment: Foster an atmosphere where students feel comfortable expressing their thoughts and ideas without fear of judgment.

4. Provide Guidance: Offer clear instructions and guidance on how to participate in the activities.

5. Encourage Participation: Actively encourage all students to participate by asking open-ended questions, prompting discussions, and acknowledging contributions.

6. Facilitate Discussion: Guide discussions to ensure they stay on track and facilitate meaningful exchanges of ideas among students.

7. Promote Collaboration: Emphasize the importance of collaboration and teamwork, and provide opportunities for students to work together towards common goals.

8. Offer Feedback: Provide timely and constructive feedback to students to help them reflect on their learning and improve their understanding

9. Reflect and Adapt: Reflect on the effectiveness of the interactive methods used and be willing to adapt your approach based on student feedback and outcomes.

10. Integrate Technology Thoughtfully: Use technology to enhance interactive activities but ensure it complements rather than replaces face-to-face interaction and engagement.

By following these steps, teacher can create a dynamic and engaging learning environment that encourages active participation and fosters deeper understanding among students.

Biological Sciences

Biochemical Properties of Spring Mutant Lines of Wheat Grains

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ABSTRACT

In the global production of cereals, wheat has a very important place. Flour obtained from grains wheat, is the main staple for the manufacturing of bakery and pasta of many sorts. Today, industry enterprises face the same problems. These include the quality of the processed flour and, as a result, the quality of the finished product. Most acutely today is the problem of the quality of flour. Besides, the main component of wheat are starch and energy, wheat also hold essential quantity of a number of micro and macro elements which are valuable or advantageous for health such as grain proteins, vitamins, dietary fiber, chemical elements and any various biologically active compounds found in plants.

Keywords: Mutagenesis, grain protein content, grain iron and grain zinc concentrations, grain yield characteristics, mutant lines spring common wheat.

INTRODUCTION

Wheat is the most valuable food crop: it consumed by above than half of the humans in the world, among cereals it occupies a leading location in the occupied areas and gross grain harvest, which makes up almost half of the grain crops. Wheat was one of the first cereals; it was cultivated at the very beginning of the Neolithic revolution. The selection of the first varieties carried out according to the strength of the spike, which must withstand the harvest, resistance to lodging and grain size. The protein content in wheat is much higher than in other crops, such as rice, corn and others. Therefore, when cultivating this crop, it is not always possible to get maximum yields, since wheat is quite demanding on soils and climatic conditions.

Taking into account the needs and demand of production, selection of early maturity and adaptability to local climatic conditions are becoming the priority areas of research today; factors, resistance to biotic and abiotic stresses, product quality, etc. The basis of the selection development of a certain culture is the initial genetic diversity and methods of genetic reconstruction.

Presently, agricultural production necessity wheat diversity with a range of beneficial economic specification and biological characteristics. The practice of domestic and world screening demonstrated that a perfect wheat line, in addition to a high yield opportunity, should have a strong shortened stem, attempt to prevent lodging in conditions of vigorous farming, strong immunity to infection and pests, ability to endure difficult conditions like a temperature and dry resistance. Simultaneously, the variety could be described by early ripeness, high baking characteristics, a high satisfied of gluten and protein in the grain with the needful group of significant amino acids. A particular role in the improvement of the grain manufacturing is played by the quality of wheat. In allowing the issue of developing the characteristics of grain, a particular position belongs to mutagenesis, which is help to create progressively large amounts of varieties with beneficial biological and technological properties.

Gamma rays belong to ionizing radiation and are the most energetic form of such electromagnetic radiation, having the energy level from round 10 kilo electron volts(keV) to several hundred keV. Therefore, they are more penetrating than other types of radiation such as alpha and beta rays [1]. For agriculture there are many applications of the nuclear techniques. In plant improvement, seed irradiation may lead to genetic variation that allow plant manufacturer to select new genotypes with developed characteristics such as earliness, saltiness tolerance, grain yield and properties. By definition yield associated components such as grain weight and number per main spike, grain weight per plant, 1000 grain weight to search and identify high-yield lines; micronutrients (Fe and Zn) and grain protein content in 100 Gy and 200 Gy mutant lines of spring wheat Zhenis we can in practical demonstrate the effectiveness of gamma radiation to the wheat grains.

The role of wheat in the world and Kazakhstan

Wheat (*Triticum aestivum*), one of the main significant harvests, is a kind of single- and biennial herbal of the cereal's family. The food received from wheat is used to bake white bread and to making other food products; the no purpose of meal milling utilized as a fodder for farm animals and domestic fowl. And has been increasingly used as a raw material for industry recently. There are thousands of wheat varieties and it is very difficult to classify them, but there are only two major forms hard and soft. Soft varieties are also divided into red and white. They are usually cultivated in regions with assured hydration.

Hard varieties are bred, for example, in areas with drier climates where steppe is the predominant type of vegetation. The grain market is the largest food market in the world and its research shows the major trends in ensuring food security.

With a magnification in population growth rates, humanity is compelled to rise agricultural manufacture, the basis of which is grain farming. At that point, latest a lot of consideration has been paid in the world to the cultivation of winter crops.

According to the updated Food and Agriculture Organization forecast, world grain production in 2019 reached a new record level and amounted to 2,715 million tons, which is 2.3 percent (61.7 million tons) higher than in 2018. [2]

China is the leader in millet production. As the major manufacturer of wheat, China gets a considerable place in the world grain market. About 126 million tons of wheat is grown in the country yearly in an area of 24 million hectares, which is equal to the area of Algeria. Wheat is one of the main products for the Chinese population, 40% of the consumed cereal crops are wheat. It is grown in the valleys of the Huáng hé River and Huái Hé River along with corn and in the Yangtze River Valley along with rice. [3]

The second leader in the production of wheat is India, which grows more than 95 million tons of wheat per year. Wheat is the second most important grain crop grown in India after rice. Hundreds of millions of Indians eat it every day. India accounts for about 8.7% of global production, and 13% of all cultivated Indian land is used for growing wheat. The Green Revolution in India led to an active increase in grain production and a double increase in yield, which occurred in the period from 1960 to 1970. Uttar Pradesh, Punjab, Haryana and Madhya Pradesh are the main wheat producing states in the country.

Russia is the third largest wheat producer in the world. Since 2006, it has been in the top 5 countries that export the largest amount of grain. The most important variety growing in the country is winter wheat. Wheat yield is for the most part grown in the western part of the country near Moscow. Sowing is carried out between August and the first week of October, and the crop is harvested from July to August next year. Wheat is the main cereal plant in the United States and is grown throughout the country. In the United States, nearly 55 million tons of wheat are grown, which corresponds to the fourth position in the world in terms of grain quantity.

There are 8 diversity of wheat that are produced in the country according to the U.S. Department of Agriculture Classification. Durum wheat (used for pasta making), durum red winter wheat, durum spring red durum, soft white, and durum white are the most common types of wheat.

The 70-80% of wheat produced in the United States belongs to the winter wheat group (often used in baked bread because of its high gluten content).

In 2014, North Dakota, Kansas and Montana were the major wheat manufacturer in the country, as stated by the United States Department of Agriculture. Fifty per cent of the crop is exported, bringing \$9 million in annual profits. [3]

Kazakhstan is one of the world leaders in the export of agricultural crops. At the same time, the lion's share is occupied by barley and wheat. In just 11 months of last year, our country shipped 5.5 million tons of grain to overseas markets worth over \$ 862 million. To date, shipments with Kazakh wheat are shipped to 70 countries. The grain market's export potential is the agricultural sector's ability to deliver grain of sufficient quality annually to the external market, taking into account climatic, economic, and other objective factors, as well as ensuring the country's domestic needs. The mechanism for the development of grain markets is issued, on the basis of which the key features of the Kazakh grain market in particular follow: low demand level and high coverage of domestic needs by own production volume. As a result, almost every year Kazakhstan exports grain at the level of 3- 5 million tons. Favorable geopolitical position of the country, revealing the possibility of grain supplies to densely populated and grain deficient regions (Iran, Iraq, Afghanistan, countries of Central Asia, Mongolia, etc.). The priority direction to the plant grower is Only wheat production remains. Situation in the grain market of Kazakhstan has a tendency increase grain production and consumption, due to global population growth the evolution of the globe and with dynamic development I eat livestock, as well as processing industry. According to constant emphasis that of the ex-President of the country N.A. Nazarbayev that export potential of the country within 10 million tons of grain has not yet been reached and farmers should provide the country with its own products, turn on food imports.

Soft winter wheat (*Triticum aestivum* L.) is extremely polymorphic. There are winter and semi winter forms. In winter forms, vegetation is interrupted by a season of winter quiescence, the continuous of which rise from north to south. Transplant of the major cold-resistant lines can allow short-term droplet in air temperature in the spring to ten degrees. The dangerous temperature at the deepness of the tiller node of the main resistant for freezing forms of winter wheat is close eighteen degrees. Upon the cultivation season, the sum of medium daily air temperatures of about 2100 is required C. During the time of output into the tube - stuffing grain, culture is rather exacting on providing humidity. The grain yield crucially reduces by drought. The growing time is 45-50 days in the fall (vegetative organs develop) and 75-100 days in the spring and summer (generative organs form and the plant introduce fruiting). Wheat do not open minded the raised acidity of the soil and are less feeling to salinity. The better soils are chernozems; on sod-podzolic soils, benign yields are received by using bio fertilizers. Main diversity reacts on a short day with a rise in the growing season, even though there are view that are neutral to the length.

The average yield of parental cultivar Zhenis on the semi-endowed dryland "Kazakh Research Institute of Agriculture and Crop Production" is 37.7 centners per hectare. By grain quality, it belongs to valuable whelps. The vegetation time is 89 days, the lines are described with drought tolerance, resistance to shedding and dropping of spike. It is resistant to smut. It reacts positively to optimal sowing dates and a high agricultural background.

Physical Mutagenesis

In the past eighties years more than seventeen percent of mutant varieties were improved applying physical mutagenesis by mainly ionizing radiations, have been used extensively for inducing hereditary aberrations.

Radiation is determined as energy which moves in the form of waves or particles through a distance. These are relatively high-energy electromagnetic (EM) spectrum levels that are capable of discharging electrons from the nuclear orbits of the atoms they affect. Consequently, the atoms that have been affected become ions. The EM's ionizing components include cosmic, gamma (g), and X-rays. Irradiation is used for a variety of reasons, such as disinfesting/sterilizing food, reducing or eliminating food borne pathogens, shelf life extending and may serve as a quarantine treatment for many fruits, vegetables, nuts, cut flowers and animal origin products to facilitating international trade of foods.

The action of radiation, laser and UV radiation leads to a wide range of changes in the metabolic and energy nature. In plants, a change in the permeability of membranes is observed, their integrity is violated, a change in the content of various compounds occurs, free radical compounds accumulate, genetic damage is observed, it is assumed that regulation of protein synthesis and genome expression are changing [4].

Gamma radiation from radioactive cobalt (^{60}Co) is extensively applied in agriculture. This gamma radiation has high opportunity for penetration, and is dangerous. It can be used to irradiate whole plants and sensitive materials, such as pollen grains. Different mutations were produced by gamma radiation. The mutagenic effect occurs mainly from double-strand breaks in DNA. Mutants show higher potential for improving plant architecture which leads to better crop improvement and are used as a complementary tool in plant breeding. Compared to chemical mutagenesis, the major benefit of using physical mutagenesis is the degree of accuracy and adequate reproducibility, particularly for gamma rays that have a uniform tissue penetration strength. Penetrating into a living microorganism, gamma particles kill harmful pathogenic microorganisms, initiate certain chemical reactions, inhibit biological processes in foods and alter the physicochemical properties of polymeric materials.

Wheat grain can storehouse of biologically active compounds and components which are important and beneficial for the health humidity and animals. The elements like a protein, amino acids, fats, vitamins, nitrogen, phosphorus, potassium, sulfur, trace elements, etc. have make the grain culture. The nutrition of future wheat depends on the level of chemical constituent of the wheat grain. Additionally, grain protein role is about gluten protein. Gluten's level in the grain is expose to considerable variations and it depends on raising of dry weather state, because it is hydrophilic macromolecular component engage humidity, support providing of absorption of water from the environment to grain swelling.

A high productivity of any wheat crop is able to be done only with the full and sufficiently supply of nutrients. Wheat plants needs not only needful nutrients also light, ideal temperature and water for normal growth. The plant components of wheat include more than seventy biological active compounds, of which sixteen are absolutely needed to wheat organogenesis (carbon, hydrogen, nitrogen, oxygen), microelements (phosphorus, potassium, calcium, magnesium, sulfur), as well as iron and manganese.

Each element performs its special function in the physiology of wheat and therefore it is not interchangeable. The physiological crop improvement can be developed by utilizing low dose gamma radiation in agricultural manufacture. Seed treatment of low dose gamma radiation 0.01–0.10 kGy discounted plant height, become better plant vigor, rise leaf area. The characteristics like a morphological, structural and functional changes in a wheat are determined by the intensity of use and length of the gamma irradiation [5].

Micronutrients

Wheat (*Triticum aestivum* L.) is used as the main source of food that is rich in vital biological elements. It makes up about 30 percent of the world's overall cereals eaten, making it a significant source of minerals. Iron and zinc are two of the three micronutrients (i.e., Fe, Zn, and vitamin A) which the World Health Organization considers as restricting [6].

Therefore, it is crucial that wheat lines with improved concentrations of iron and Zinc be created to reduce lack of healthy sustenance among individuals who expend basically cereals. This research sums up advance on the distinguishing proof and analyzing of wheat germplasm with huge amount of micronutrient concentrations, molecular components for micronutrient concentration, and possibilities for wheat breeding of wheat.

The lack of micronutrient “hidden hunger” directly speak to over 40% of the world’ humanity and is developed especially in numerous progressing countries. Nutrition and health experts are concerned that the population is lacking in the nutrient components in the body that include including zinc, selenium, calcium and magnesium, in some regions of the world. As a result, great economic and social problems are created regarding nutrition and its impact on health. Lack of nutrient micronutrients have serious consequences as significantly raise the level of mortality and disease rates, decrease cognitive capacities of children and diminish their instructive advance, decreasing the labor performance, discount the livelihood and quality of life for all those influenced.

Plant breeding (genetic bio-enrichment) and fertilizing Zn and Fe (agronomic bio-enrichment) are two important agricultural tools for improving the concentration of zinc and iron in grain. Despite the fact that genetic engineering offers more opportunities for a significant increase in the bioavailability of Zn and Fe in grain, the adoption of GMO technologies for consumers and regulators is very limited, and genetically modified cultivation and marketing of such crops is unlikely to be widely accepted by society in the near future. Agronomic bio-enrichment is achieved by adding trace elements to the soil and / or directly to the leaves of the plant. Unlike genetic engineering, agronomic bio-enrichment is potentially more sustainable, economical, and easier to implement than other strategies.

The trace element that is consumed by plants in the largest quantity; from 0.6 to 9.0 kg / ha is carried out. It plays an important role in redox reactions as a component of enzymes, provides the synthesis of chlorophyll (without iron, chlorophyll is not synthesized). Iron, zinc, copper, manganese, boron, molybdenum and chlorine are involved in many biochemical reactions that occur in plant cells. Some of them only contribute to the process of protein formation, while others are involved in the construction of large molecules, and therefore are critical for the functioning of cells. Nitrogen, phosphorus and potassium are of great importance for the basic functions of cells, as well as for their restoration, but the overall need for them is small.

Basically, the symptoms of iron, manganese or copper deficiency appear primarily on new organs of the plant. However, zinc deficiency appears first on old leaves. It can be assumed that the plant itself redirects this nutrient to new leaves at the expense of old ones. A plant experiencing a deficiency of one of the microelements lags in growth, therefore, as a rule, it has small sizes and a small number of shoots. The most obvious symptoms appear on the leaves: they first turn yellow, usually between the veins (inter-vein chlorosis), and then completely lose their color. The requirements for wheat in micro and microelements are meager - as it were one hundredth or one thousandth of its needs for this trace elements - calcium, magnesium, sulfur, etc.

Trace components are not broadly utilized in North America as a required portion of the fertilizer program. Despite of this their deficiency some of the time gets to be a restricting agent in getting an achievable wheat plant. Insufficiency in zinc, manganese, copper and iron will make

more issues in soils with large Ph level. It is known that with increasing soil pH, these trace elements become less accessible.

From the environment, oxygen, carbon, and hydrogen are basically provided to plants. They account for 93.5% of the dry weight, counting carbon - 45%, oxygen - 42%, hydrogen - 6.5%. [7]

Carbon is intensely engaged from the environment by the leaves of plants and a little by the roots from the soil in the chemical form of carbon dioxide (CO₂). Carbon dioxide is the important base of the structure of every organic compound: fats, proteins, carbohydrates and others.

Hydrogen is taken as component of water and is significant for the combination of organic matters.

Oxygen is intensely engaged by leaves from the environment, roots from the soil, and also allow from other compounds. It is needful both for respiration and for the synthesis of organic compounds.

The next important elements for wheat are nitrogen, phosphorus and potassium:

Nitrogen is a significant component for the improvement of wheat, especially, for the formation of protein substances. Its protein content varies from 15 to 19%. It is component of chlorophyll, which means it is engaged in photosynthesis process. Nitrogen is found in enzymes - catalysts of various processes in wheat system. [8]

Phosphorus is introduced in the composition of cell nuclei, enzymes, phytin, vitamins and other in the same manner important compounds. Takes part within the change forms of carbohydrates and nitrogen-containing substances. In wheat, it is hold in both organic and mineral form. Mineral compounds - salts of phosphoric acid - are used in the synthesis of carbohydrates. Wheat plants also utilize organic phosphorus compounds (hexophosphates, phosphatides, nucleoproteins, sugar phosphates, phytin).

Potassium has great significance function in protein and carbohydrate metabolism, increase the action of the taken of nitrogen from ammonia forms. Potassium nutrition is a powerful factor in the development of individual plant organs. This element favors the accumulation of sugar in the cell sap, which increases the resistance of plants to adverse natural factors in the winter, promotes the development of vascular bundles and thickens the cells.

The next important element is calcium in a wheat plant is necessary for the cell membrane and accelerate the development of root hairs (lengthening cells at the tips of root hairs). It is also a bonding material between cells. It is believed that calcium enhances the transport and retention of certain nutrients (such as potassium) in the root tissue. Since calcium in the plant is not mobile, the young tissue first of all feels its deficiency. Characteristic symptoms of potassium deficiency are a decrease in the size of the root system, as well as a make fewer in the number of shoots.

In general, calcium deficiency symptoms are rarely talked about. One of the reasons for this, as a rule, is that its deficit is most often observed on acidic soils. It is usually masked by the negative effects of other factors, such as excess aluminum and manganese. Calcium will be the limiting factor for wheat in soils with a pH below 5.0. Wheat absorbs about 20 pounds of calcium for every 100 bushels (3-4 kg / t) of grain produced. When lime is used to deoxidize the soil, the added calcium will most likely be a limiting factor, not a nutrient. One of the positive aspects of the use of lime is that it reduces the concentration of aluminum and manganese and as a result increases the availability of certain nutrients to the plant, which were in limited quantities in acidic soil. In addition, lime improves soil structure.

Magnesium plays a structural role in chlorophyll, which is an essential factor in photosynthesis in a plant. Like phosphorus, magnesium is necessary for the normal functioning of plant cells. We have no information about the soils of North America, where magnesium is in short supply for wheat and there is a need for the use of special fertilizers containing magnesium. Wheat contains less than 1.5-2 kg of magnesium per 1 ton of grain and makes a total of less than 20 pounds in the entire above-ground mass of plants for every 100 bushels of the crop (less than

3.0-3.5 kg / t). Although there were cases of cattle disease that were grazed in the south of the Great Plain in places where winter wheat was grown. The cause of the disease was the low magnesium content in the leaves of wheat in the area. The concentration of magnesium in wheat can be increased by applying a tape method when sowing fertilizers such as magnesium sulfate together with wheat seeds or wheat seedlings. However, studies have not provided any conclusive evidence that the animal disease problem can be solved in this way.

Iron and zinc are essential cofactors in a wide range of metabolic enzymes. Thus, these elements occur in protein-bound forms in plants and animals. Iron can bind directly to the protein, or as an iron–Sulphur cofactor or as haem.

Iron (Fe)

Iron (the chemical symbol Fe) is one of six micronutrients or trace elements necessary for the growth and reproduction of plants. Iron has a leading role among all metals found in wheat. This proves that it is contained in plant tissues in larger quantities than other metals. The physiological role of iron lies in the fact that it is a part of enzymes, and also participates in the synthesis of chlorophyll, in respiration and in metabolism.

A lack of iron leads to a decrease in the intensity of photosynthesis, chlorosis appears on young plants. It is of great importance for the passage of respiratory processes. It has fungicidal properties. High soil moisture interferes with the absorption of iron.

The catalytic effect of iron is connected with its capacity to change the degree of oxidation. The iron particle is oxidized and decreased moderately effectively, so iron compounds are electron carriers in organic forms. The reactions that happen amid plant respiration are based on the process of electron transfer. It is supported out by chemicals - dehydrogenases and cytochromes containing iron. The lack of iron affect to the death of leaves without any changing their dark green color. As well as, plant growth is inhibited, they constitute few flowers, fader, the tops of shoots die off. Any reason that limits the accessibility of iron for plants leads to genuine sickness.

Within the occasion of an infringement and debilitating of the forms of photosynthesis and breath due to deficiently arrangement of natural substances from which the plant body is built, and an insufficiency of natural saves, a common metabolic clutter happens. Subsequently, with an intense deficiency of iron, plant death definitely occurs.

The accumulation of iron in cells can be toxic. It can operate catalytically to forming hydroxyl radicals that can damage lipids, proteins, and DNA. Due to the opportunity toxicity connected with high iron levels, cells storage iron with the intracellular protein ferritin, which extrication iron in a controlled manner. Ferritin is secreted by nearly all being organisms, containing algae, bacteria, higher plants and animals [9].

Zinc (Zn)

Zn takes part in many physiological processes in a plant, in particular in photosynthesis, synthesis of amino acids, chlorophyll, organic acids, vitamins, etc., in redox processes, the metabolism of carbohydrates, lipids, phosphorus, sulfur. Promotes the accumulation of auxin plant hormone; necessary for the growth of internodes. In ionic form affects the viscosity of the cytoplasm. Due to the stabilization of respiration when temperature conditions change, it increases the heat, drought and frost resistance of plants, protein content, and resistance to disease damage.

High zinc, phosphorus and lime norms and low soil temperature interfere with zinc absorption.

With deficiency of zinc in the soil, the formed leaves of the plants get a yellow - green color, begin to be colored and died; young leaves are small, with wavy edges, having parts that fail to

correspond to one another in shape. In spite of zinc deficiency has a better efficiency on seed improvement than on the improvement of vegetative organs. The lack of Zinc causes a considerable storage of soluble nitrogen compounds - amines and amino acids, which negatively affect to the protein synthesis.

Under the impact of zinc, the synthesis of sugars and starch, the total content of carbohydrates, protein substances, ascorbic acid and chlorophyll improve, drought, heat and cold resistance of plants magnify. The high-level zinc in plant nutrition is completely rare. Nevertheless, plant growth is attenuate, young shoots die off, the leaves become coated with rusty-brown stains. The high level of zinc substance within the soil diminishes the assimilation of copper by plants. The portability of zinc and its passage into plants depends on the causticity of the soil, the substance and portability of compounds of other components, the escalated of microbiological forms. In this way, the mobility of zinc compounds within the soil increments with an increment within the substance of humus and acidity, and diminishes with the nearness of solvent phosphates, calcium carbonates and an alkaline environment.

If a deficiency of zinc is detected in the soil, then fertilizers with zinc content can be applied. The most common sources of zinc-based fertilizers are zinc chelates (containing about 14% zinc), zinc sulfate (25-36% zinc) and zinc oxide (70-80% zinc), where zinc sulfate is the most commonly used source. [10].

The protein content in wheat

The protein content in wheat varies widely from 9.2 to 25.8% (an average of 13.5%). With vegetative experiments, you can get wheat grain. Cereal wheat contains more protein than grain. In the muscular.

The vitreous index is labile, more influenced by a variety of external factors than the protein content. The substance is not evenly distributed. The protein content in the endosperm is less than in whole grain. The endosperm is all around by the fused pericarp and seed shell. The outer endosperm, the aleurone layer, has a particular construction: it composes of single layer of cubic formed cells. The aleurone layer is rich in proteins and enzymes, which have an important function in the germination process. The endosperm without the aleurone layer, i.e. The inner endosperm, is mention to as mealy or starchy endosperm.

The endosperm for the most part holds nourishment saves, which are utilized for improvement of the seedling, which is contain in energy-yielding starch. Besides carbohydrates, the mealy endosperm contains fats (1,5%) and proteins (13%): albumins, globulins and the major proteins of the gluten complex- glutenins and gliadins. - proteins that will form the gluten at dough making. The contents of minerals and of dietary fibers are law; 0,5% and 1,5%, respectively [10].

Proteins classification and function

Protein from the Greek mean proteios for primary as demonstrated significantly highest importance of nutrient for humans and animals. The protein content of wheat grains can have varied from 10% to 18% of the whole dry matter. The proteins of wheat are categorize connecting with to their extrability and solubility in different solutions. Grouping is according to the study of T.D. Osborne at the turn of the last century. Wheat, like all food products, contains a number of proteins: more than 300 were compared with the official protein database. In his manipulations, consecutive obtaining of ground wheat grain results in the next protein types:

1. albumin (water soluble; other than egg or milk albumin)
2. globulins (salt-soluble, insoluble in water)
3. gluten, or gluten (consisting of gliadin and glutelin, water and salt-soluble proteins wheat)

4. Gluten can be divided into:
5. gliadins (28-42%; the main prolamin protein in wheat, soluble in 70-90% alcohol)
6. glutenins (42-62.5%; the main glutelin proteins in wheat, soluble in weak acidic or alkaline solutions) [28].

Because of gluten components, for example, such as: gliadin, glutenin, albumin and globulin, wheat flour products have unique scalability and high technological properties. To isolate albumins, the crushed plant material is extracted in the cold with water, the solution is centrifuged and dialyzed against distilled water. Albumin remains in solution. Albumins a relatively low molecular weight; many of them were obtained in crystalline state. They are detected in almost all plant tissues.

Gluten is a protein constituent element of cereal gluten. Wheat flour include from 7 to 12% gluten proteins by weight. The gluten proteins are high the content of proline and glutamine, and belong to prolamines. Cereal prolamins have no other known functions other than stock protein functions. Gluten is a compound that is segment of the protein of wheat, barley, rye and most other cereal crops. The high-level gluten is hold in flour, the easier it is to make dough that get into air baking. Gluten content in premium wheat is up to 30%. The hype around gluten is mostly artificially heated the presence of a specific condition-celiac enteropathy (celiac disease). It a kind of birth defect, an abnormality in the genes that encodes a deficiency of enzymes, helping in the absorption of gluten in the intestines Gliadins soluble in a 70% ethanol solution of one wheat grain may be divided into pending 50 components and are a heterogeneous mixture of one chain polypeptides. Gliadins are divided into 4types, in decreasing order of activity during electrophoresis in an acidic medium: alpha, beta, gamma and omega gliadins.

Wheat developing within the southeast is wealthiest in protein compared to wheat developed within the northern and western locales. An expansive sum of precipitation amid the aging period of the grain leads to a diminish within the relative protein content. In addition, other factors acting both during the growing season and in the post-harvest period significantly affect the protein and gluten content. Grain quality deteriorates significantly when plants are affected by diseases, damage by a bug-bug and in adverse weather conditions (alternating rains and droughts immediately before harvesting). There is a significant decrease in the content of gluten and protein with an increase in the drying temperature of wet grain.

In the agricultural industry, gamma radiation is used to increase the protein level in mildew and other cereals. At the beginning to understanding of the main action of irradiation on proteins therefore need an comprehension of the reactions in by amino acids following irradiation in the presence of water, including the abstraction of hydrogen atoms, reductive deamination, disproportionation, decarboxylation, and reactions between the intermediates formed with the highly reactive products of water radiolysis. In addition, radicals formed by the irradiation process are comparatively still and are thus much more prone to recombination, as opposed to reaction with other components of the food matrix. Degradation of proteins to smaller polypeptides can occur as a result of the splitting of carbon-nitrogen bonds and disulfide bridges. Conversely, globular proteins irradiated in solution may undergo aggregation reactions, producing higher relative molecular mass proteins and thus solutions of higher viscosity. [11]

The presented enzymes in wheat plant are completely stable on irradiation. There is some evidence to show that radiation damage to the amino acids in proteins is quite limited, little change in amino acid composition generally being observed at doses below 50 kGy.

Materials and methods

Grains of spring bread wheat variety Zhenis (*T. aestivum* L.) were irradiated with 100 and 200 Gy doses. After harvesting the M5 mutant wheat, 6 lines from the native 100 Gy radiation dose were chosen. Zhenis mutant 12 lines were selected from the 100-Gy radiation and 200-Gy

radiation dose and these were numbered: 13(3), 18(5), 24(2), 25 (2), 26(10), 30(1), 43(4), 45(1), 48(3), 49(2), 51(2), 53(2).

Developed by irradiation treatment samples of grains of each mutant lines of local spring wheat Zhenis, estimated based on the following yield parameters: grain weight per plant (GWP), grain number per main spike (GNS) and grain weight per main spike (GWS). 1000-grain weight (TGW) was calculated as the mean weight of three sets of 100 grains per line, as well as compared to the parental variety. The genotypes with the highest quality were chosen according to their elements of yield.

The near-infrared reflectance (NIR) using proprietary calibration software provided (Zeltex Hagerstown, MA, USA) was used to determination grain protein content. Three repeating were done using 25 grains per line.

Samples of grain (100- and 200- Gy dosed M5 mutant lines and initial varieties of cv.Zhenis) were washed with sodium dodecyl sulfate (0.1%), rinsed in deionized water, dried to a constant weight at 65-70°C and after ground with a mixer mill. The 0.2g of sample was digested with a mixture of nitric acid (65% HNO₃, analytical grade) and hydrogen peroxide (30% H₂O₂) (5:1, v/v) using digestion. Samples digestion was done using the following temperature regime: heating to 70°C for 40 min, 90°C for 45 min, 130°C for 3 hours, 150°C for 1 hour, cooling and then waiting until 25°C was reached. The sample was diluted to 20 mL with twice-distilled water. By using atomic absorption spectroscopy (Analytic Jena, NovAA350, Germany) iron and zinc concentration data were analyzed also was using flame. Measurements of mineral nutrients were checked against the certified reference values from the State standard samples diluted by 0.3% HNO₃. Three extract and analysis repetitions were performed.

The determined data was calculated in format Microsoft Office Excel, which contains statistical information about Fe and Zn concentration, results of grain protein content in 100 Gy and 200 Gy mutant lines of spring wheat Zhenis and parent cv.Zhenis, which calculated by analysis of variance.

Results and discussion

Mutant lines of spring common wheat indicate considerable modification in a means of grain weight per main spike; grain weight per plant, thousand grain weight (Table1). The Grain number per main spike of 100 Gy-dosed M5 mutant lines rank from 27.53 up to 47.14 with an average mean of 39.29 ± 9.11 (n=6). The Table1 illustrated that differentiate to parental line and o100 Gy-dose M5 mutant lines, the mutant lines were recognize as possessing considerable high Grain number per main spike. The estimated figures for 200 dosed M5 mutant lines specify upper results than 100 Gy-dosed M5 mutant lines. Based on data calculations 200 Gy-dosed M5 mutant lines ranged from 31.82 up to 52.57 with an average mean 44.58 ± 6.61 (n=6).

These results show that Grain number per main spike of 200 Gy-dosed M5 mutant lines considerably upper than 100 Gy-dosed M5 mutant lines. The both mutant lines get the highest Grain number per main spike than the parent variety which shows thw effectiveness of radiation.

The next table column specifies the results of Grain weight per main spike of mutant lines and parent variety. The table illustrated that only 3 mutant lines have haiger results of Grain weight per main spike. The mutant line 13(3) exceeds the result by 9 %, the next mutant line 25(2) by 28% and the last line 26(10) by 30%.

Regarding the matching 200 Gy mutant lines and cv. Zhenis, there are five mutant lines of six indicate the uppermost result than parent cv. Zhenis. The calculations demonstrate that on average they exceed by 25%. Only one line 30(1) have less result by 20% than parent line. After analyzing the statistical data express that 200 Gy mutant lines show considerably high results. (Fig 4)

The third column of table give the information about Grain weight per plant of parent line and two mutant lines. Actually, parent cv. Zhenis's Grain weight per plant is 2.25 ± 0.81 . So, in comparison we can see that in 100 Gy-dosed M5 mutant lines 33% of lines prove the upper results. They exceed parent line by 225%. As to other 77% of line, they exceed parent line by 20%. Concerning 200 Gy-dosed M5 mutant lines, there are 77% show highest result and 33% show less consequence.

The last comparison object is 1000-grainweight of parent and mutant lines. The 1000-grainweight of parent cv. Zhenis is 38.08 ± 3.67 . In table demonstrated that both mutant lines show high results. The result of 100 Gy-dosed M5 mutant lines ranged from 40.37 to 51.69 and exceed by 14%. The 200 Gy-dosed M5 mutant lines ranged from 34.92 to 74.65 and exceed by 22%.

Table 1 – Comparing yield-associated traits of advanced spring wheat M₅ mutant lines developed using 100 Gy and 200 Gy and the parent cv. Zhenis.

Genotypes/ Mutant	Grain number per main spike	Grain weight per main spike, g	Grain weight per plant, g	1000-grain weight, g
cv. Zhenis	40.64 ± 9.27	1.57 ± 0.44	2.25 ± 0.81	38.08 ± 3.67
100 Gy-dosed M ₅ mutant lines				
13(3)	38.06 ± 11.09	1.71 ± 0.40	2.59 ± 0.83	41.02 ± 1.36
18(5)	34.02 ± 8.19	1.36 ± 0.57	$7.39 \pm 3.90^{***}$	39.69 ± 1.85
24(2)	43.86 ± 12.94	1.32 ± 0.30	2.64 ± 0.86	$51.69 \pm 1.58^{***}$
Continuous of table 1.				
25(2)	45.00 ± 6.71	2.02 ± 0.37	$7.23 \pm 1.30^{***}$	40.37 ± 1.01
26(10)	47.14 ± 5.64	2.04 ± 0.29	3.67 ± 1.61	42.64 ± 0.26
30(1)	27.53 ± 10.09	1.17 ± 0.45	1.87 ± 0.62	44.65 ± 2.25
200 Gy-dosed M ₅ mutant lines				
43(4)	45.36 ± 4.48	1.63 ± 0.32	2.01 ± 0.34	$74.65 \pm 1.62^{***}$
45(1)	37.33 ± 6.22	1.93 ± 0.25	$5.01 \pm 0.28^{**}$	39.43 ± 1.59
48(3)	52.57 ± 5.88	2.10 ± 0.26	$5.73 \pm 1.45^{**}$	42.41 ± 0.46
49(2)	52.33 ± 9.93	2.25 ± 0.47	$8.91 \pm 2.19^{***}$	44.23 ± 3.29
51(8)	48.11 ± 6.23	1.93 ± 0.28	$8.99 \pm 1.69^{***}$	41.71 ± 2.01
53(2)	31.82 ± 6.93	1.27 ± 0.36	1.90 ± 0.63	34.92 ± 4.73
*, **, and *** denote significance at 0.05, 0.01, and 0.001 probability levels, respectively. The lines are significantly different from parent line.				

Analysis of the mutant wheat Fe and Zn concentration

The radiation influence to the on the gas exchange components particularly photosynthesis, carbon, and nitrogen assimilation efficiency and the plant uptake of mineral nutrients.

In Fig 1 illustrated the comparison of 100 Gy mutant lines of spring wheat Zhenis and parent line. The result of iron concentration ranged from 27.63 up to 86.14 mg/kg with an average mean of $54.09 (n=6)$. The highest result was given by line 18(5) is 86.14 mg/kg. The smallest result showed line 30(1) by 27.63 mg/kg. Compared with parent line cv. Zhenis which is showed 34.82 mg/kg, the 100 Gy mutant lines demonstrated highest result by 55%, and line 18(5) showed better result by 174%.

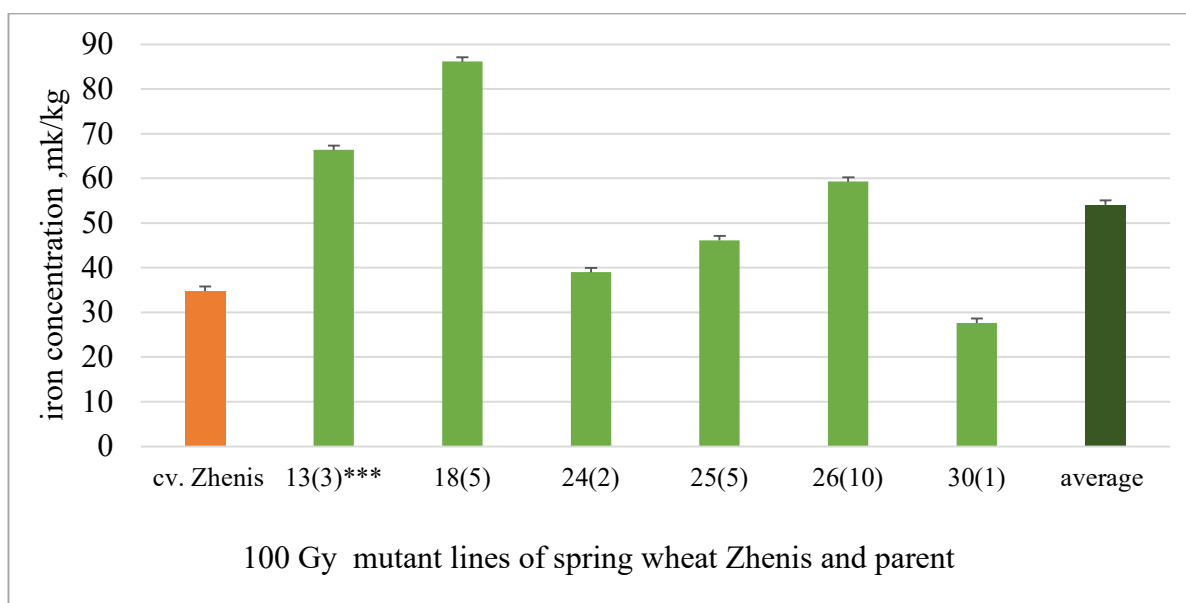


Figure 1. Iron concentration of 100 Gy M5 mutant lines of spring wheat Zhenis

As for 200 Gy mutant lines of spring wheat Zhenis which is demonstrated in graphic Fig 2 the iron concentration ranged from 35.15 up to 119.88 mg/kg with an average mean of 77.80 (n=6). Regarding the highest point of rise is to 119.88 mg/kg of line mutant line 45(2). The calculations show that this result above parent line by 244%. The smallest index in graphic is line 43(4)-35.15 highest parent line by 1%. The 200 Gy mutant lines of spring wheat Zhenis show better result than parent wheat by 106%. It is important to note that after comparing both mutant lines, 200 Gy mutant lines of spring wheat Zhenis showed the better result than the first one by 46%. Gamma radiation had significant effect on final germination percentage.

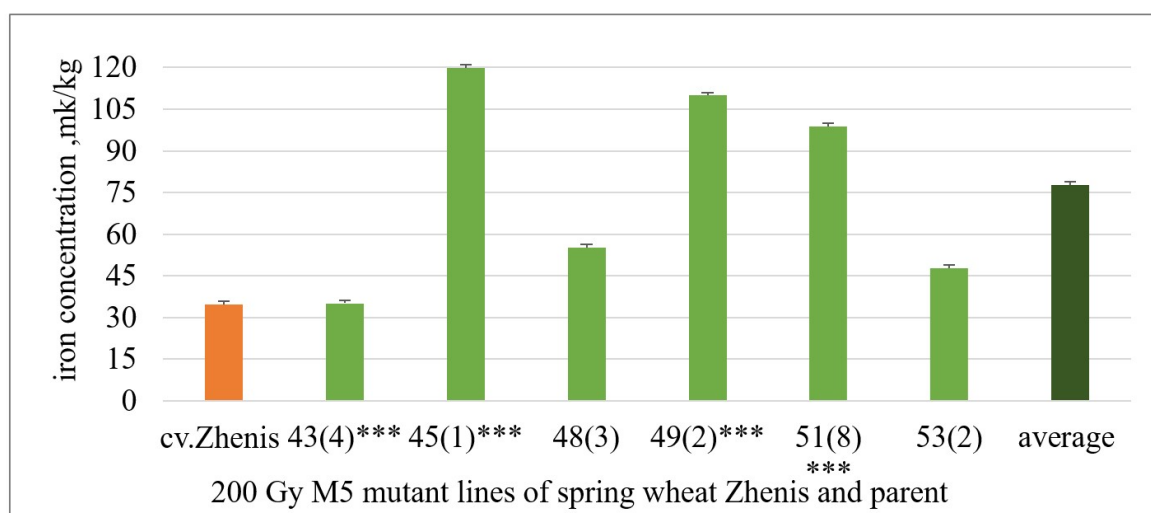


Figure 2. Iron concentration of 200 Gy M5 mutant lines of spring wheat Zhenis.

The evidence submitted in two graphics demonstrated the degree of Zn concentration after influence of 100 and 200 gamma irradiation on the wheat grains. The observation of mutant lines (n = 6) for Zn concentration indicates large alteration in this grain quality criterion. The level of Zn in 100 Gy mutant lines of spring wheat Zhenis vary from 27.64 (89%) to 82.17 (164%) mg/kg with an average mean of 44.7 mg/kg. We infer that five M5 mutant lines of which five lines were from 100 Gy treatment have significantly supreme Zn concentration than that of the parent

grade. The results demonstrated that wheat was exposed to gamma irradiation 100 Gy exhibited magnification of Zn by 44% than parent line.

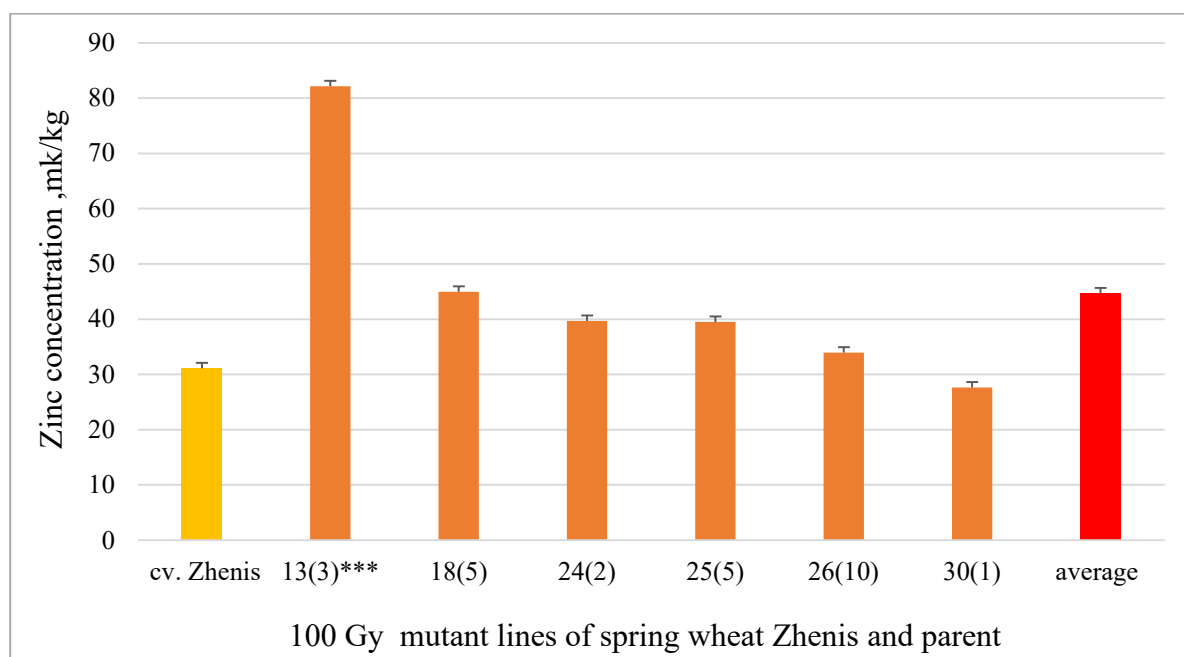


Figure 3. Zinc concentration of 100 Gy M5 mutant lines of spring wheat Zhenis

Concerning 200 Gy mutant lines of spring wheat Zhenis, there are results varied from 17.9(58%) to 88.87(164%) mg/kg with a mean of 62.9 mg/kg. The most effect of 200 Gy gamma radiation show the line 13(3)-88.87 mg/kg (186%) and the smallest result was in line 30(1)-17.9 mg/kg (58%). We have every reason to believe that five lines demonstrate great result after 200 gamma radiations by 102%.

The results of comparison of mutant lines with significantly enhanced grain Zn concentrations pointed out that 6 lines of 100- and 200-Gy-gamma-irradiated M5 had concomitant increase Zn. (Figures 3 and 4).

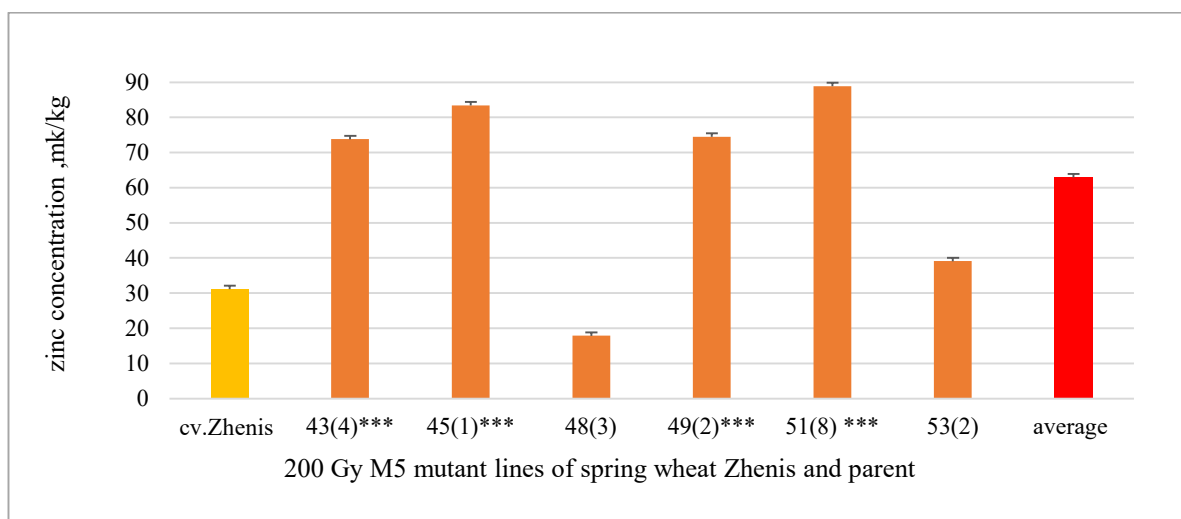


Figure 4. Zn concentration of 200 Gy M5 mutant lines of spring wheat Zhenis.

Since in some mutant lines we get the smallest result of the concentration of trace elements compared to the parent line, we can assume that the material was damaged. Damage of the genetic material happen as an effect of a direct collision between the radiation energy and the

genetic material. Also, it can be effect of the radiation ionizing a neighboring molecule, which can react with the genetic material. The defeat may be a break in a single strand of the DNA or electron can break both strands on the DNA. As for the other results, they also appeared by exposure to gamma radiation. Zinc and Fe deficiency can lead to impairment of the immune system, physical growth retardation, and reproductive health etc.5–7. Wheat is the primary food in many nations of the world and make available the needful calories and biological compounds. However, its micronutrient content is particularly low (e.g., Zn about 20–40 mgkg⁻¹). for this reason, it is important to artificially increase zinc levels using gamma radiation and make comparative studies to identify the best mutant lines. Deficiency of Zn and Fe is a well-documented public health issue especially in the developing world, affecting for most of the population around the globe particularly young people and pregnant women.

Analysis of the mutant wheat grain protein content

It is known that plant productivity depends on their ability to respond quickly and adapt to the effects of stress. The reaction of plants to stress, against the background of the general tendency of inhibition synthesis of normal proteins and amplification - stress, depends on the parameters of the negative impact, and namely: its duration, range, intensity, etc.

We plotted data from the pooled chemical analysis of grain to show the range of values generated by the radiation treatments. Below illustrated two graphics (Fig 5 and Fig 6) which contain comparative information about grain protein content in 100 Gy and 200 Gy mutant lines of spring wheat Zhenis with parent cv. Zhenis. The Grain protein content for the pooled data showed considerable variation from 13.23 to 15.10%, with an average mean of 13.81%. Five genotypes (83.3%), mainly in the 100-Gy-dosed treatment higher grain protein content than the parent line. (n = 6) (Figure 5). No significantly low result show only one line 26(10) by 13.23%. The highest effect of treatment shows the line 13(3) by the result 15.10%. A comparison with parent cv.Zhenis and mutant genotypes , which were from the 100-Gy treatment show significantly differences by 1.03 times.

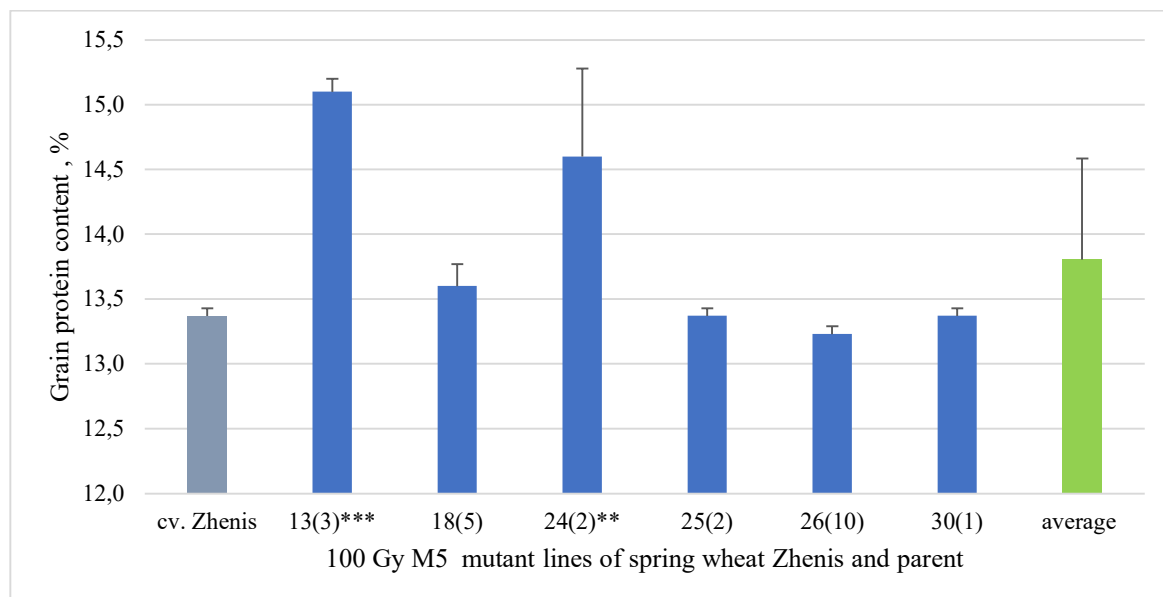


Figure 5. Comparison of Grain protein content of 100 Gy M5 mutant lines of spring wheat Zhenis with parent line

Data presented in figure 6 illustrate the effect of 200 gamma irradiation on wheat gains of six different genotypes by considerable variation from 13.40 to 14.87%, with an average mean of

13.78%. Significantly high result shows the mutant line 24(2) by 1.1 time than parent line cv. Zhenis. Five genotypes (83.3%), mainly in the 200-Gy-dosed treatment higher grain protein content than the parent line. (n = 6) The highest effect on 200 GY treatment show the line 53(2) by the result 14.87%. One mutant line which were from the 200-Gy treatment, had the same result with the parent line 13.37%.

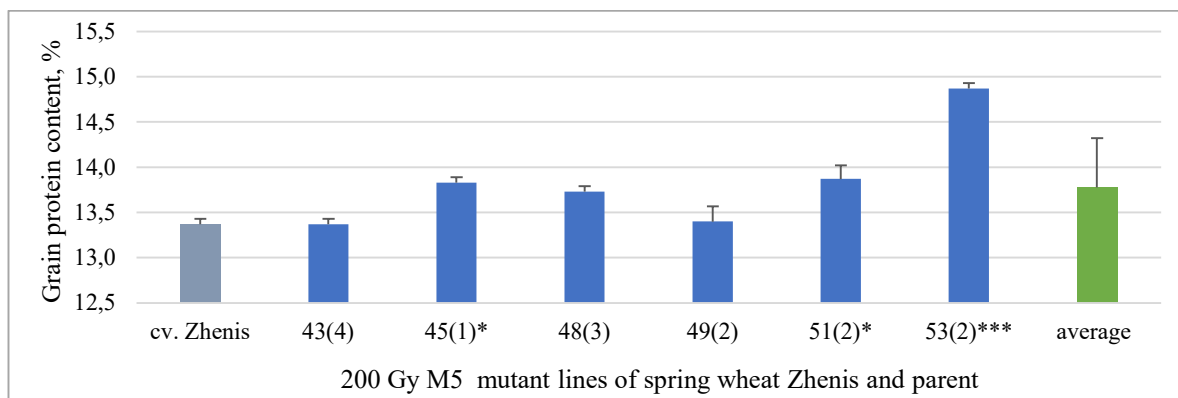


Figure 6. Comparison of Grain protein content of 200 Gy M5 mutant lines of spring wheat Zhenis with parent line

Accordingly, the results of a M5 analyzing research of mutant lines of spring wheat of the Zhenis cultivar for grain protein content demonstrated that applying a dose of 200 Gy gamma treatment is more successful for causing mutations in grain protein content in than dose of 100 Gy radiation treatment. in a higher frequency of samples having a significantly increased grain protein content than in the original parent variety. The results of our research admitted us to bring that the characteristic of grain protein content can be genetically developed on the basis of mutational selection by using gamma radiation. The mutability in grain protein content in mutant germplasm is mostly dose-gamma-dependent. The 100 Gy dose of gamma radiation have large rate cause positive changes in the grain protein content on the genetic basis of the spring wheat variety Zhenis.

CONCLUSION

The research shows that different doses of gamma radiation treatment have various effects on biochemical plant characteristics, such as of grain protein content, stimulation of increasing or decreasing life important chemical elements such us iron and zinc. It is important to note that this technique can be used increasing or the development of a mutant with an environmental stress tolerance quality. Recent studies have convincingly shown that the use of the most modern methods opens up great opportunities for progress in breeding and the radical improvement of cultivated plants.

1. Mutant wheat productivity. Gamma irradiation effects on the stimulating conditions and growth parameters such as modification in a means of grain weight per main spike; grain weight per plant, thousand grain weight have been studied by means of morphological and physical methods.

The predictions of the present results clearly illustrated the preeminence of the 200 Gy irradiation dose compared with the other irradiation treatments and parental line in increasing the plant growth.

2. Fe and Zn concentration. The data demonstrated in the present research has shown considerable variation in nutrients Fe and Zn, in new spring wheat mutant lines. The results demonstrated that among these mutant resources a large number of lines have a significantly

higher Zn and Fe concentration than that of the parent which proves the effectiveness of both 100 and 200 Gy gamma radiation.

3. Grain protein content. Gamma irradiation effects on the grain protein content's results clearly illustrated the preeminence of the 100 Gy irradiation dose compared with the other irradiation treatments and parental line in increasing the plant growth. In fact, grain protein is a sink for Zn and Fe.

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PETase enzyme

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Polyethylene terephthalate is one of the most popular types of plastic and is used to make beverage containers and man-made fiber. Researchers are therefore looking for ways to recycle PET without harming the environment. In 2016, Japanese microbiologists examining soil near a PET plant found the bacterium *Ideonella sakaiensis* (now renamed *Piscinibacter sakaiensis* 201-F6), which hydrolyzes it. Using special enzymes, the microorganism breaks down PET into low-toxic terephthalic acid and ethylene glycol. In six weeks, the bacteria were able to process the 0.2-millimeter-thick polymer film.

One of the enzymes of *I. sakaiensis*, PETase, "triggers" the PET degradation process and cleaves the polymer into monomeric links.

PETase belongs to the α/β -hydrolase superfamily with highly conserved structures including a central twisted β -sheet ($\alpha 3$) formed by 9 mixed β strands and surrounded by seven α -helices and a Gly-X-Ser-X-Gly motif. Ser160, Asp206 and His237 form a catalytic triad, and two disulfide bonds (C203-C239 and C237-C289) were also identified. Site-directed mutation analysis revealed that D51, W156, S185 and Y58 may play a crucial role in PET degradation [1]. Moreover, W156 residues adjacent to the active site have different conformations, including "A", "B" and "C" conformers, which are important for substrate binding and product release. Interestingly, the enzyme-substrate interactions of PETase are largely identical to those of ICCG, with the most notable change being that the aromatic component of the two bound ligands deviates by about 30° [2].

PETase active site. PETase degrades PET into monomers such as bis(2-hydroxyethyl)terephthalate (BHET), mono(2-hydroxyethyl)terephthalate (MHET), and terephthalic acid (TPA). PETase also hydrolyzes BHET, which is a monomer that has similarity to the basic structure of PET and is widely used to study PET. BHET is hydrolyzed by PETase to MHET without further degradation [3]. In the active center of PETase, the three residues Ser160, His237 and Asp206 form a catalytic triad and it is suggested that Ser160 acts as a covalent nucleophile towards the carbonyl carbon atom in the cleaved ester bond as in other carboxylesterases. The oxyanion of the tetrahedral intermediate is stabilized by an oxyanion hole consisting of the nitrogen atoms of Tyr87 and Met160 with distances of 2.90 and 2.83 Å, respectively. The substrate binding site is modeled as a long shallow L-shaped slot on a flat surface with dimensions of approximately 25 and 29 Å. The surface of the substrate-binding slit is predominantly hydrophobic and the length of the slit is ~40 Å. Based on the cut ester bond 2-HE(MHET)₄, the substrate binding site can be divided into two subsites: subsite I and subsite II, where one and three MHET fragments are bound, respectively. For the binding of the first MHET fragment in subsite I, the benzene ring is located in a recess between two aromatic residues Tyr87 and Trp185. π - π - interactions between Trp185 and the benzene ring of the first MHET fragment at a distance of ~3.6 Å, make a major contribution to ligand stabilization. Met161 and Ile208 are expected to contribute to the binding of the first MHET by providing a hydrophobic surface downstream and lateral to subsite I, respectively. Subsite II tends to form a longer and shallower cleft than subsite I and accommodates three MHET fragments (the second, third and fourth MHET 2-HE(MHET)₄ fragments). Depending

on MHET binding, subsite II is further subdivided into three parts: subsites IIa, IIb, and IIc. Sub-site II consists of residues including Thr88, Ala89, Trp159, Ile232, Asn233, Ser236, Ser238, Asn241, Asn244, Ser245, Asn246 and Arg280. Although the interaction between subsite II and the three MHET fragments is mainly mediated by hydrophobic interactions, the carbonyl oxygen atoms in the fourth MHET fragment also form polar interactions with the Ser236 main chain and the Asn246 side chain in subsite IIc. Arg280 is located at the end of subsite IIc, and this residue appears to interfere with substrate binding site extension because of its positive charge and slightly protruding structure. Arg280 at the end of sub-site IIc is a polar residue and has a protruding shape that appears to prevent stable binding of the PET substrate beyond the fourth fragment. Scientists hypothesize that replacing Arg280 with a small hydrophobic residue may allow for more stable binding of the longer substrate, subsequently leading to an increase in PETase activity [4].

PET degradation mechanism by PETase. The researchers propose the following process for PET degradation. To initiate the degradation of PET, PETase secreted by the bacterium first binds to the surface of PET using its flat hydrophobic surface that has a slot for substrate binding [4, p. 387].

The degradation process of PET can be divided into two steps [4, p. 387]:

- notch formation stage;
- terminal cleavage stage.

In the notch formation step, four MHET fragments bind to each subsite (one MHET fragment to subsite I and three MHET fragments to subsite II), and the cut ether bond appears to be located between subsites I and II near the catalytic Ser160 residue. The breakage of one ester bond then leads to the formation of a gap in PET, resulting in the formation of two PET chains with different ends: a TRA-termini released from subsite I and a HE-termini released from subsite II [4, p. 387].

In the terminal cleavage step, the two PET chains having HE- and TPA-termini are digested to MHET monomers in slightly different ways. For cleavage of HE-terminal PET ($^{\text{HE}}\text{PET}$), terminal MHET and the following three MHET fragments bind to sub-site I and sub-site II, respectively, and breaking the ester linkage results in a single MHET monomer and $^{\text{HE}}\text{PET}_{n-1}$. Subsequent cleavage of $^{\text{HE}}\text{PET}_{n-1}$ is expected to proceed similarly to the first cleavage process. Digestion of TPA-terminal PET ($^{\text{TPA}}\text{PET}$) is expected to occur by positioning the terminal TPA and the following three MHET fragments in sub-site I and sub-site II, respectively. Cleavage of the ester linkage appears to result in the formation of a single molecule of TPA and $^{\text{HE}}\text{PET}_{n-1}$, and this $^{\text{HE}}\text{PET}_{n-1}$ undergoes subsequent cleavage as observed in the degradation of $^{\text{HE}}\text{PET}$. Alternatively, $^{\text{HE}}\text{PET}$ and $^{\text{TPA}}\text{PET}$ can also be cleaved by binding of the polymer chains of PET and the enzyme in the reverse direction, although this type of cleavage may be less efficient than the above cleavage. In this case, one or two MHET fragments may bind to subsite II instead of three MHET fragments. These bindings can produce various PET monomers and dimers such as 2-HE(MHET)₂, (MHET)₂, MHET and BHET, which are eventually cleaved to MHET, TPA and EG. Continuous cleavage of $^{\text{HE}}\text{PET}$ and $^{\text{TPA}}\text{PET}$ proceeds combinatorially as described above, resulting in the accumulation of four molecules including MHET, TPA, BHET and EG. BHET can be further degraded into MHET and EG, and finally, PET degradation results in the accumulation of three molecules, MHET, TPA and EG [4, p. 387]. In addition, it is worth noting that PET degradation by PETase accumulates a significant amount of TPA, although PETase cannot hydrolyze MHET to TPA and EG [5]. Based on the PET degradation process proposed here, it can also be concluded that the accumulation of TPA from PET film degradation mainly occurs in the final step of $^{\text{TPA}}\text{PET}$ degradation [4, p. 387].

Future possibilities. The discovery of PETase provides a pathway for the development of biodegradation technology for synthetic polymers. Improving the enzyme so that it can degrade a higher degree of crystallinity of PET and in a shorter time may also be a promising direction. There are still many problems and unexplored issues related to PETase, but with a deeper understanding

of its molecular mechanism, many more applications can be foreseen and related useful enzymes can be identified.

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ISOLATION AND USE OF STARTER CULTURES FOR FERMENTED MILK DRINKS

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Abstract: The article provides data on the isolation and use of starter cultures for fermented milk drinks, as well as the results of obtaining a pure yeast culture, which was later used in the composition of the starter culture for a fermented milk drink such as kumis.

Key words: starter culture, technological properties, dairy products, fermented milk drinks, titratable acidity, viscosity, healthy nutrition, kumis production.

In the developed countries of the world, the issues of a healthy lifestyle, including a healthy diet, have been elevated to the rank of state policy. One of the products of a healthy diet is milk and dairy products.

The dairy industry of Kazakhstan is one of the most dynamic and competitive in the republic's market.

The first detailed description of the preparation of koumiss, its taste and effect on the human body is found in the Frenchman William Rubricas, who traveled in 1253 through the territory of modern Tatarstan. In his notes, Rubrika emphasized the intoxicating and diuretic effect of the drink. There is also a mention of koumiss by the Italian traveler Marco Polo (1254-1323), who called it a favorite drink of the Tatars and compared koumiss with "white wine", noting its peculiar taste qualities [1, p. 352].

Natural koumiss contains all the vital human nutrition elements [2, p. 380].

The production of koumiss is based on the fermentation of milk sugar caused by enzymes of lactic acid bacteria and yeast [3, p. 580].

It has long been known that the medicinal properties of koumiss cannot be compared with any medicinal product or mineral waters. Natural koumiss contains all the necessary elements of nutrition for a person [4, p. 303].

Its effect on the body is universal and is characterized by a complete absence of complications. Koumiss has been successfully used in combination with antibiotics to prevent and treat pulmonary, bone and kidney tuberculosis, gastrointestinal and cardiovascular diseases, diseases of the nervous system and general exhaustion.

Researchers have found that koumiss stimulates gastric secretion, improves pancreatic

function, digestion, absorption of nutrients in the intestine, bile secretion; has a tonic, restorative effect, normalizes overall metabolism. Natural koumiss is made only from mare's milk. But it is economically unprofitable to put it on an industrial basis due to insufficient volumes of raw materials for these purposes. As a result, drinks such as koumiss are produced from camel, goat and cow's milk. Moreover, using the latter type of raw material, it is possible to solve the above problem. In addition, koumiss from cow's milk is close to natural in its composition, organoleptic and physico-chemical parameters, and surpasses it in terms of the content of individual vitamins and essential amino acids. The protein in this dairy product is in the form of small flakes and is therefore well absorbed by the body. In addition, scientific and clinical studies have convincingly shown that koumiss from cow's milk has the same medicinal properties as koumiss from mare's milk. Therefore, the production of koumiss from cow's milk is economically profitable.

Based on the research of these authors, it was decided to add yeast of the genus *Torulopsis* for our future fermented milk drink, which we isolated from natural koumiss in the laboratory of the Republican Collection of Microorganisms of the RSE National Center of Biotechnology of the Republic of Kazakhstan.

To isolate pure yeast cultures from the studied koumiss sample, nutrient media were prepared: Chapeka-Doxa, Saburo medium (liquid and solid). The composition of the Capek-Dox nutrient medium is shown in the table (Table 1).

Table 1

The composition of the Cape-Dara nutrient medium (gel 300 ml)

NaNO ₃	K ₂ HPO ₄	KCl	MgSO ₄	FeSO ₄	Sucrose
9	3	1,5	0,6	traces	9

Preparation of nutrient media. The amount of powder (21.75 g) required to prepare 300 ml of Saburo medium was determined at the rate of 72.5 g of powder per 1 liter of medium.

Media is placed in the flask, distilled water is added: for the Chapek-Doks medium – 300ml, for the Saburo medium (solid) – 300ml, for the Saburo medium (liquid) – 120 ml. The mixture is mixed well until smooth and heated on a plate to melt the agar. Then the media is autoclaved for 55 minutes. Petri dishes are also sterilized in a dry-burning cabinet SHS 80-01 SPU.

Saburo medium (liquid) is poured 5 ml into 20 test tubes and also sterilized for 15 minutes at a temperature of 121°C (1 atm.).

Sowing the sample on a nutrient medium. The kumiss sample was sown into the Saburo nutrient medium in a special box. 100 ml of koumiss is taken with a sterile dispenser and placed in a liquid Saburo medium (three parallel crops). In the presence of growth of colonies of microorganisms in a liquid medium, Saburo is sown on a solid one. By firing the tube and stopper on the burner flame, the tubes are mixed until homogeneous and sent for cultivation.

Cultivation is carried out in a thermostat with a temperature of 28-30 °C for 48 hours. For control, test tubes with a sterile Saburo medium are placed in the thermostat.

After 48 hours, a change in the environment is noted in the test tubes: turbidity and formation of biomass at the bottom of the test tube, which indicates the growth of microorganisms (Figure. 1).



Figure 1. Growth of microorganisms during sowing in a liquid medium of Saburo

As can be seen from Figure 3.16, microbial growth is observed in three tubes with Coombs sample crops; the 4th tube (control, without sowing) remained transparent.

The following pattern could be observed in the preparation from the Saburo liquid medium (Figure. 2).

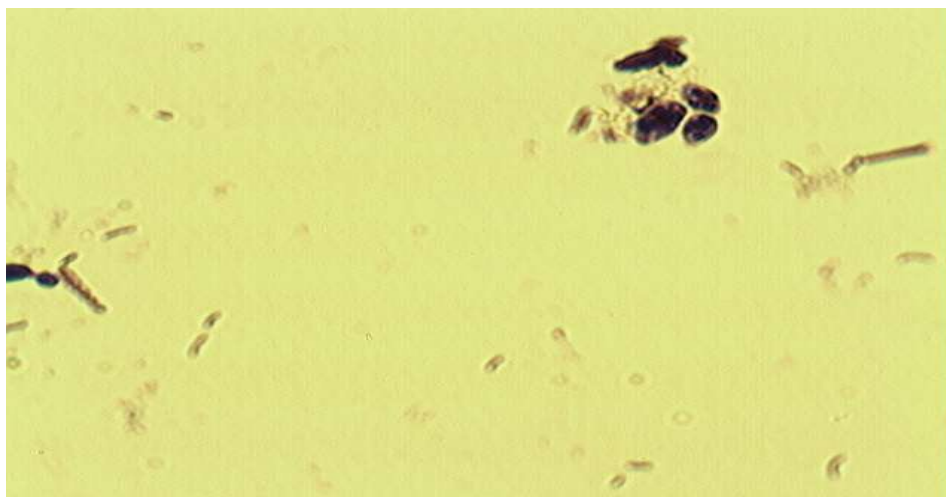


Figure 2. A smear from biomass grown on a liquid Saburo medium

Figure 3.17 shows that in the Saburo liquid medium, along with yeast, other types of microorganisms grow.

At the next stage, tubes with signs of microbial growth are seeded on a solid Saburo Gold medium. To do this, the test tube is mixed well, the culture medium is taken with a sterile bacterial loop and seeded into a solid Saburo medium. The crops are grown in a thermostat for 24 hours at a temperature of 28°C.

The grown colonies were white and gray in color. Microscopy of preparations prepared from gray colonies revealed the presence of mixed cultures (Figure. 3); only yeast is present in white colonies (Figure 4).

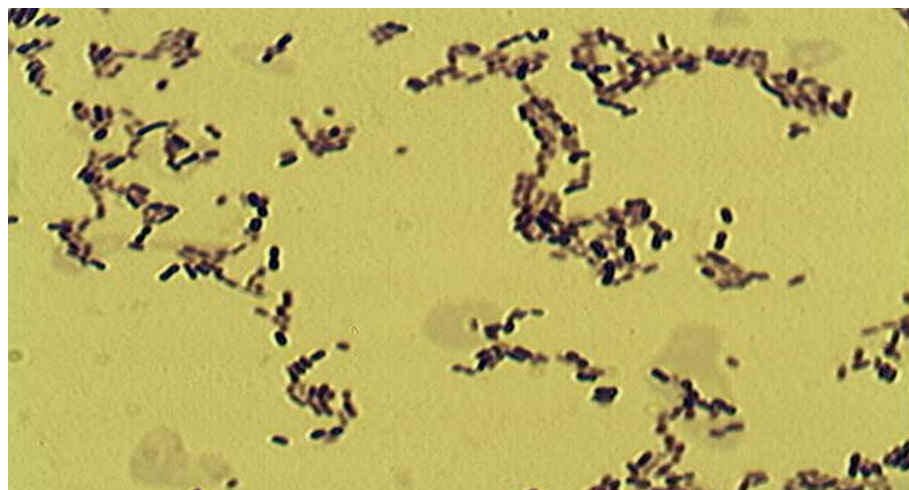


Figure 3. A smear of gray colonies grown on a solid Saburo medium

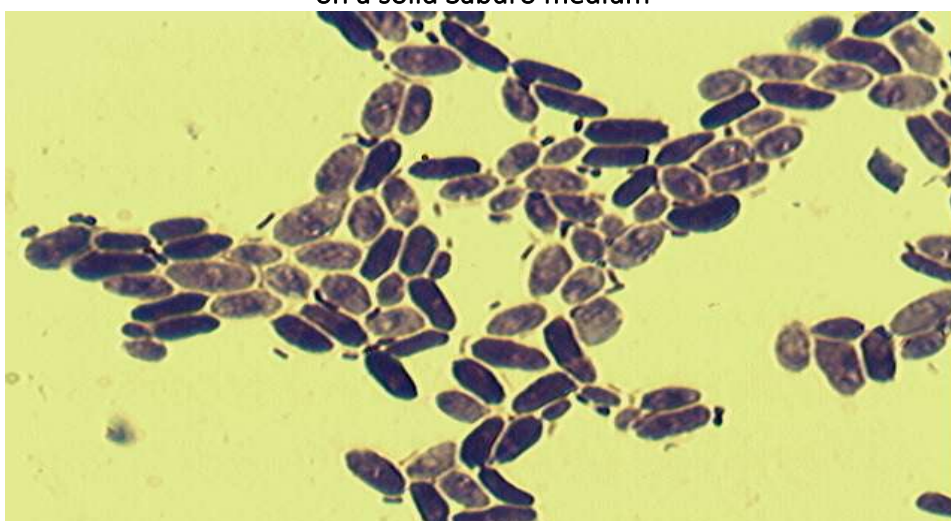


Figure 4. A smear of white colonies grown on a solid Saburo medium

To isolate a pure yeast culture, repeated sowing is performed. The culture in sterile conditions is again transplanted into a solid Saburo medium and the crops are thermostated at a temperature of 28°C for 48 hours.

A microscopic preparation prepared from repeated sowing (Figure 5) showed the presence of pure yeast cultures.

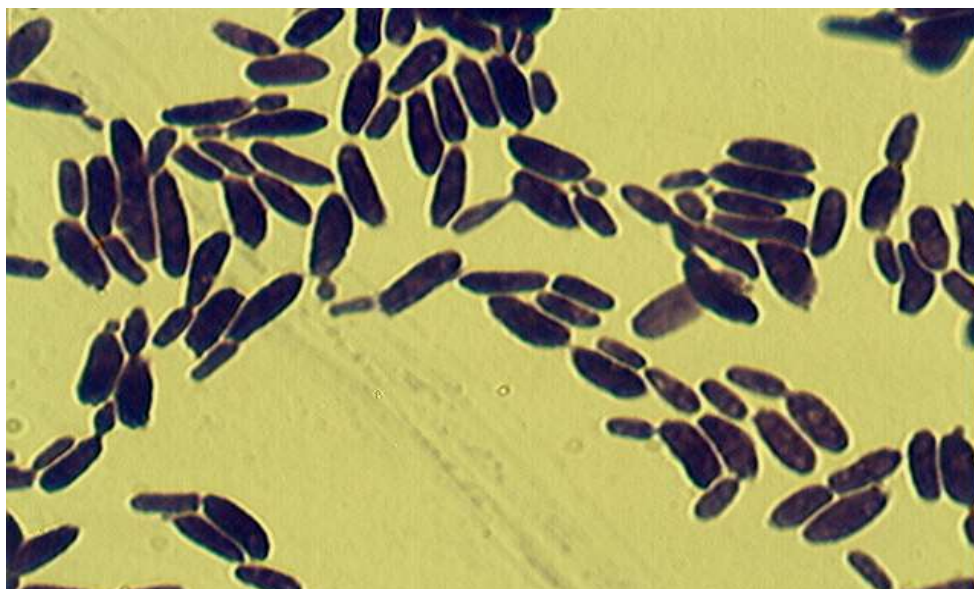


Figure 5. Smear of yeast culture grown on a solid Saburo medium

Thus, a pure culture of yeast was obtained, classified according to cultural and morphological characteristics to the genus *Torulopsis*, which was later used as part of a starter culture for a fermented milk drink of the koumiss type.

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Medical Sciences

ПРОБЛЕМЫ ПРЕПОДАВАНИЯ ТРАДИЦИОННОЙ АНАТОМИИ В МЕДИЦИНСКИХ УНИВЕРСИТЕТАХ

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Одной из не решенных проблем в преподавании анатомии в Казахстане является обеспечение учебного процесса трупным материалом.

Эта проблема существует во всем мире, особенно в постсоветских странах и формулируется в специальной литературе как «кризис в преподавании традиционной анатомии» (журнал «Anatomical Sciences Education»).

В настоящее время испытывают значительный дефицит трупного материала кафедры анатомии не только в Казахстане, но и во многих университетах стран Азии [1, 2], Африки [3], Южной Америки [4, 5] и Европы [6].

Эта проблема связана как с особенностями законодательств разных стран, так и этическими, религиозными и правовыми нормами.

После приобретения Казахстаном независимости и вступления во все международные конвенции по правам человека, судебные морги и прозектуры категорически отказывают в передаче трупов и трупного материала для учебного процесса, так как на трупный материал распространяются те же права, как и на живого человека. В связи с чем, передача трупного материала для учебных, научных целей и трансплантации может быть возможна только при прижизненном нотариальном завещании.

Помимо законодательного несовершенства, проблема обеспечения трупным материалом учебного процесса кафедр анатомии университетов Казахстана, существует и по ряду других причин.

В казахстанском обществе еще не укоренилась практика завещания своих тел или органов для трансплантации, науки или учебного процесса.

К сожалению, менталитет и национальные обычаи, наряду с религиозными убеждениями, культивируют среди населения неприемлемость вскрытия. Изъятие органов считается неуважительным и недостойным отношением к умершему.

В этой связи, появилась настоятельная необходимость законодательного обеспечения возможности получения трупного материала для учебного процесса и научных исследований.

Для решения этой проблемы был предпринят ряд мер – в Закон Республики Казахстан от 07.07. 2006 № 170-З «Об охране здоровья» была включена Статья 35. Анатомический дар.

Основные положения которой сводились к следующему:

1. Анатомический дар осуществляется завещателем посредством надлежаще оформленного нотариального завещания. «Анатомический дар – **добровольное пожертвование** дееспособным лицом тканей и органов как при жизни, так и после его смерти, осуществляемое лицом посредством **надлежаще оформленного договора или завещания** т.е. нотариально».

В последующем, 23 октября 2020 года был издан приказ МЗ РК № ҚР ДСМ-150/2020 «Об утверждении правил и условий совершения и передачи организациям здравоохранения анатомического дара», согласно которому **неопознанные трупы не признаются в качестве анатомического дара** (глава 1, пункт 2).

В качестве анатомического дара, помимо завещанных органов (части органа) и (или) тканей, признается труп лица с установленной личностью, невостребованный для захоронения в течение двадцати дней со дня смерти в медицинской организации.

Очевидно, что в столь длительный срок сохранить трупный материал пригодным для учебного процесса в наших условиях не реально, и такой материал представляет известную опасность, как для технического персонала, так и для студентов. Как показывает наша практика, через 20 дней после смерти труп не пригоден к фиксации и использованию в учебном процессе.

Таким образом, действующее законодательство с одной стороны не запрещает получать трупный материал учебным заведениям, но в то же время ставит такие условия, в рамках которых использование этого материала не представляется возможным.

На все наши официальные и неофициальные обращения судебно-медицинские органы отвечают категорическим отказом, ограждая себя от каких-либо возможных уголовных последствий (которые иногда возникают).

В таком же положении находятся кафедры анатомии других медицинских вузов Казахстана и большинства вузов России.

В связи с этим медицинские университеты вынуждены тщательно сохранять имеющийся запас влажных препаратов, а также, по возможности, закупать за рубежом дорогостоящие пластинированные силиконом анатомические препараты.

Тем не менее, находясь в таких стесненных обстоятельствах, кафедра анатомии прилагают все возможные усилия для обеспечения учебного процесса.

Так, на кафедре хранится и используется большой запас натуральных влажных и костных препаратов, накопленных ранее, а также большой фонд качественных муляжей по всем разделам анатомии.

В трупном хранилище, препараторской, анатомических музеях, а также в каждой учебной комнате хранятся в фиксирующих растворах препараты по всем разделам анатомии, которые комплектуются в соответствии с календарно-тематическим планом. Лаборанты проводят постоянную ревизию влажных препаратов и своевременную смену фиксирующих растворов.

В значительной степени недостаток трупного материала на нашей кафедре восполняют синтетические анатомические модели манекена, производства США, которые служат альтернативой использования человеческих трупов для преподавания анатомии. На таком манекене синтетические ткани отображают живую ткань в лучшем качестве, чем мертвая ткань трупа и имитируют физические свойства живых тканей, благодаря чему студенты имеют возможность изучать строение органов и систем без риска подвергнуться биологическим опасностям.

Преимуществом такого манекена перед обычными муляжами является то, что мышечные ткани и органы, изготовленные из органосиликатного композита, имеют мягкие сухожилия и фасции, полностью артикулирующиеся суставы, функционирующие дыхательную и кровеносную системы.

Так же хорошо зарекомендовали себя интерактивные доски со встроенной аудиосистемой Interactive intelligent panel user manual, имеющие значительные преимущества перед «столом Пирогова».

По мере выхода из экономического кризиса университеты республики стали проводить политику по интеграции в мировое образовательное пространство и поиску дальнейших путей развития для выхода на международный уровень науки и образования. Получив возможность стажироваться в зарубежных университетах и приглашать профессоров из ведущих университетов Европы и США, коллективы кафедр стали активно внедрять современные методы преподавания анатомии, используемые в ведущих университетах мира [6-10].

Для преодоления предубеждения населения к использованию биоматериала в учебных и научных целях очень важно разработать и внедрить специальные социальные и образовательные программы для СМИ, по примеру Израиля и Китая, чтобы люди с пониманием относились к донорству и забору органов у погибших родственников.

Необходимость информированности о важности завещания, добровольности передачи отдельных органов для трансплантации и тел для преподавания анатомии очевидна. Отсутствие программы по завещанию и добровольной передаче тел умерших и активной разъяснительной работы, наряду с религиозными и национальными традициями, является основной причиной негативного отношения населения к патологоанатомической службе, донорству органов и завещанию тел умерших медицинским университетам.

Решение проблемы дефицита биоматериала требует еще много усилий для изменения отношения широких слоев населения Казахстана к завещанию органов и тел умерших, медицинским учебным и научным организациям.

Заключение. Для приближения преподавания анатомии человека к западным стандартам, после вхождения Казахстана в Болонский процесс, медицинские университеты перешли на кредитно-модульную технологию преподавания анатомии. В связи с этим кафедры анатомии стали активно внедрять современные методы преподавания, используемые в ведущих университетах мира.

Как и в некоторых других медицинских университетах стран Азии, Африки и Южной Америки в Казахстане имеется дефицит человеческого трупного материала, как для учебного процесса, так и для трансплантологии. В этой связи, возникла настоятельная необходимость законодательного обеспечения возможности получения трупного материала для учебного процесса и научных исследований.

Кроме того, для ликвидации дефицита трупного материала необходим ряд мер для изменения менталитета и отношения населения Казахстана к добровольному пожертвованию органов и тел для донорства, учебных и научных целей.

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UDC: 616.34-006.6-036.22/-082(574)

EPIDEMIOLOGY AND SCREENING INDICATORS COLORECTAL CANCER IN THE SYSTEM PRIMARY HEALTH CARE IN KAZAKHSTAN

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Annotation: This scientific and analytical work presents regional rates of morbidity and mortality from colorectal cancer, as well as a detailed methodology and results of screening for this pathology in our country. Clinical and organizational aspects of early diagnosis based on the method of active detection of this type of cancer in clinically asymptomatic patients are presented. The technology of two-stage screening and the subsequent routing of examined patients depending on the results of this type of preventive examination of the population are described in detail.

Key words: colorectal cancer, epidemiology, morbidity, mortality, screening, hemocult test, fecal occult blood test - FOBT, total colonoscopy.

History knows many examples when the originally formulated postulates in a particular area continue to be relevant to this day. These postulates, which follow from one of the main tasks of the oncological service, include the early diagnosis of malignant tumors. Colorectal cancer (CRC) occupies one of the leading positions in terms of morbidity and mortality, and early symptoms are very poor, which leads to a high neglect of this disease at the time of diagnosis. In this regard, two-stage colorectal screening is one of the most important areas to improve the early diagnosis of this cancer localization. At the same time, the main conditions for screening are the availability of trained personnel and a standard approach to identifying the trait under study and evaluating the results. The applied methods should be quite simple, reliable and reproducible [1,2].

Colon cancer with a specific gravity of 5.53% (2021 - 5.2%) in the structure of oncopathology of both sexes of the population has risen to 5th place, in men it remains in 6th place - 5.8% (5.5 %), for women - in the 5th - 5.3% (4.91%) The incidence rate of cancer of this localization in the country in the reporting year increased from 8.8 to 9.95 per 100 thousand population.

The morbidity of colon cancer in 10 regions is higher than the national average - 9.95 per 100 thousand population: Kostanay - 20.7 (2021 - 15.9), Pavlodar - 18.8 (15.3), North Kazakhstan - 18, 0 (12.7), East Kazakhstan - 16.9 (13.4), Karaganda - 15.4 (15.0), Akmola - 14.6 (10.2), West Kazakhstan - 11.0 (10.1), Abay - 10.0 (9.0) regions and cities. Almaty – 12.8 (12.1) and Astana – 10.5 (9.0). As in 2021, colon cancer was detected much less frequently in Turkestan region - 3.1 per 100 thousand population (2.7), Kyzylorda region - 4.1 (4.6), Zhambyl region - 5.5 (5.8), Almaty - 6.3 (4.7), Zhetysu - 6.4, Mangistau - 6.8 (4.9) regions and Shymkent - 5.0 (4.0) [3].

Rectal cancer in the structure of malignant neoplasms of both sexes retains 7th place in rank with a specific gravity of 4.9% (2021 - 4.92%), but in men it dropped from 4th to 5th place - 6. 1%, for women – from 9th to 10th – 4.0%. The incidence rate per 100 thousand population increased from 8.4 to 8.8.

A high morbidity rate was recorded in Kostanay - 17.8 per 100 thousand population (2021 - 16.2), East Kazakhstan - 17.7 (13.9), North Kazakhstan - 15.6 (15.1), Pavlodar – 14.9 (18.1), Karaganda – 13.3 (11.7), Abay – 12.9, West Kazakhstan – 12.9 (9.8), Akmola – 10.3 (13.1) regions and Astana city – 10.3 (9.0). Traditionally, a low incidence of rectal cancer is observed in Mangistau - 3.1 (2.8), Turkestan - 3.3 per 100 thousand population (2.7), Zhambyl - 3.7 (5.1), Kyzylorda - 4, 1 (5.3), Almaty – 5.3 (5.6) regions and in Shymkent – 5.5 (5.0) [3].

Rectal cancer in the structure of causes of death from malignant neoplasms of the population of both sexes in 2022 remained in 5th place with a share of 5.41% (2021 – 5.41%). In the republic as a whole, the mortality rate from this form of cancer was 3.6 per 100 thousand population (3.87).

The mortality rate per 100 thousand population was higher than the national average in East Kazakhstan - 7.8 (2021 - 8.6) - the maximum level, Pavlodar - 7.5 (7.6), Abay - 5.9, North Kazakhstan - 5.8 (4.3), Kostanay - 4.9 (4.9), West Kazakhstan - 4.8 (4.2), Karaganda - 3.8 (5.2) regions. Below the national average - 3.8 per 100 thousand population, mortality in Aktobe - 3.2 (4.1), Almaty - 2.6 (2.6), Atyrau - 2.5 (3.4), Zhetysu - 2, 6, Zhambyl - 3.3 (2.7), Turkestan - 2.1 (1.6), Mangistau - 1.9 (1.2), Kyzylorda regions - 1.8 (2.1) - the lowest figure , and years Almaty – 3.7 (4.3), Shymkent – 2.6 (2.1) [3].

Colon cancer in the structure of causes of death from malignant neoplasms of the population of both sexes in 2022, as in 2021, ranks 6th, with a share of 5.2% (2021 – 5.0%). At the same time, the mortality rate in the country decreased by 5.6%, from 3.6 to 3.4 per 100 thousand population.

Mortality rates in 10 regions are higher than the national average: East Kazakhstan - 7.1 per 100 thousand population (2021 - 5.1) - maximum level, Pavlodar - 5.6 (6.0), Kostanay - 5.3 (5.6), Akmola - 5.2 (3.8), Abai - 5.1, Karaganda - 5.1 (5.6), West Kazakhstan - 4.8 (4.4), North Kazakhstan - 4.8 (5.0) regions and cities. Astana - 3.6 (2.7), Almaty - 4.5 (5.3). Low mortality rates from colon cancer were noted in Kyzylorda - 1.2 per 100 thousand population (2.7) - the best result, Turkestan - 1.3 (1.7), Mangistau - 1.6 (2.6), Aktobe - 2.0 (2.5), Zhetysu - 2.4, Zhambyl - 2.5 (3.7), Atyrau - 2.5 (1.8), Almaty - 2.6 (1.8) regions and gg. Astana - (2.7), Shymkent - (2.4).

For colon cancer (94.0%) - 100% verification level was achieved in 3 regions (Abay, Almaty and Turkestan regions), high rates in the cities. Astana (98.5%), Shymkent (98.0%), Zhambyl (98.4%), Atyrau (98.2%) regions, low - in Akmola region (86.7%), Almaty (84.3%), in the Kyzylorda region (61.8%) - the worst result since 2017.

For rectal cancer (97.4%) - in 6 regions there is a 100% verification level, the worst level is still in the Kyzylorda region - 85.3%, lower than the republican average in the Akmola region - 92.6%, Aktobe region - 96.8%, Mangystau - 87.0%, Pavlodar - 95.3%, Almaty - 93.2% [3].

The frequency of diagnosis of stage I-II rectal cancer, as a visually accessible localization (68.9% - national average) in the regions, was: in Akmola - 34.6% - the worst result, as in 2021, in the country (2021 - 44.1%), Mangistau - 47.8%, Abay - 53.9%, West Kazakhstan - 59.1%, Almaty - 66.2%, Zhetysu - 68.6%, Karaganda - 65.7% regions and Shymkent - 62.9%.

For colon cancer (52.4%), early diagnosis rates are higher in Pavlodar (65.9% - best result), Abay, Aktobe, Atyrau, East Kazakhstan, Zhambyl, Zhetysu, Karaganda, Kostanay, Pavlodar, North Kazakhstan, Turkestan regions and Shymkent. The lowest figure (23.5%) is in the Kyzylorda region.

For colon cancer (17.3%), the rates of neglect at stage IV are higher - in Akmola - 31.0% - the worst result (2021 - 20.3%), Zhetysu - 27.3%, Abay - 23.1%, Turkestan - 22.2% (29.1%), Karaganda - 28.1% (28.6%), West Kazakhstan - 18.8% (8.2%), Mangistau - 17.6% (19.4%) regions and cities. Astana - 18.0% (22.9%), Shymkent - 20.0% (22.7%). The lowest level of neglect is 2.9% in the Kyzylorda region (7.9%).

The proportion of stage IV in rectal cancer (13.1%) is higher in Akmola region - 29.6% - the worst result (2021 - 19.4%), Abay region - 19.7%, Kyzylorda region - 17.6% (9.1%), Karaganda - 16.9% (28.4%), Almaty - 15.6% (17.0%), Kostanay - 14.8% (11.1%), Zhambyl - 13.3% (13.6%) regions and Shymkent - 14.5% (12.5%). The lowest level of neglect - 6.0% - is in the Atyrau region (12.5%).

Late diagnosis of rectal cancer as a visually accessible localization (stages III-IV) in 2022 amounted to 31.1% (in 2021 - 33.5%).

For rectal cancer, the level of neglect is higher than the national average - 31.1%, the indicators in Akmola - 65.4% (2021 - 55.9%) - the worst result in the country, Mangistau - 52.2% (38.1%), Abay - 46.1% (30.6%), West Kazakhstan - 40.9% (25.4%), Karaganda - 34.3% (46.5%), Almaty - 33.8% (35.7%), Zhetysu - 31.4% (34.1%) regions and Shymkent - 37.1% (42.9%). The lowest neglect is in the Atyrau region - 12.0% (17.5%).

In the country as a whole in 2022, the five-year survival rate of patients with colorectal cancer registered in 2018 decreased to 40.4% (2021 - 52.9% for those registered in 2017); there is a significant dispersion of indicators by region, from maximum - 56.1% (47.5%) in the Kyzylorda region, to minimum - 24.3% (51.5%) in the Aktobe region [3].

Screening of CRC screening is the systematic use of screening studies in an asymptomatic population. The purpose of screening is to identify people with abnormalities suggestive of CRC. These persons in the future need additional examination to clarify the diagnosis. Opportunistic screening is the non-systematic use of screening tests in routine medical practice. A screening program is much more challenging than an early detection program. At the same time, the success of the screening program is largely determined by the awareness of the population and medical workers about the possibilities of early diagnosis of CRC. The feasibility of a screening program is

determined by several factors that relate to the disease being screened, the screening test, the characteristics of the population, and the characteristics of the healthcare system.

The first factor is that the disease must be well understood, common enough in the target population to justify screening, have a recognizable early stage; treatment of the disease at an early stage should be more effective than at a later stage.

The second is that the test should be characterized by sufficient sensitivity, i.e. the ability to detect cancer among people with the disease; sufficient specificity - the probability that among people who do not have a disease, the test result will be negative; have a high positive predictive value (positive predictive value) or, in other words, the likelihood that people with a positive test result have the disease; have a high predictive value of a negative result (negative predictive value), i.e. the likelihood that people with a negative test result do not have the disease; security; low cost; and acceptability - the likelihood that people for whom this test is intended will agree to the examination (which to some extent depends on the awareness of the population about the possibilities and importance of early diagnosis).

The third factor is that the healthcare system should be ready for maximum screening test coverage of the target group, have the resources to confirm the diagnosis, appropriate treatment and follow-up of people with positive test results, and regularly conduct screening tests at regular intervals. At the same time, the benefits of screening must outweigh the potential physical and psychological harm and justify the financial costs of its implementation [4].

The factors most significant for the development of CRC are:

- the presence of chronic inflammatory bowel diseases, adenomatous polyps, cancer of other localization, etc.;
- family history (presence of one or two first-degree relatives with CRC or familial diffuse intestinal polyposis);
- the age of men and women over 50 years old, taking into account the fact that more than 90% of patients with colorectal cancer are people of this age (medium risk).

Age, regardless of gender, is an important risk factor for CRC. After the age of 50, the incidence of CRC increases from 8 to 160 per 100,000 population. Thus, people who have reached the age of 50, even in the absence of symptoms, constitute a moderate risk group for CRC.

The second category of increased risk of CRC (20%) is made up of persons with a genetic and family predisposition, suffering from chronic inflammatory bowel diseases, diffuse familial polyposis.

The high-risk CRC group is determined by the so-called Amsterdam criteria (the presence of malignant tumors in two generations, the presence of cancer in a first-line relative under the age of 50 years), in this case, CRC screening should be carried out after the age of 30 years [5].

The degree of individual risk of developing CRC is determined before screening to select the scope of studies and the frequency of their conduct.

The interval for oncological colorectal screening is 1 time in 2 years, target group: men and women aged 50-70 years, with the exception of persons registered at the dispensary for CRC and colon polyposis. At the same time, when forming the target group, one should take into account the absence of severe concomitant diseases, such as the presence of a common malignant neoplasm, cerebrovascular diseases in the stage of decompensation, chronic obstructive pulmonary disease with respiratory failure, cirrhosis of the liver, myocardial infarction with congestive heart failure, diabetes mellitus with vascular complications. and others, which are highly likely to lead to death in the next 10 years.

The first step in screening for CRC is the fecal occult blood test (FOBT). Traditionally, such methods include a benzidine test for occult blood in the feces. This is a biochemical method based on the assessment of pseudoperoxidase activity of hemoglobin. There is ample evidence that invitation to guaiac FOBT screening (gFOBT) reduces CRC mortality by approximately 15% in age-

matched average-risk populations.

To ensure the effectiveness of screening with gFOBT, the interval for screening under the national screening program should not exceed two years. To date, there is an immunochemical FOBT method - iFOBT, which is superior in efficiency to gFOBT in terms of the probability of detecting adenoma and cancer. iFOBT has improved analysis performance compared to gFOBT.

Immunochemical (immunochromatographic) examination of feces for occult blood - iFOBT or hemocult test is carried out for all men and women of the target group using an express method, which allows you to get a result within 3-5 minutes, without the participation of a medical worker. However, the evaluation of the test is carried out only by a medical worker in the PHC preventive department.

With a positive analysis of feces for occult blood, the second stage of colorectal screening is performed, which consists in endoscopic examination of the colon - total colonoscopy [6]. At the same time, in this case, this medical manipulation is of a therapeutic and diagnostic nature, since it allows one-stage removal of adenomatous polyps, which, according to various authors, occur in every third subject after 50 years of age. At the same time, women have 20% fewer polyps than men, but they have more right-sided lesions, which are more difficult to detect using fecal blood tests, because they are less traumatic [6,7].

Now, regarding the results of CRC screening. In 2022, 937,859 men and women of the target group aged 50 to 70 years were examined during colorectal screening (in 2021 - 920,640) [3].

Colorectal screening revealed 325 cases of colorectal cancer in the reporting year, which is 114 cases more than in the previous year (211 cases). The detection rate increased from 0.23 to 0.35 per 1000 patients examined. Low detection of colorectal cancer was noted in Zhambyl, Karaganda, Kostanay, Kyzylorda, Mangistau, Turkestan - the worst result, East Kazakhstan regions, Astana - from 0.07 to 0.30 per 1000 examined. The best result is in the North Kazakhstan region – 0.81 per 1000 examined. Compared to 2021, there was a decrease in the detection of colorectal cancer per 1000 people examined during screening in Karaganda (from 0.22 to 0.21), Kostanay (from 0.29 to 0.28), Mangistau (from 0.20 to 0.12) regions and Astana city (from 0.20 to 0.19).

Colon precancer (adenoma detection rate) was detected in 27.5% of patients who underwent colonoscopy (2021 – 22.8%). The detection rate of precancer in Akmola, Aktobe, Almaty (8.5% is the worst result), West Kazakhstan, Zhambyl, Kostanay, Kyzylorda, Mangistau, Pavlodar, North Kazakhstan, Turkestan regions and cities is lower than the national average. Astana and Shymkent. The best result is 36.2% in Almaty. It should be noted that the planned indicator for the detection of precancer of the colon and rectum in the country for 2022, according to the Comprehensive Plan, was 23.0% and was achieved.

In 2022, the proportion of patients identified during screening studies with early stages of malignant neoplasms (stages 0-I) was 26.2% during colorectal screening (in 2021 - 27.5%).

High early detection of colorectal cancer (above 30%) was noted in Akmola, West Kazakhstan, Karaganda, Kostanay, Kyzylorda, Turkestan regions and Astana city (57.1% - the best result). Not a single case of early cancer has been identified in the Mangistau region. Cases of cancer in stages III-IV detected during screening were registered in Akmola, Aktobe, Almaty, West Kazakhstan, Zhambyl, Karaganda, Kostanay, Mangistau regions and Almaty. A total of 21 cases of colorectal cancer in stage III and 3 in stage IV were identified (in 2021 - 18 and 5, respectively) [3].

The complex analysis carried out allows us to conclude that satisfactory results of colorectal screening can be achieved only with its proper organization, high quality of implementation, active participation in population screening, the use of highly sensitive tests and instrumental methods of preventive examination, accurate subsequent diagnosis of identified tumors and timely treatment. High-quality colorectal screening leads to early diagnosis of colon tumors, both benign in the form of polyps and CRC in the early stages, which, in turn, increases

the effectiveness of treatment and improves the prognosis of the disease. Target groups who, for one reason or another, do not participate in this screening should be informed that there are no other screening methods that can also effectively reduce mortality from CRC. Morbidity and mortality rates from colorectal cancer clearly show the epidemiological situation with this pathology in the regions of our Republic.

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Анализ исследования основных факторов, влияющих на решение молодых специалистов о выборе места трудоустройства

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Резюме / Ключевые положения

Сельские территории Казахстана сталкиваются с дефицитом медицинских кадров в области здравоохранения, что оказывает воздействие на доступность и качество оказания медицинской помощи. Существующая проблема усугубляется не только отсутствием медицинских специалистов, но также нежеланием молодых выпускников трудоустроиться в сельских медицинских учреждениях.

По мнению большинства исследователей, существует ряд факторов, таких как недостаточная развитость сельской и медицинской инфраструктуры, повышенная нагрузка на работников, неблагоприятные условия труда, отсутствие возможностей для отдыха и другие аспекты. Для решения проблемы дефицита кадров в мире активно разрабатываются и внедряются стратегии, направленные на привлечение и удержание

специалистов в сельских районах.

Учитывая, что мотивация медицинских работников зависит от комплекса взаимосвязанных факторов, необходимо правильно сочетать различные мероприятия для эффективного привлечения и удержания медицинских кадров.

В данном исследовании изучены различные аспекты, влияющие на выбор места работы выпускников организаций медицинского образования и науки, понимание этих аспектов позволяет более точно адаптировать условия труда и предоставляемые меры социальной поддержки. Это необходимо для привлечения и удержания квалифицированных специалистов, готовых работать в различных регионах, в том числе в сельских населенных пунктах.

Цель исследования. Данная аналитическая справка предназначена для лиц, принимающих политические решения по вопросам кадровых ресурсов здравоохранения в целях принятия научно-обоснованных и эффективных решений, а также для заинтересованных профессионалов в сфере здравоохранения и населения с целью расширения знаний.

Ключевые слова: система здравоохранения, медицинские кадры, трудоустройство, Казахстан.

Введение

В свете глобальных вызовов и потребностей в области здравоохранения Всемирная организация здравоохранения (ВОЗ) придает особое значение роли медицинских кадров в формировании устойчивости стран для адекватного реагирования в условиях чрезвычайных ситуаций и отмечает, что к 2030 году нехватка медицинского персонала во всем мире достигнет 10 млн человек. Об этом в начале апреля 2023 года на V Глобальном форуме по кадровым ресурсам здравоохранения в Женеве заявил глава ВОЗ Тедрос Аданом Гебреисус [1].

По официальным статистическим данным на 1 января 2023 года в сельской местности осуществляют свою трудовую деятельность 68 984 медицинских работников в том числе [2]:

- врачи - 13 480 человек (в 2021 году – 13 395 чел., в 2020 году – 13 365 чел.);
- средние медицинские работники (СМР) - 55 504 человек (в 2021 году – 54 371 чел., в 2020 году – 54 095 чел.).

Отмечается незначительная динамика и увеличение врачебных кадров на селе на 0,6% и СМР на 2,1%.

При анализе административных данных ведомственной статистической формы №19 установлено, что дефицит врачей в государственном секторе по незанятым должностям по состоянию на 1 января 2023 года составил 6326,75 шт.ед., в том числе: в городе - 4902,75 шт.ед., на селе – 1424,00 шт.ед. (таблица 1).

Таблица 1- дефицит врачей в государственном секторе по незанятым должностям по состоянию на 1 января 2023 года

Наименование	Штатные	Занятые	Дефицит
РК	65683,75	59357,00	6326,75
Город	50638,75	45736	4902,75
Село	15045	13621	1424

Одним из инструментов снижения дефицита медицинских работников, является распределение выпускников организаций медицинского образования и науки в соответствии с текущими потребностями на рынке труда в здравоохранении.

Согласно Постановления Правительства Республики Казахстан от 18 февраля 2009 года №183 «Об утверждении размеров и Правил предоставления мер социальной поддержки специалистам здравоохранения, образования, социального обеспечения, культуры, спорта и агропромышленного комплекса, прибывшим для работы и проживания в сельские населенные пункты» [3], специалистам здравоохранения, прибывшим для работы и проживания в сельские населенные пункты, предусмотрены следующие меры социальной поддержки:

- 1) выдача подъемного пособия в сумме, равной 100-кратному МРП;
- 2) выдача бюджетного кредита для приобретения или строительства жилья в сумме не превышающий 1 500-кратного размера МРП.

Правила предоставления мер социальной поддержки специалистами, прибывшим для работы и проживания в сельские населенные пункты утверждены приказом Министра национальной экономики РК от 6 ноября 2014 года №7 [4].

Источником финансирования для оказания мер социальной поддержки помимо республиканского бюджета выступают средства местных исполнительных органов и медицинских организаций.

В регионах, где местными исполнительными органами принимаются меры по стимулированию и повышению мотивации медицинских кадров, складывается положительная кадровая динамика и идет приток молодых специалистов.

В сфере здравоохранения, как и во многих других отраслях, выбор первого места работы для молодых специалистов является одним из важнейших и стратегических решений. Молодые специалисты, сталкиваются с рядом сложных факторов, которые могут оказать существенное влияние на их решение о выборе места работы.

Данное исследование поможет понять почему молодые специалисты не хотят уезжать в сельскую местность, какие факторы воздействуют на выбор места трудоустройства молодых специалистов и какие меры нужно предпринять для привлечения и удержания медицинских кадров в сельской местности.

Методология

Вопросы, включенные в исследование, охватывали важнейшие критерии, необходимые для сбора информации о факторах, оказывающих влияние на решение молодых специалистов относительно выбора места трудоустройства. Само исследование было проведено с использованием сервиса

«SurveyMonkey» и включало в себя классический метод опроса, при этом гарантировалась анонимность участников анкетирования. В данном исследовании участвовали выпускники организаций медицинского образования и науки Республики Казахстан, которые завершили обучение в 2022- 2023 году.

В анкетировании приняли участие 306 выпускников организации высшего и/или послевузовского образования (ОВПО) и научных организаций в области здравоохранения (НООЗ) в области здравоохранения: 44% или 135 респондентов завершили обучение в резидентуре, 40% или 123 респондента завершили обучение в интернатуре, 10 % или 29 респондентов завершили обучение на уровне бакалавр (рисунок 1).

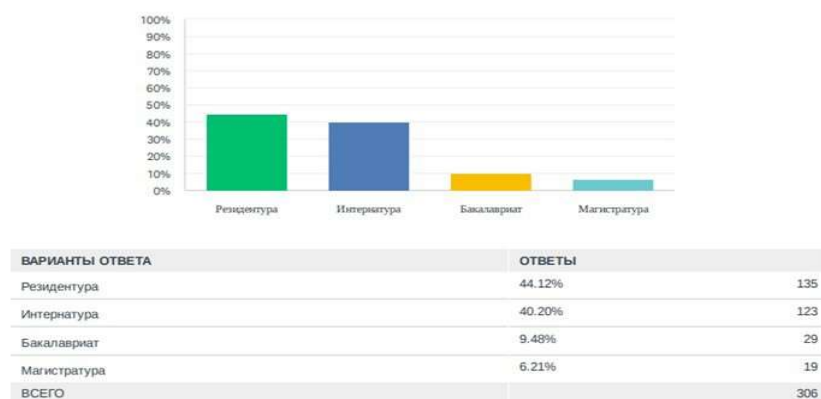


Рисунок 1- Уровень образования выпускников 2023 года

По половому составу: 73% или 222 человек выпускники женского пола, 27% или 84 человек составляют выпускники мужского пола (рисунок 2).

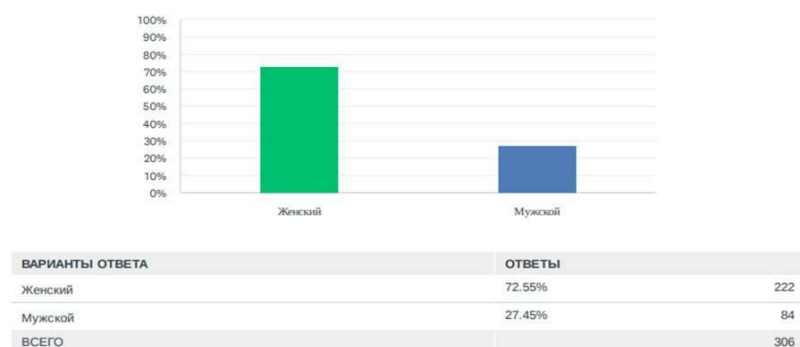


Рисунок 2- Половой состав выпускников 2023 года

Основные факторы, влияющие на решение молодых специалистов о выборе места трудоустройства

Результаты проведенного исследования показывают, что 79% респондентов изначально предпочитают работать в крупных городах, у 17% респондентов нет четких предпочтений о месте первого трудоустройства, и только 4% участников анкетирования выразили желания начать свою трудовую деятельность в сельских населенных пунктах.

Всего 33% участников анкетирования или (98 человек) считают, что недостаток доступной и высококачественной медицинской инфраструктуры, и оборудования является одной из основных причин, по которым они не желают работать в сельской местности, что подчеркивает важность наличия медицинской инфраструктуры и оборудования для специалистов, работающих в отдаленных районах и сельских населенных пунктах.

27% опрошенных (82 человека) считают, что неудовлетворительные условия проживания и ограниченные возможности для социальной и культурной адаптации в сельских населенных пунктах играют важную роль при принятии решения, что свидетельствует о влиянии качества жизни на выбор места работы

17% респондентов, что составляет (51 человек), отметили, что главной причиной, по которой они предпочли бы не работать в сельской местности, является удаленность от научных центров и ограниченные возможности для консультации с

опытными специалистами в области здравоохранения, что подчеркивает важность доступности медицинской экспертизы и наставничества для молодых специалистов.

11,7% опрошенных (35 человек) считают, что большие расстояния и ограниченные транспортные связи оказывают негативное влияние на доступ к работе и личное время, что указывает на значимость развитой транспортной инфраструктуры для принятия решения о трудоустройстве в сельские населенные пункты. Близость к семье и друзьям также является существенным фактором для респондентов.

11,3% опрошенных (34 человека) указали, что причиной отказа от работы в сельской местности являются неудовлетворительные условия труда и низкая заработная плата, что свидетельствует о том, что экономические условия для этих респондентов играют решающую роль в принятии решения при выборе места работы.

Экологическая и природная составляющие также учитываются, но не играют такой важной роли для выпускников организаций медицинского образования и науки при выборе места работы.

Результат исследования показывает, что разнообразные факторы, включая условия труда, транспортные связи, доступ к специализированной медицине и качество жизни, играют особую роль в принятии решения об отказе от работы в сельской местности.

Следовательно, удержания кадров в сельской местности зависит не только от денежных вопросов, но и от других факторов тоже, меры по удержанию должны быть комплексными и включать в себя разносторонний подход.

В ответ на вопрос об их первоначальных предпочтениях относительно места будущей работы респонденты высказались следующим образом: 49% (150 человек), опрошенных предпочли бы работать в городе республиканского значения; 30% опрошенных (91 человек) предпочли бы работать в городе областного значения; 17% опрошенных (52 человек) заявили, что у них нет конкретных предпочтений относительно места будущей работы (рисунок 3).

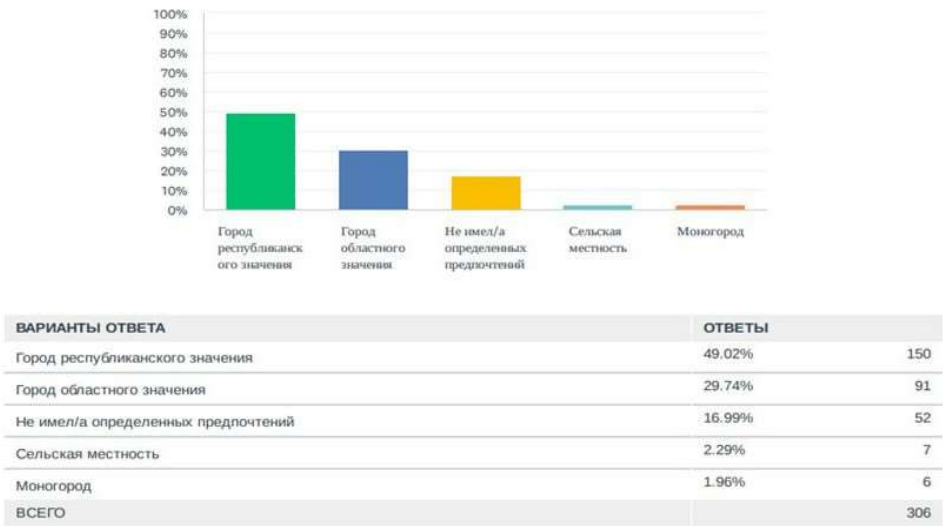
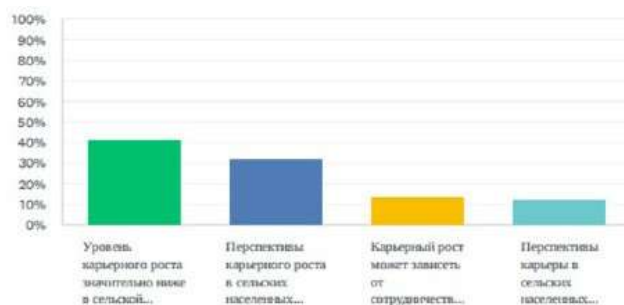


Рисунок 3 - Предпочтения относительно места будущей работы

В целом, результаты опроса по предпочтениям относительно места будущей работы показывают, что наибольший интерес у опрошенных вызывают города областного и республиканского значения, в то время как моногорода и сельская местность имеют более низкий приоритет.



ВАРИАНТЫ ОТВЕТА	ОТВЕТЫ
Уровень карьерного роста значительно ниже в сельской местности по сравнению с городами.	41.50% 127
Перспективы карьерного роста в сельских населенных пунктах ограничены отсутствием специализированных медицинских учреждений и возможностью для профессионального обучения.	32.03% 98
Карьерный рост может зависеть от сотрудничества с городскими медицинскими центрами и участием в обменах опытом.	13.73% 42
Перспективы карьеры в сельских населенных пунктах связаны с более широким спектром обязанностей и возможностью работать в разных областях медицины.	12.75% 39
ВСЕГО	306

Рисунок 4- Оценка выпускниками перспективы карьерного роста в сельских населенных пунктах по сравнению с городами

Как респонденты оценивают свои перспективы карьерного роста в сельских населенных пунктах по сравнению с городами? 42% опрошенных (127 человек) и 32% опрошенных (95 человек) считают, что перспективы карьерного роста в сельских населенных пунктах ограничены отсутствием специализированных медицинских учреждений и возможностью для профессионального обучения. Это указывает на ограничения, с которыми сталкиваются медицинские специалисты, работающие в сельской местности. 14% опрошенных (42 человек) считают, что карьерный рост в сельских населенных пунктах может зависеть от сотрудничества с городскими медицинскими центрами и участием в обменах опытом. Это указывает на важность сотрудничества между различными медицинскими учреждениями для развития профессиональных навыков (рисунок 4).

Итак, на основе анализа результатов опроса можно сделать вывод, что большинство опрошенных считают, что уровень карьерного роста в сельской местности существенно ниже по сравнению с городами. Однако некоторые видят преимущества в многофункциональности работы и сотрудничестве с городскими медицинскими центрами.

Важные факторы для выпускников при принятии решения об отказе от работы в сельской местности: 33% опрошенных (100 человек) считают, что отсутствие доступной и качественной медицинской инфраструктуры и оборудования является одной из причин отказа от работы в сельской местности. Это указывает на важность медицинской поддержки для специалистов, работающих в отдаленных районах. 27% опрошенных (83 человека) считают, что неудовлетворительные условия проживания и ограниченные возможности для социокультурной адаптации в сельских населенных пунктах играют важную роль при принятии решения. Это свидетельствует о влиянии качества жизни на выбор работы. 18% опрошенных (54 человек) указали, что одной из причин отказа от работы в сельской местности является отдаленность от специализированных медицинских центров и ограниченные возможности для консультации с опытными специалистами. Это указывает на важность доступа к медицинской экспертизе (рисунок 5).

Итак, результаты опроса показывают, что разнообразные факторы, включая

условия труда, транспортные связи, доступ к специализированной медицине и качество жизни, играют роль в принятии решения об отказе от работы в сельской местности.

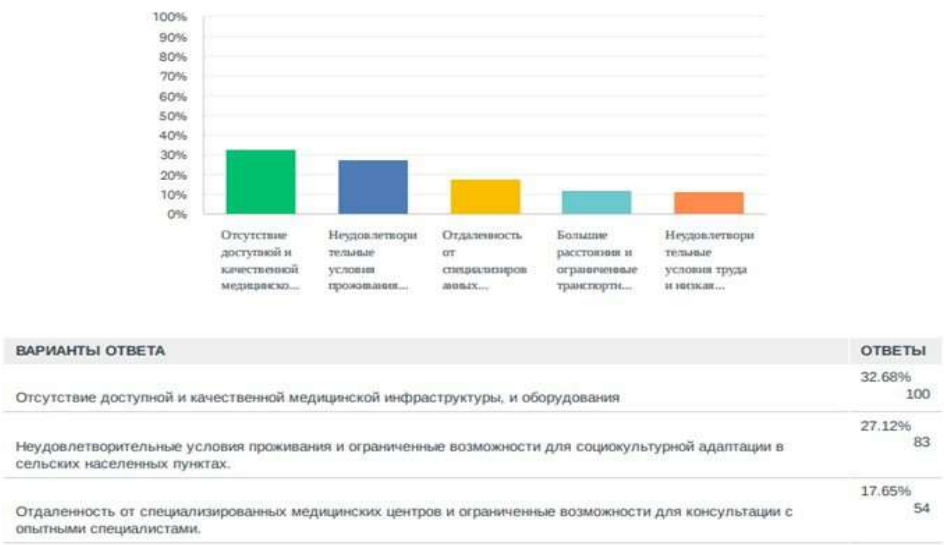


Рисунок 5 - Важные факторы для выпускников при принятии решения об отказе от работы в сельской местности

Мнения выпускников относительно значения наличия развлекательных, культурных и спортивных мероприятий при выборе места работы: 43% опрошенных (132 человек) считают, что доступность развлекательных, культурных и спортивных мероприятий очень важна, и им хотелось бы иметь возможность проводить разнообразный досуг. Это указывает на то, что для этой группы людей качество свободного времени также играет значимую роль при выборе места работы. Другие 43% опрошенных (130 человек) считают, что доступность развлекательных, культурных и спортивных мероприятий важна, но не является главным критерием при выборе места работы. Это может означать, что они учитывают разнообразные факторы при выборе работы, включая и профессиональные аспекты. 14% опрошенных (42 человека) указали, что доступность развлекательных, культурных и спортивных мероприятий не имеет для них особого значения, и они больше заинтересованы в профессиональных аспектах работы. Это говорит о том, что для них профессиональная деятельность имеет более высокий приоритет (рисунок 6).

Для значительной части опрошенных доступность развлекательных, культурных и спортивных мероприятий имеет важное значение при выборе места работы. Однако некоторые считают, что это не является основным критерием, а для других интересы в профессиональной сфере преобладают над развлекательными аспектами.

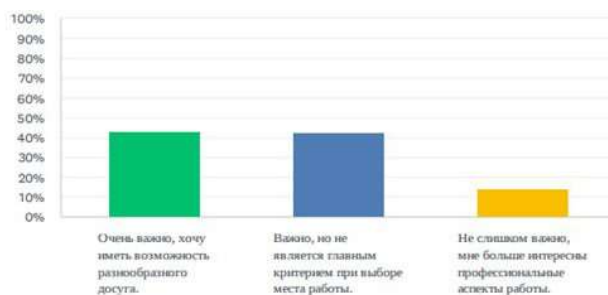


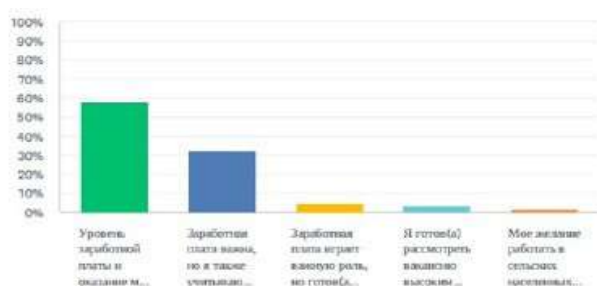
Рисунок 6- Важность доступности развлекательных, культурных и спортивных мероприятий при выборе места работы

Как респонденты оценивают влияние уровня заработной платы и возможностей социальной поддержки на процесс принятия решения о выборе места работы?

58% (177 человека), считают, что уровень заработной платы и социальная поддержка являются ключевыми факторами при выборе места работы. Это указывает на важность экономических условий и социальных льгот. 32% опрошенных (99 человек) отметили, что заработная плата важна, но для них также важны другие аспекты, такие как профессиональное развитие и личный рост.

Это указывает на комплексный подход к выбору места работы. 5% опрошенных (15 человек) считают, что заработная плата важна, но также учитывают стимулы для профессионального развития и повышения квалификации (рисунок 7). Это говорит о важности обучения и развития в принятии решения о работе.

Большинство опрошенных считают, что уровень заработной платы и возможности оказания мер социальной поддержки играют значительную роль при выборе места работы. Эти факторы влияют на привлекательность работы в сельской местности.



ВАРИАНТЫ ОТВЕТА	ОТВЕТЫ
Уровень заработной платы и оказание мер социальной поддержки является одним из ключевых факторов при выборе места работы, и я стремлюсь работать там, где предлагается наилучший доход.	57.84% 177
Зарботная плата важна, но я также учитываю другие аспекты, такие как профессиональное развитие и возможности для личного роста.	32.35% 99
Зарботная плата играет важную роль, но готов(а) работать в сельской местности, если предоставляются стимулы для профессионального развития и повышения квалификации.	4.90% 15

Рисунок 7- Уровень влияния ЗП и возможности оказания мер социальной поддержки при принятии решения о месте работы

Какие преимущества и недостатки респонденты выделяют в рабочей среде сельских местностей в сравнении с городскими районами, согласно результатам анкетирования?

Преимущества: широкий спектр обязанностей, что позволяет развивать разносторонние навыки. 66% опрошенных (201 человек) отметили, что медицинским работникам в сельских районах часто предоставляется широкий спектр обязанностей, что позволяет развивать разносторонние навыки. 22% опрошенных (68 человек) считают, что медицинские работники в сельских местностях получают большую признательность от местного населения и становятся центральными фигурами в медицинской помощи. 7% опрошенных (22 человека) увидели преимущество в более спокойной обстановке, чистом воздухе и сниженном уровне стресса в сельских местностях.

Недостатки: 66% опрошенных (201 человек) указали, что отсутствие доступа к высокотехнологичным и специализированным медицинским учреждениям является недостатком для медицинских работников в сельских населенных пунктах. 22% опрошенных (68 человек) считают, что уровень развития IT-технологий в сельских районах остается недостаточно высоким. 7% опрошенных (22 человека) увидели недостаток в ограниченных возможностях для развития как культурно, так и профессионально.

Какова позиция респондентов по вопросам экологии и природы, а также насколько окружающая среда важна для них при выборе места работы, согласно результатам анкетирования?

Всего 144 опрошенных (47%) считают, что экология и природа важны, но не являются главным фактором при выборе места работы. 140 опрошенных (46%) считают, что экология и природа имеют для них высокий приоритет, и они бы хотели работать в месте, где экологическая ситуация благоприятна.

Всего 22 опрошенных (7%) не считают, что экология и природа оказывают влияние на их предпочтения при выборе места работы (рисунок 9).

Итак, мнение опрошенных разнообразно. Некоторые считают экологическую ситуацию и состояние природы важными критериями при выборе места работы, в то время как другие считают, что это не является основным фактором при принятии таких решений.

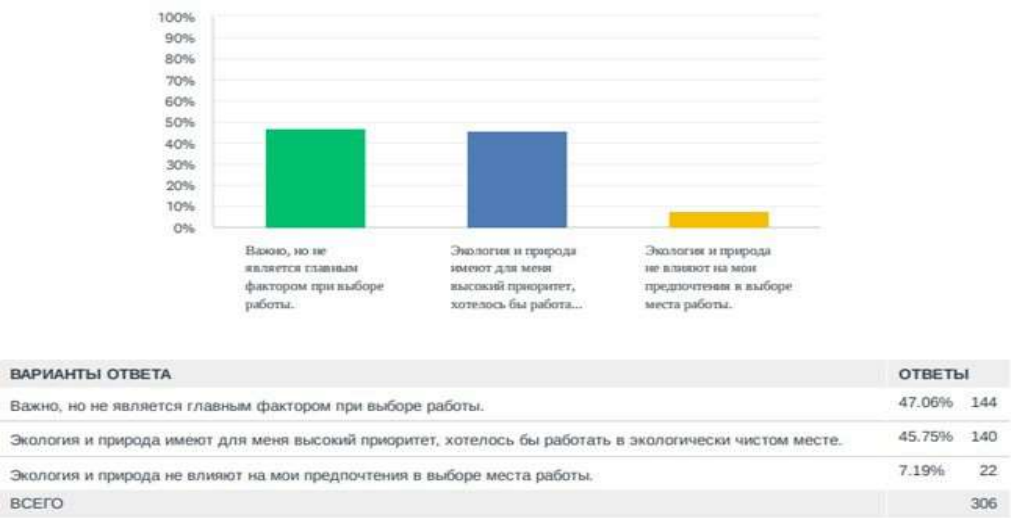


Рисунок 9 – Позиция респондентов по вопросам экологии и природы

Как социальные и культурные аспекты, такие как семья, друзья и общение, влияют на решение о выборе места работы, согласно ответам респондентов в анкете?

177 опрошенных (58%) считают, что близость к семье и друзьям является очень важным аспектом, и они предпочитают работу в своем родном регионе для поддержания социальных связей.

Всего 96 опрошенных (32%) считают важным иметь возможность общения и поддержки от близких, но они готовы переехать за работой, если это потребуется. А 33 опрошенных (11%) считают, что социальные и культурные аспекты не оказывают влияния на их решения, и они готовы работать в любом месте (рисунок 10).

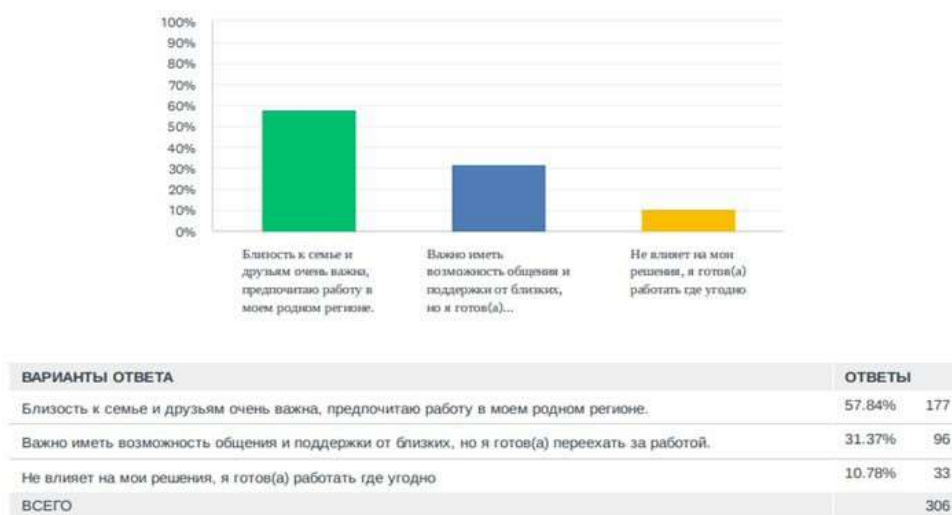


Рисунок 10 – Влияние социальных и культурных аспектов при принятии решения о месте работы

В итоге, социальные и культурные факторы оказывают значительное влияние на решения многих опрошенных при выборе места работы. Некоторые готовы перемещаться за работой, в то время как другие предпочитают оставаться ближе к семье и друзьям.

Респонденты высказали свою готовность к переезду и адаптации в новой среде в соответствии с результатами анкетирования: 83 опрошенный (27%) готовы переехать, но они считают, что им потребуется время на адаптацию к новому месту. 80 опрошенных (26%) готовы полностью адаптироваться и переехать без проблем. 72 опрошенных (24%) предпочитают оставаться в знакомой среде и не готовы менять место проживания (рисунок 11).



Рисунок 11 – Готовность выпускников к переезду и адаптации в новой среде

Таким образом, отношение респондентов к переезду и адаптации в новой среде разнообразно: некоторые выразили готовность к моментальной адаптации и переезду, другие предпочли бы оставаться в знакомой обстановке, в то время как третьи готовы к переезду, но считают, что им потребуется некоторое время на приспособление.

Анализ данных, полученных в результате проведения опроса может предоставить ценную информацию о факторах, влияющих на решение молодых специалистов о выборе места трудоустройства в здравоохранении.

Анкета содержала вопросы, ответы на которые позволили собрать информацию по ключевым аспектам, которые наиболее часто влияют на выбор места работы выпускников. Для большинства респондентов оказалось очень важным и существенным наличие и количество мер социальной поддержки, а также уровень/размер заработной платы.

Так, 80% (246 человек) респондентов выразили свои предпочтения относительно конкретных сумм заработной платы, чаще всего указывая на желание получать не менее 500 000 тенге и наличия мер социальной поддержки, таких как подъемные пособия, предоставление льготного кредитования на покупку жилья либо предоставление служебного жилья (рисунок 12).

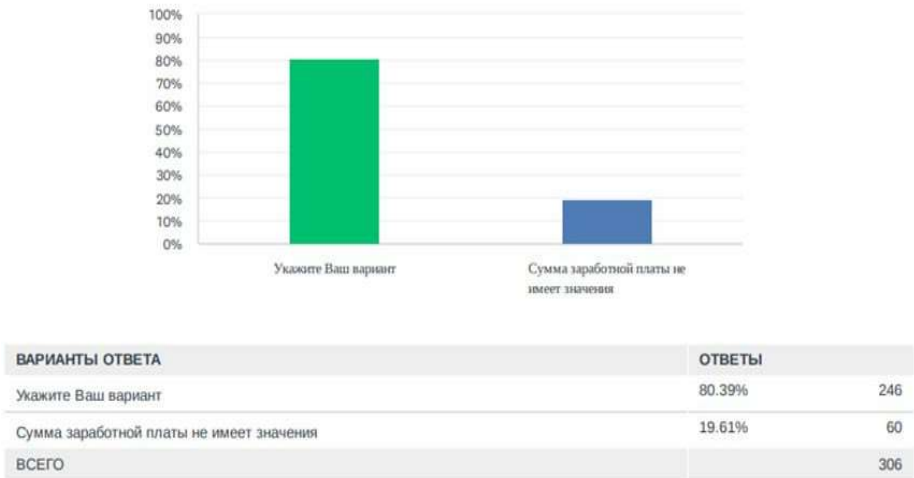


Рисунок 12 – Ожидания социальной поддержки и потребности в дополнительной помощи среди респондентов

Решение о выборе места работы для выпускников зависит от множества факторов, причём важность этих аспектов может различаться для разных респондентов.

Изучение этих аспектов позволяет адаптировать существующие условия труда, предоставляемые меры социальной поддержки, уровень заработной платы, с тем чтобы привлекать и удерживать квалифицированных специалистов, готовых работать в сельских населенных пунктах.

Пути решения проблем дефицита врачей и СМР на уровне сельских населенных пунктов

1. Образовательные меры:

Наиболее эффективным, малозатратным и доступным, с точки зрения проведенного исследования, блоком мероприятий являются образовательные меры. Образовательные меры могут включать:

- проведение производственной практики в сельских населенных пунктах с целью знакомства студентов выпускных курсов с особенностями работы в медицинских организациях, расположенных в сельских населенных пунктах;

- организацию децентрализованного обучения на базе медицинских организациях, находящихся в сельских населенных пунктах;

- усиление работы с абитуриентами, проживающими в сельских населенных пунктах в рамках приемной кампании, для последующего трудоустройства в село;

- разработку программ непрерывного профессионального развития медицинских работников, отвечающих потребностям медицинских работников, работающих в сельских населенных пунктах.

2. Финансовые меры:

Вторым блоком мероприятий является финансовое стимулирование:

- стипендии для студентов, обучающихся в рамках целевых грантов;

- единовременные выплаты при работе в сельских населенных пунктах;

- повышающий коэффициент к заработной платы.

Важное значение для медицинских работников имеет возможность выбора одного из описанных выше мер финансового стимулирования.

3. Организационные меры:

Третьим блоком являются организационные меры, в числе которых:

- повышение удовлетворенности работой за счет улучшений условий труда в сельских населенных пунктах

- внедрения гибкого графика работы;

- повышение статуса врача;

- создание возможности для развития карьеры;

- создание устойчивых горизонтальных коммуникаций между городскими и сельскими медицинскими организациями.

ВЫВОДЫ

Проведенное исследование позволяет выявить ключевые факторы, влияющие на интерес студентов-медиков к работе в сельской местности.

Полученные результаты помогут политикам в сфере здравоохранения реализовать комплексную стратегию развития человеческих ресурсов, которая будет ориентирована на конкретные факторы, чтобы побудить студентов-медиков выбирать рабочие места в сельской местности. Однако, для достижения наилучших результатов необходимо комплексное осуществление всех трех вариантов.

Конфликт интересов отсутствует.

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Ob opredelenii razmerov predostavlenija mer social'noj podderzhki specialistam v oblasti zdravoohranenija, obrazovanija, social'nogo obespechenija, kul'tury, sporta i agropromyshlennogo kompleksa, gosudarstvennym sluzhashhim apparatov akimov sel, poselkov, sel'skih okrugov, pribyvshim dlja raboty i prozhivaniya v sel'skie naselelennye punkty. Postanovlenie Pravitel'stva Respubliki Kazahstan (On determining the size of the provision of social support measures to specialists in the field of healthcare, education, social security, culture, sports and the agro-industrial complex, civil servants of the akims of villages, towns, rural districts who arrived to work and live in rural settlements. Decree of the Government of the Republic of Kazakhstan) [in Russian] ot 18 fevralja 2009 goda № 183. Utratilo silu postanovleniem Pravitel'stva Respubliki Kazahstan ot 17 ijulja 2023 goda № 603. Rezhim dostupa: <https://adilet.zan.kz/rus/docs/P090000183>

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Analysis of the Study of the Main Factors Influencing the Decision of Young Professionals to Choose a Place of Employment

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Abstract / Key messages

Rural areas of Kazakhstan face a shortage of medical personnel in the field of healthcare, which has an impact on the availability and quality of medical care. The existing problem is aggravated not only by the lack of medical specialists, but also by the reluctance of young graduates to find employment in rural medical institutions.

According to most researchers, there are a number of factors, such as the underdevelopment of rural and medical infrastructure, increased workload for workers, unfavorable working conditions, lack of recreation opportunities and other aspects. To solve the problem of staff shortages in the world, strategies aimed at attracting and retaining specialists in rural areas are being actively developed and implemented.

Given that the motivation of medical workers depends on a complex of interrelated factors, it is necessary to combine various measures correctly to effectively attract and retain medical personnel.

This study examines various aspects that influence the choice of employment for graduates of medical education and science organizations, understanding these aspects allows you to more accurately adapt working conditions and social support measures provided. This is necessary to attract and retain qualified specialists who are ready to work in various regions, including rural settlements.

The purpose of this study. This analytical note is intended for policy makers on health human resources issues in order to make scientifically sound and effective decisions, as well as for interested healthcare professionals and the public in order to expand knowledge.

Key words: healthcare system, medical personnel, employment, Kazakhstan.

Literature

АБАЙ ШЫҒАРМАЛАРЫ- ОТБАСЫНДАҒЫ РУХАНИ ҚҰНДЫЛЫҚТЫҢ НЕГІЗІ

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Абай шығармасының сая бағында өсу, тәрбие алу – қазақ халқының бүгінгі ұрпақтарының негізгі, басты міндеттерінің бірі. Ұлы данышпан Абайдың шығармашылық мұрасы – халқымыздың ғасырлар бойы маңызын жоймайтын рухани қазынасы. Маңызын жоймау былай тұрсын, қазіргі заманда бұл қазына өзінің жаңа бір қырларымен жарқырай ашылып, қадірін арттыра түсті. Бұған жастарға, жеткіншектерге берілетін әрбір сабақтың Абаймен бірге өрілетінінің куәсі болып отырмыз. Абайдың дүниеге келгеніне бір жарым ғасыр, ал өзінің мәңгі өлмес шығармаларының халқына ұстаздық ете бастағанына бірталай уақыт өтсе де, өз мәнін, мағынасын жаңа қырынан танытып келеді. Сондықтан да Абайды – классик ақын дейміз. Бұл күнде Абай сөзі әр қазақтың бойына мектеп қабырғасында ғана емес, әрбір отбасында ана сүтімен бірге дарыса құба-құп болар еді. Ана сүті тән қорегі ретінде жас сәбидің буыны бекіп, бұғанасы қатаюына қызмет етсе, ақын сөзі оның санасына адамдық пен азаматтықтың ұрығын сеуіп қызмет етеді. Абай бала кезінде ширақ, пысық болмағанымен, елдегі шешен, ақын, ертегішілер әңгімесін тез ұғып алатын зеректігімен, ынталылығымен ерекшеленген. Анасы Ұлжан да, әжесі Зере де, әкесі Құнанбай да сөз қадірін білетін, өзіндік пайымдау дәрежелері жоғары, өмірдің мән-мағынасын түсінетін, ұрпағына саналы тәрбие беру жолында қызмет еткен адамдар. Ел аузында жүрген Шортанбай, Дулат, Бұхар жырау, Марабай, Шөже ақындардың сөздерін, мағыналық татымын ұрпағы танып, ұғып өсуіне жағдай жасаған. Әкесі Құнанбай қажының кеңінен толғап сөйлер тереңдігі, өз тұстарының ғана емес, шетелдік ғалымдардың назарына іліккен. Құнанбай қажы «Ескітам» деген қоныстан медресе салдырып, өзінің және туыстарының балаларын оқытқан. Абайдың данышпан, ойшыл болып өсуіне туған ұясы, өз отының басындағы тәрбиесі, тілі болды. Қазақтың: «Баланың бас ұстазы – ата-ана», «Балапан ұяда не көрсе, ұшқанда соны іледі» – дегеніндей, есі кіріп, тілі шыға бастасымен-ақ баланы байсалды, ұғымпаз, тілалғыш етіп баулыған [1].

Дана Абай бабамыз қазақ әйелінің, ананың отбасындағы орнын ерекше жырлайды. Жалпы, «Адам бойындағы барлық қасиеттер ананың ақ сүтімен жаралған» – деген ғұламалық ойды тарата келе, адамгершілік қасиеттердің бәрі отбасынан бастау алатындығын айтады. Тәрбиенің негізі «ананың әлдінінен» басталады. Ана тәрбиесі ұлылық дәнін себеді. Тәрбиелі анадан – тәрбиелі бала өсіп шығады. Сонғы жылдары отбасында, қоғамда ер адамдардың, әкелердің рөлі төмендегендей. Бұған кейде заманды да кінәләп жатамыз. Әрине, бала тәрбиесіндегі әкенің орны бөлек, әсіресе, ер бала тәрбиесінде. Әкенің қатаң талабын, тәрбиесін көрген бала ертең қоғамда да өз отбасында да шешуші тұлға бола алады. Абай шығармаларын отбасында оқу – талдау – тамаша тәрбиенің негізі болмақ. Абай өмірі кейінгі ұрпаққа үлгі болу керек.

«... Жүрегімнің түбіне терең бойла,

Мен бір жұмбақ адаммын, оны ойла.

Соқтықпалы, соқпақсыз жерде өстім,

Мыңмен жалғыз алыстым, кінә қойма!...»-деп, Абай болашақ ұрпаққа өткеннің құлазыған ғасырларынан өзіне бейтаныс, басқа, бірақ жарқын болашаққа сенімді жол салған

ақынның айтқан сөзі еді. Даланы торлаған надандық түнегіне ол шамшырықтай сәуле төкті және таңы атып, күні шығатын жаққа апаратын жолды өз халқына аянбай талмастан көрсетті. Түн ұйқысын төрт бөліп, жүз ойланып, мың толғанып, елі үшін қызмет қылды [2].

Абай – құбылыс, ғасырларда біртуар ғұлама. Сондықтан да оның түрлі айтыстар мен даулардағы, мәжілістер мен кеңестегі айтқан пікірлері – дара өнеге, нақыл. Абай дүниеге өз көзімен қарап, көргені мен сезгенін жалтақтамай айтқан. Құдай берген даналық оны даралық жолына, данышпандық шыңына бастады. Өмір мен қоғамды барлап, болашақты болжап жазған әр шығармасы – әрбір отбасындағы бала тәрбиесіндегі негізгі қағида, ереже болып тұру керек.

Отбасының негізі баланы өмірге келтіру ғана емес, оны мәдени- әлеуметтік ортаның құндылығын қабылдату, ұрпақтың, ата-бабалардың, ұлылардың ақыл-кеңес тәжірибиесін бойына сіңіру, қоршаған орта, адамзатқа, өз қоғамына пайдалы етіп тәрбиелеу. Абайдың нақыл-кеңестері отбасындағы үлкен тәрбие мектебіне айналуы керек. Абай мектебінен ата-ананың өзі де нәр алып, адамгершілік, әдеп-инабат тағылымдарын алуы, оларды меңгеріп іс - жүзінде қолдануы болашақ қазақ елі үшін жұмсалатын ынта мен ықылас, қайрат пен қажырлылық жолына айналуы тиіс.

Абайға әр оралған сайын «көкірек көзің ашылады», азаматтық ірілік пен адамдық ұғымдардың жаңа қырларына, сырларына жолыққандай боласың. Дүние жүзі халықтары Абайды тану арқылы оны туып, өсірген халқын, елін тани бастады. Қазақ халқының алдында енді қазақтың ғана емес, оны Адамзаттың Абайына айналдыру міндеті тұр.

Абайдың қолына қалам алып, надандықпен алысуға бет байлап, ақиқат пен жалған пәлсапалық категориялар заңдылықтарына сүйене отырып жазған өлеңдері мен қара сөздеріндегі педагогика, мораль, эстетика, психология, философия, этика, сатира, әдебиет, өнер, ғылым саласында айтылған терең ойларына қайран қаласың, таңырқайсың.

Бала тәрбиесінде ата-ананы осындай дана Абайдың шығармаларымен қаруландырса, бала дамуына маңызы бар рухани құндылықтармен қамтамасыз етілетін еді. Ал бұл отбасында үйлесімді қатынас пен толыққанды адамгершілігі мол азамат етіп тәрбиелеудің бірден-бір жолы. Қазақта «Алдыңғы дөңгелек қалай жүрсе, артыңғысы да солай жүреді,»-деген сөз бар. «Бала – өмір гүлі», «бала – біздің болашағымыз» сияқты көптеген стандартты сөздер бар, бұл шын мәнінде де солай. Өйткені біз өз балаларымызды өсіріп, оларға тәрбие мен білім беріп, болашақта олар бізге де көмек қолын созады деген ниетпен, өмірде көмек беру үшін өмір сүреміз ғой. Кез келген балаға ата-анасының махаббаты қажет, отбасындағы қорғалу сезімі - ол үшін ең бастысы. Ендеше, өз баламызды жақсы көріп, онымен ықыласты қарым-қатынас жасауға уақытымызды аямай, Абай шығармаларының тәлім-тәрбиелік мәнін ұқтырып, тәрбиелесек, шынында да біздің келешегіміз – жарқын, адал ұрпақтан болары сөзсіз [3].

Абай қазақ халқының мінез-құлқындағы келеңсіз, нашар қылықтардың қайдан және қалай туындайтынын саралап, ақиқат пен жалған философиялық категориялар арқылы талдап беріп отырады. «Қазақтың бірінің біріне қаскүнем болмағанын айтады. Бірінің тілеуін бірі тілеспейтін уақытқа жеткендігінің себебі не екенін, рас сөзі аз болып, қызметке таласқыш болуы және өздерінің жалқау болатынының себебі не?» - деген сұрақ қойып алып, ары қарай талдау жасап, ол талдауларды бір топ философиялық ойларымен таразылайды. Мәселен, Абай бұл тұрғыда тек қана өз халқының туындыларына ғана зер салмай «һәмма ғылымға белгілі данышпандар әлдеқашан байқаған» - деп өзінің ой-өрісінің кеңдігін, дүние жүзіне белгілі данышпан адамдар, ғалымдар, ойшыл-философтардың еңбектерімен таныс екенін білдіре келе: «Әрбір жалқау кісі қорқақ, қайратсыз тартады; әрбір қайратсыз-қорқақ, мақтаншақ келеді; әрбір мақтаншақ – қорқақ, ақылсыз, надан келеді; әрбір ақылсыз – надан, арсыз келеді; әрбір арсыз жалқаудан сұрамсақ, өзі тыйымсыз, өнерсіз, ешкімге достығы жоқ жандар шығады» - дейді. Абайдың осы сөзінде пайдаланылған философиялық

категорияларға зер салсақ: қорқақ-ақылсыз, қорқақ-мақтаншақ, қорқақ -қайратсыз, ал қорқақ категориясы жалқаулықтан туындайтынын ашық айтып отыр [4].

«Құлық саумақ көз сүзіп, тіленіп, адам саумақ – өнерсіз иттің ісі. Әуелі құдайға сыйынып, екінші өз қайратыңа сүйеніп еңбегіңді сау, еңбек қылсаң, қара жер де береді, құр тастамайды» - дейді Абай. Абай айтқан құлық сауу, көз сүзу, тілену, адам сауу (адам қанау) – өнерсіз иттің ісі. Ал мұндай теріс мінезден арылу үшін Абай қандай кеңес береді – еңбегіңді сау дейді. Ал еңбекті сауу үшін бос күлкіден, жарамсыз қылықтан, мақтаншақтықтан арылғанда ғана өнерсіз иттіктен кетесің дейді. Абай өнерге үйрену мәселесі адамның өміріндегі ең бағалы да қажетті іс екеніне көзімізді жеткізді. Бүгінгі өмірдің тауқыметі базар, нарық экономикасының ауыртпалығына тіреліп отырған халқымыздың мән-жайы, одан туындап отырған кеселдер сол Абай заманында да, бүгін де белең алып отыр. Ол Абай айтқан «Құлық саумақ көз сүзіп, тіленіп, адам саумақ – өнерсіз иттің ісі» - дегендей құлық, көз сүзу, тілену, адам адамның еңбек ақысын жеу арқылы өзінің мал мүлкін молайту, жастарымыздың, қала берді үлкендеріміздің де ісі, бүгінгі таңның ең бір жағымсыз қылықтарының бірі екеніне бәріміз де куәгерміз.

Сондықтан Абай шығармалары арқылы отбасындағы да, қоғамдық ортадағы да тәрбиеде балаларды еңбек ете білуге, еңбексіз бос отыра алмайтындай сезімге тәрбиелеу басты нысана болуы тиіс. Сонда ғана отбасы мүшелелері арасындағы қарым-қатынаста әдеп-инабат, адалдық пен ақпейілдік үстем бола алады.

Абай мұрасының тәрбиелік мәні, тағылымдық бағыт бағдары тұрасында сөз қозғағанда, алдымен ойға оралатын Абайдың өз басының адамгершілігі. Ақыл мен қайратты, білім мен адамгершілікті тең ұстаған ақын шығармаларына деген ілтипатымыз, құштарлығымыз бүгінгі күн санап артқандай болса, ал мынау нарықтық экономика қыспағында қысылып жүрген жағдайда ақын шығармаларына, оның терең мағыналы, күні бүгінге дейін мәнін жоймаған ой-тұжырымдамаларына деген қажеттілік одан да артық. Оның кіршіксіз, таза, ақ жүрегінен тебірене туындаған жырларынан адам жанына әл қуат беретін, жанға жайлы, ыстық леп ескендей. Бар асылын, ойын замана жастарына, келер ұрпаққа да арнады. Оның шығармашылық қызметінің негізгі мұраты – адам тәрбиесі. «Адамның білімі, өнері – адамшылықтың таразысы» деп санаған Абай білімді барлық атақ, құрмет пен бедел, байлықтан жоғары қояды. Ақын адамның ең қымбат кезі – жастық шақты оқуға, ғылымға, жұмсауды еске салады. Ойын-сауықты кейін қоя тұрып, алдымен ғылым жолында еңбек ет, ізден, білімдіден үйрен, үлгі ал, солардай болуға тырыс дей келе:

«Дүние де өзі, мал да өзі

Ғылымға көңіл бөлсеңіз...», - деген тұжырым ұсынады.

Шын мәнінде нағыз адам болу үшін адамгершілікке тән, жағымды жақсы қасиеттер, жақсы сипаттар – адамдық, әділеттік, достық, махаббат, ар-намыс, сабырлық, батырлық т.б. толып жатыр. Солардың ішінен ақын жастардың бойындағы адамгершіліктің негізгі қасиеттері, «Бес асыл іс»: талап, еңбек, терең ой, қанағат, рақым туралы даналық ой қозғауының өзіндік мәні бар. «Бес дұшпан» - Абай айқындап берген адамгершілікке жат этикалық-әдеп нормалары.

Адамды адам етіп тұрған Ар екендігін, тіпті өлім төніп тұрса да Ар сатуға болмайтындығын, халық санасында «өлімнен ұят күштіні» терең түсінген Абай – қазақтың тарихына ой жүгірте отырып: «Аты аталып, аруақ шақырылған жерде ағайынға өкпе, араздыққа қарамайды екен...», «өзіне ар тұтқан жаттан зар тұтады», - деп түйеді. Абай түсінігінде әр адамның ең үлкен күнәсі, міні, өзінің өз ары алдында жасалған рухани қылмысы – арын сату, арсыздыққа салыну, ұяттан безу. «Ант ішіп күнде берген жаны құрсын, Арын сатып тіленген малы құрсын, Қысқа күнде қырық жерге қойма қойып, Қу тілімен құлық салған заңы құрсын». Адам болудың бір шарты – Ұят деген ұғымды бойға сіңдіру. Ұят

дегеніміз – адам бойындағы адамгершілікке жат, жаман қылықты, істі өз мойнына алып, өзіңді-өзің сөгү, өзіңе-өзің ұрсу, өзіңді-өзің дұрыс, әділ, адал жолға салу дейді.

Ақын адамгершілік, мораль мәселесін сөз еткенде жақсылыққа: адамшылық, адалдық, әділеттілік, берекелік, достық, білімділік, еңбеккерлік, терең ойлылық, ерлік, жомарттық, қайраттылық,, кісілік, қанағатшылдық, рахымдылық, махаббат, арлылық, намысқойлық, сабырлық, сертке беріктік, табандылық, татулық, тәуекелшілдік, шүкіршілік т.б. қасиеттерді, жамандыққа: арамдық, азғындық, айлакерлік, парақорлық, арызқойлық, тәкаппарлық, сараңдық, алдампаздық, сайқалдық, даңққұмарлық, әділетсіздік, әдепсіздік, пәлеқорлық, паңдық, әсемпаздық, бақастық, борышқорлық, өсекшілдік, надандық, менмендік, әсемпаздық, еріншектік, әулекілік, есерлік, жалақорлық, мақтаншақтық, жарамсақтық, залымдық, жылпос-тық, қияңқылық т.б. жиіркенішті мінез-құлықтарды жатқызады. Абайдың негізгі этика, адамгершілік, түсініктері әділдік пен әділетсіздіктің ұғымдық мәнін, арақатынастарын түсінуге арналған. Абайдың адамгершілік туралы, Адам деген атқа лайық сілтеген бағыттары, көрсеткен жолдары ақынды бізге жақындата түседі.

Абай өткеннің ғана Абайы емес, біздің қасымызда жүрген, қазақ халқының басына қиыншылық түскенде дем беруші, рух беруші пайғамбарымыз, рухани көсеміміз. Абайдың адамгершілік туралы этикалық ойлары, пікірлері өз халқының ұрпақтарына әрқашан қуат бере бермек. Содан бері оның артына қалдырып кеткен мұрасы елі мен жұртының рухани өміріндегі қай бұрылыстар мен қай құбылыстар тұсында да айнымас темірқазық, адастырмас құбыланама болып қызмет етіп келеді

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Historical Sciences

IDEAS OF NATIONAL EDUCATION AND EDUCATION OF THE INTELLIGENTSIA "ALASH"

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In the centuries-old Kazakh history, the Alash movement is written in unusual letters. He set the path of cultural and spiritual development of our nation as a historical and political phenomenon on a new path. After all, it was an innovative movement that, emphasizing that the Kazakh child has risen through the ranks of politics, education and culture, can now live independently as a nation, freely live as a people equal to other countries. The Alash intelligentsia raised such fundamental issues as raising national consciousness, instilling the resulting history, art and culture of the Kazakh generation.

The Alash intelligentsia has a lot of educational knowledge, which it extracts from its multifaceted heritage, their moral actions. Therefore, without considering the Alash movement as a historical event of a bygone era, we must value it as a set of new trumps of modernity, attach importance to what is intertwined with the pedestal of independence today, and draw instructive lessons from it.

The position of "Alash" is the position of the people, the Nation. "Alash" will live the same way as the Kazakhs. The idea of "Alash" is the idea of preserving the spiritual and cognitive values and educational positions of the people, passing them on to generations. The main goal, a huge task in the political and spiritual struggle of the Alash intelligentsia is to consolidate our nation, thereby defining our country, within the framework of such a grandiose matter, the question arose of preserving the native language, promoting national identity, and not deviating from traditions and customs.

Each of the leaders of Alash attached special importance to the issues of education and political and public life, being well aware that this is a powerful phenomenon uniting the entire nation. Therefore, the problem of education occupied a special place in the content of such a large movement as Alash. The works of the intelligentsia dedicated to our native language, educational works and various types of struggle for the Kazakh language, which formed the era of the national liberation struggle, are a legacy, a life commandment to the Kazakh child, who today is both a free and a free language. The diversity of the works of the Alash intelligentsia is a deep and comprehensive understanding of their importance in the fate of the nation.

There were great people in the Kazakh people who worked a lot on such an educational and educational matter. One of them, one of the Arys Alash, one of the Tuar citizens of the era in which he lived, one of the patriots of his people, the writer Magzhan researched and laid the foundations of ethnopedagogy.

M. Zhumabaev is a lyric poet, translator, and teacher-scientist. Along with writing dozens of poems, hundreds of lyrical poems, Magzhan Zhumabayev, working as a teacher, wrote the first pedagogical textbooks. He invented and introduced hundreds of new pedagogical terms into our language.

M. Zhumabaev's scientific work "Pedagogy" is aimed at educating future generations. The purpose of his pedagogy:

1. education of the mind,
2. education,
3. Beauty education,
4. Physical education.

The education of the mind is when you think straight, decide correctly, find accurately. And beauty education is a wonderful word, a magical tone, a beautiful view and excitement. In addition, the issues of physical education – hot and cold, health preservation are considered.

Let's focus on the psychological foundations of these four educations. So: the intellectual, creative development of a person in the education of the mind. Behavioral psychology in the formation of personal qualities of a person in behavioral education. I drew attention to an important issue in character formation. The second education of beauty. This is the correct formation of a culture of speech, techniques and rules of communication. In addition, physical education addresses the problem of the psychology of human health, observance of a healthy lifestyle.

There are several other types of education in the field of pedagogy. But M. Zhumabayev's emphasis on four educations is intertwined with an approach born of the demands and demands of that time. Economic, environmental and legal education, as it is today, is not a sufficiently relevant issue. He explains the four types of this upbringing and says: "If all these four types of upbringing were given to a person smoothly, then his entire upbringing was complete. If a child is of strong build, straight-thinking, correctly deciding, accurately finding, a beautiful word, a magical melody, enjoying a beautiful view, exciting the soul, disgusted with evil and wishing for good, then only if the person has received the right upbringing and has become a real person... let the four educations be carried out correctly," M. Zhumabayev emphasizes the importance of the goal of education.

M. Zhumabaev divides his textbook "Pedagogy" into 5. They:

1. General pedagogy. It shows the ways of educating a person's physical and mental strength.
2. Didactics. Shows the main learning paths.
3. The methodology. They based it on the main ways of learning and saw how to teach a certain subject.
4. School management. This subject is devoted to how a school should be built, how it should be managed, how to assign students to tests, how to set the time of study.
5. The History Of Pedagogy. How people treated different parenting at different times, what paths they followed, what knowledge they passed in the world of parenting, what new ways they found. The history of pedagogy tells about this.

The ideas of mentoring and mentoring in the works of the great M. Zhumabayev are very valuable things for us. The author's direction on mastering the rich educational heritage of his native people is also welcome.

According to M. Zhumabayev, "since the education of the nation has been a proven path since ancient times, every educator should be without words, the education of the nation and an acquaintance. This nation is obliged to educate and educate".

Magzhan studied psychological science and pedagogy in depth, studied Kazakh folk pedagogy scientifically and left valuable things necessary for the education of future generations according to K. D. Ushinsky, the father of Russian pedagogy.

Kazakh intellectuals and academic teachers Sh. Kudaiberdiev, Zh. Aimauytov, A. Baitursynov, M. Zhumabaev, M. Dulatov, etc. Along with the problem of opening a school in their native language, they called for the awakening of national consciousness in the educational

process of moral traditions, customs, oral creativity of the people, to which special attention was paid to the use in order to form their worldviews.

The works of psychologists V. Stasov, M. Zhumabaev, J. Aimaurov, M. Mukanov, S. Kaliev, K. Zharylbaev, who studied the ethnopsychological nature of the Kazakhs, characterize the importance of psychological and ethnopsychological sciences in the development and upbringing of a child, his formation as a personality. And also to study the pedagogical thoughts and ideas of medieval scientists Al-Farabi, J. Balasagun, M. Kashgari, enlighteners Sh. Ualikhanov, I. Altynsarina, A. Kuanbaev, who left a legacy in the samples of Kazakh ritual, customs, traditions, national art and oral literature, every teacher is obliged to educate and develop the minds of students in accordance with the requirements of modernity. But still, the development of a child's national character, the study and cognition of his soul and the formation of national behavior in a child requires a great seeker in psychological science.

Shakarim Kudaiberdiev in his work "Three Clarifications" theoretically reveals many issues of education, considers morality as "the doctrine of the art". Proving that the content of conscience is justice, mercy, he connects them with the concept of humanity. This was aimed at shaping the behavior of the individual. It was based on the upbringing of her spiritual and moral qualities, a sense of kindness.

In the philosophical work of Sh. Kudaiberdiev "Three clearnesses", the problem of spiritual formation of personality is of particular importance. The spiritual consciousness of the individual in his works "soul, spirit" is the development of the meaning of life, his place in life, the ability to understand his fate as common with the fate of the people, awareness of responsibility to loved ones, fulfillment of his inherent civic and moral duty, the formation of unity of moral and spiritual virtues of the soul and spirit, the body can understand what is happening out of harmony.

The work of Sh. Kudaiberdiev "Three Clearnesses", demonstrating the relationship between soul and body, calls for reasonableness, education of intelligence, benevolence, and the formation of harmony of mind and character. His main principle was to cultivate and cultivate a sense of self-worth, a pure mind, to cultivate black and white, good thoughts and bad thoughts, the ability to distinguish, to find a straight path, his place in life.

Thus, the Alash movement is the Kazakh idea of statehood of the XX century. The Alash movement is the leader of an innovative Creator. Although all the figures of Alash were destroyed, their ideas continued in the minds of the Kazakh people, in the actions of the immortal sons. The spirit of Alash appeals to the current generation with an appeal to the people, unity, and the ability to faithfully serve the country. Calls for the strengthening of independent Kazakhstan. The idea of yesterday's Alash is an independent Kazakhstan today! After gaining independence, the topic of the previously banned Alash movement is now being studied again as an important component of our national history. It is necessary to carefully study the life and deeds of the Alash intelligentsia, evaluate their achievements, learn from their mistakes, evaluate wisdom and comprehend the truth they have discovered. Learning from the past of our country, we should not make mistakes in today's updates.

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Радио и Тоталитаризм

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Рождение тоталитарных государств 20 веке не случайно совпало с появлением новых технологий массовой коммуникации пропаганда и контроль над медиа это не только опора тоталитарных режимов но и фундамент для их строительства , это приводило к интересным последствиям тоталитарные государства поощряли и спонсировали развитие СМИ и стремились как доступности для всех граждан ведь иначе есть риск что граждане не услышат то что нужно вложить им в головы . Радио не всегда было важным политическим инструментом эту технологию созданную в конце XIX века то ли Маркони то ли Поповым то ли вообще Теслой до 20-х годов использовали в основном для передачи сообщений вышедших в море судов качество звука было не очень так что чаще пользовались азбукой Морзе. Во времена Первой мировой радио оставалось почти эксклюзивно военной технологии передача депеш без проводов и без задержек стало вестью в военном деле помимо скорости у радио было другое важное преимущество его можно было внезапно слушать , Сейчас то не нужно никому кроме пользователей Дискорда а тогда это имело решающее значение тем более что с умением читать даже в развитых странах в 30-х все было куда хуже чем сейчас. Став массово доступным радио сразу же оставила далеко позади и печатные СМИ и тем более книги по охвату живой аудитории. Ну на то аудитория и называется живой что хочет переживать события в тот момент когда оно происходит, И впервые это стало по-настоящему возможно вопрос был только в том что это были за события и кто выбирал каких событиях собственно услышит. Дело было в том что изначально во-первых многие радиочастоты уже были так скажем забронированы и забитые военными кстати очень похожая история в наши дни уже происходит с форматами 4G и 5G, Но а во-вторых на тот момент многие печатные СМИ все еще зарабатывали посредством продажи непосредственно экземпляров а не только за счет рекламы а с радио по очевидным причинам такая схема была невозможна и было не очень понятно за счет чего радио можно монетизировать . Так что во многих странах радиовещания очень быстро оказывалось в руках государства Первая мировая порождение индустриальной эпохи стала одним большим черным пиаром для новых технологий европейские интеллектуалы стали скептически относиться к инновациям особенно к связанным с военной сферой оказалось что именно массовое общество материализм и технологии довели европейскую цивилизацию до кризиса и новый мир после Великой войны должен стать иным. Радио уверенно шагало по планете в 1920 радиоприемники были лишь в нескольких тысячах домов через 5 лет их число перевалило за 6 миллионов. Во многих странах стали образовываться местные вещательные компании в 25 году в Женеве был создан международный вещательный союз который должен был объединить сначала всю Европу а потом и весь мир в единую сеть радиостанции. Через год между странами участниками было заключено так называемое джентльменское соглашение которое предполагало что никаких агрессивных оскорбительных и уж тем более националистических материалов не будет транслироваться ничего не должно было вносить разлад международные отношения . Сразу после подписания джентльменского акта вследствие территориальных споров венгерской радиостанция начала бесовестно обвинять правительство Чехословакии на любые попытки вмешательства Вещательного союза Чехи отмечали что это проблемы Центральной Европы и вмешиваться в них не стоит. Вскоре произошло еще несколько инцидентов шовинистической пропаганды стало понятно что без какой-то серьезной силы без какого то

действительно настоящего давления контролировать радио пространство попросту невозможно. Вещательный союз обратился к Лиге Наций с просьбой связать национальные государства ограничениям по вещанию всякой враждебной пропаганды на радио, Но предложение конечно же было утопическим .

Но почему же вопрос националистической пропаганды в итоге остался без особого внимания лиги ведь он активно обсуждался в одном из бесчисленных комитетов Лиги наций в международном комитете по интеллектуальному сотрудничеству в котором среди прочих числились например Томас Манн , Альберт Эйнштейн , Мария Кюри и так далее вот всё бы ничего но проблема заключалась в том что конкретно радиовещания никто не рассматривал всерьез интеллектуальная элита попросту не включала эту технологию систему своих координат это не было частью их культурного мира в отличие от мира различных тоталитарных диктатур. Только 1928 году Лига Наций начала проявлять хоть какой то интерес к радио пропаганде тогда Париже был подписан знаменитый пакт Бриана Келлога запрещавший использовать войну как орудие национальной политики , Европа начала создавать систему коллективной безопасности которая кстати тоже окажется полным провалом но тем не менее вскоре Парижский пакт подпишет все существовавшие на тот момент страны мира лига наций таким образом все таки встал на защиту радиовещание от все различные враждебные пропаганды, Кроме того намеревалось совершенно романтическом стиле или нации превратить в самое радио пространство в инструмент насаждения идеи правильных за всё хорошее против всего плохого . Политики Лиги Нации все таки наконец то взялись за радио и очень вовремя потому что вскоре мир начнет трясти. В 1930 чем сложнее становилась международная обстановка в Европе тем важнее становилась роль радио в нем, в ноябре 1929 рухнул Уолл стрит , крепчали тоталитарные режимы в Италии , Германии и Восточной Европе попытки прежним образом регулировать обострившиеся проблемы кончались в полном провале все началось с Польской Германской границы в районе верхней Силезии где радио стало использоваться как инструмент давления. Еще в 20-х этом регионе начали работать немецкие радиостанции которые совершенно беззастенчиво заявляли о претензиях к Германии населению естественно все это было слышно на той стороне в ответ же немцы слушали польские радиостанции и засыпали под польские националистические гимны конфликт с трудом на урегулировали силами Лиги Наций и Вещательного союза.

Но все стало совсем сложно когда в 30-е годы международная политическая обстановка стала накаляться первопроходцам использования радио в политических целях стала фашистская Италия. Несмотря на то что радио как считают везде Кроме стран СНГ было изобретением итальянцев Гульельмо Маркони самих радиоприемников в Италии по иронии почти что и не было когда Муссолини взял власть в октябре 22 Италия плане радио была страной крайне отсталый то же сам Маркони будет писать Дуче уговаривая его спонсировать распространение радио по всей стране учёные прозорливо отмечал что создание подконтрольный государству национальной радиостанции вводит весьма мудрым решением ну кому как не создателю технологии знать о перспективах и возможностях этой технологии но Муссолини медлил поначалу радио в Италии развивалась за счет частного бизнеса хотя перед каждой трансляцией обязательно включалась фашистская песня . В 1926 году в стране было уже целых 3 радиостанции и примерно в это же время Дуче прозрел относительно их пропагандистских возможностей «радиоустановка может быть отличным информационным ресурсом особенно для жителей маленьких деревень у которых для развлечения нет даже кинематографа как много сердец будет биться услышав голос дуче все это значит одно радио должно быть распространено по стране и распространено в кратчайшие сроки» Вскоре появились специальные государственные комитеты которые занимались цензурой контента на радио причем касалось это еще и музыки литературы

театров и так далее новостями же Муссолини разрешил заниматься только одному опять же подконтрольному государству информационному агентству. В конце концов фашисты сосредоточили в своих руках власть над радио но вот только Муссолини и его сторонники пока что не очень понимали что согнут собственно делать настоящую государственную пропаганду им еще предстояло изобрести. В середине 1920-х Итальянское радио начало успешно проводить трансляции спортивных матчей ревущие трибуны заполненные фанатами натолкнули правительство на мысль что таким же образом можно записывать и живые выступления фашистских вождей самые важные трансляции велись с Пьяцца Венеция площади в центре Рима где Муссолини со своего балкона обращался к толпе встречами к 1926 на всю 40 миллионную Италию приходилось около 27000 радиоприемников. Учитывая что радио тогда слушали большими компаниями это все равно были очень маленькие охваты и зачастую проникновенные речи идущие попросту никто не слышал , конечно у него были свои ораторские триумфы на радио но это были скорее исключения , радио все еще не было повседневностью но уже были видны очертания Того как сильно радиотрансляции могут влиять на общественное мнение радио поможет связать итальянцев единую нацию под руководством фашистской партии нужно только покрыть как можно большую аудиторию правительство стало поставлять радиоприемники в сельские школы университеты рекреационные организации которые вообще отдельная тема для разговора Муссолини заявил что радио станет связующим звеном между городом и деревней для Италии это вообще важная проблема её аграрный Юг всегда был беднее организованного севера такой разрыв мешал построению тоталитарного государства и делал сельские районы страны совершенно невосприимчивыми к фашистской пропаганде. Так вот теперь учителя сельских школах должны были включать радио на уроках истории на уроках права и так далее так что теперь голос Муссолини услышала вся Италия.

В 30-е появилась полноценная министерство пропаганды и министерство народного просвещения оба министра отчитывались непосредственно перед Дуче на радио появилось передача хроники режима отчитывавшаяся успехах и урожаях а сама пропаганда наконец то приобрела свой узнаваемый характерный эмоциональный стиль который потом позаимствует у итальянских коллег профессор Геббельс.

Так или иначе практики государственной пропаганды успешно перекечевали из Рима в Берлин и уж там то по-настоящему расцвели пропаганда в Германии провоцировалась агрегацию расовое превосходство и милитаристские настроения гораздо беззастенчивые а главное эффективнее чем это было в Италии , сразу после прихода к власти в 33 году Гитлер полностью подчинил государству все радиовещание а заодно прессу , кинематограф , школы и профсоюзы . Монополизация медиaprостранства нацистами была проведена прямо скажем молниеносно , следом Германия вышла из Парижского пакта а потом и самой Лиги наций все международные соглашения о запрете распространения национализма с помощью пропаганды и новая нацистское правительство конечно отвергло на начавшейся вскоре конфликт между Германией и Австрией но поворотной точкой в международном радиовещании некоторые историки называют этот конфликт радиовещательной войной или войной за радиоволны началось все с Того что Австрийская радиовещательная компания начала протестовать против Того что немцы заняли практически все частоты вдоль австрийской и немецкой границы где они в общем рассказывали о том что Австрию пора уже включить в состав рейха и всячески поддерживать своих сторонников в Австрии.

Австрия обратилась в международные органы с просьбой ограничить немцам радиовещание на что Германия заявила что это всё для внутреннего слушания . В итоге международное сообщество оказалось беспомощным никакие его попытки естественно ни к чему не приводили и Германия по факту поставила крест на попытках ограничивать радиовещание в Европе на фоне выборов в Австрийский парламент все эти противоречия

обострились опасаясь победы местных нацистов канцлер Дольфус распустил парламент деятельность НСДАП была запрещена не под угрозой оказалась и Австрийская нацгвардия начался политический кризис .

Подготовив почву пропагандистскими атаками по радио и спровоцировав кризис в 3 рейх в конце концов поглотило Австрийское государство . С ледующий важной вехой в историю радио пропаганды стала гражданская война в Испании которую некоторые историки называют репетицией 2 мировой помимо прочего это была не 1 полноценная информационная война где были применены все последние технологии и радиовещания , вмешательство в Испанский конфликт Национал-социалистов и Фашистов с одной стороны и Большевиков с другой в очередной раз показала абсолютную беспомощность Лиги Наций и всех её бесчисленных комитетов . Испанские республиканцы поддерживаемые СССР контролировали большую часть радиостанций городов то время как Франкисты нам приходилось использовать мобильные точки но и те и другие крайне активно использовали радио для пропаганды собственных воззрений . Коминтерн мобилизовал все свои логистические возможности чтобы поддержать республиканцев в Испании в пресс офисах компартии по всей Европе активно шел набор волонтеров на испанский вот и вся эта деятельность координировалась мощнейшими пропагандистскими кампаниями по радио Коминтерн впервые с помощью новейших средств коммуникации мог объединить всех коммунистов Европы и попытаться создать ощущение братства и единения перед угрозой со стороны национальных .

Антибольшевистская пропаганда тоже цвела буйным цветом из Германии Франкисты поставляли свеженькие новенькие радиопередатчики и радиоприёмники ну а итальянцы просто транслировали своей передачи поддерживавшие Франко на всю территорию восточной Испании . СССР использовал позитивную пропаганду напирая на то как социализм спасет Европу которая просто катится к своему концу, нацисты же использовали негативную пропаганду они делали акцент на угрозе этого самого социализма и этого самого СССР но без стороны были схожи в методах ведения информационной войны они прекрасно понимали за что они борются за общественное мнение . Тоталитарная пропаганда конечно часто прикрывалась благородными целями итальянские фашисты прибирают к рукам все рычаги управления общественным мнением говорили о ликвидации отсталости деревни о создании современного общества ну в то время как истинная задача конечно же была иной фашизм просто не мог существовать без создания такой особой массовой культуры . Нацисты же как и во всем пошли дальше своих Итальянских предшественников революционная цель нацистского режима заключалась в создании классовой гармонии и сплочённого немецкого народа . Амбициозным целям должна была соответствовать слаженная работа госпропаганды 3 рейх с самого начала стал переобучать немецкое население в духе нацистской идеологии занималось этим конечно целая куча государственных ведомств от местных администраций до гестапо . После того как Гитлер стал рейхсканцлером он достаточно редко использовал радио для трансляции своих вещей возможно потому что не хотел чтобы их записал я не знаю но тем не менее он ценил устное слово и считал что то что человеку не нравится он вряд ли будет читать но обязательно остановится послушать так что в итоге он много и с удовольствием выступал по радио после прихода к власти нацистов его выступления стали широко транслироваться по всей Германии его речи по радио предваряло Сообщение от министерства народного просвещения и пропаганды. Министерство пропаганды кстати было куда влиятельнее своего Итальянского аналога из ведения мвд им были изъяты все вопросы пропаганды контроль над прессой , радио , кино над рекламой выставками ярмарками и над всей работой зарубежным потребителям все это стало заботой министерства пропаганды и его бессменным руководителем экс-министра Йозефа Геббельса . В его руках помимо прочего

оказалось радиовещательная корпорация Германии с 26 миллионами радиослушателей чуть меньше половины населения страны . Огромное внимание кстати уделялось зарубежному вещанию в 38 году суточная продолжительность передач на экспорт составила для стран западного полушария 22 часа Африки 8 часов и Азии 21 всего около 40% из них велось на немецком под конец режима вещание велось уже на 53 языках . Одно из главных целей немецкой точечной пропаганды стала Великобритания за нее отвечал Уильям Джойс регулярно выходивший в эфир на английском языке и рассказывавший жителям британских островов о прелестях нацистского режима , в 46 году его казнят за измену . В мире кажется больше не было пропаганды более успешной чем немецкая и никогда последствия пропаганды не были столь ужасающие использование радио как инструмента пропаганды конечно никуда не делается падением тоталитарных режимов в Италии Германии оно все также использовалось в СССР и в условиях холодной войны против него вспомнить хотя бы тоже Радио Свободы . Во многом режим Мао в Китае был также установлен при помощи пропаганды по радио. Однако послевоенные годы развития информационных технологий резко пошло в гору изобретение в 50-х транзисторных приемников стало настоящей революцией в сфере массовых коммуникаций ведь в 30 радио это такая большая коробка стоящая дома и которую невозможно передвинуть или репродуктор на площади слушали радио естественно в основном большой компанией или всей семьёй . Все это составляло значительную часть того тоталитарного эффекта который влиял на людей в эту эпоху . Радио которое можно носить с собой вытеснило этот коллективный опыт в небытие и так же как радио в свое время заменила агитационные листовки телевидение в вопросе формирования общественного мнения вытеснило радио которое пришло к другим форматам вроде музыки коротких новостей и спорта Правда если в США это произошло уже в 50 кто в Советском Союзе этот процесс до конца так и не завершился ну просто в силу дороговизны телевизоров в СССР в доступность радио вызвало такой бум увлечения этой технологией что он не спадало до самого распада страны . Любой диктатор межвоенной периоды строил свою тоталитарную риторику в отношении радио и пропаганды на том что это путь к будущему это путь новых технологий это путь к построению нового лучшего мира в этом смысле технологии 20-го века вполне естественным образом сопровождали марш тоталитарных режимов на планете . Попытки радио энтузиастов построить новое международное общество без агрессии конфликтов оказались полностью бесплодными как только набиравшие в Европе силу тоталитаризма осознал все возможности радио технологии то все институты и органы которые пытались как-то контролировать радио пространство тут же оказались совершенно беспомощными . Если перед битвой при Аустерлице Наполеона обращавшегося к своей армии слышали в лучшем случае пара полков то Адольфа Гитлера вещавшего о смертельной битве за германскую нацию внимательно слушали десятки миллионов людей и конечно рейх как и другие режимы черпал немалую часть своих сил именно из этого внимания и лучшим образом то как это происходило описал 33 году будущий лауреат Пулитцеровской премии Эвлин Брукс Уайт когда люди говорят радио они не имеют ввиду кабинет электрический феномен или человека в студии они обращаются к всепроникающему и в некотором роде божественному присутствию вошедшему в их дома и жизни .

Architecture

Роль формирования архитектурных освещений: создание атмосферы и функциональности

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Аннотация: Данная статья посвящена роли освещения в архитектуре и его влиянию на внешний облик зданий, городскую среду, а также внутренние архитектурные пространства. Рассматривается важность освещения для выделения архитектурных деталей, создания настроения, комфорта и функциональности помещений.

Так же обсуждают аспекты формирования архитектурных освещений, включая учет формы и функции здания, влияние на окружающую среду, энергоэффективность, а также визуальные и психологические аспекты освещения.

Ключевые слова: Инфраструктура, магистраль, конструкция, светораспределение, пешеход, гармония, прожектор, пространство.

Аннотация: Бұл мақала сәулет өнеріндегі жарықтандырудың рөліне және оның ғимараттардың сыртқы келбетіне, қала ортасына, сондай-ақ ішкі сәулет кеңістіктеріне әсеріне арналған. Сәулет бөлшектерін ерекшелеу, бөлмелердің көңіл-күйін, жайлылығын және функционалдығын жасау үшін жарықтандырудың маңыздылығы қарастырылады.

Сондай-ақ сәулеттік жарықтандыруды қалыптастыру аспектілерін, соның ішінде ғимараттың нысаны мен қызметін, қоршаған ортаға әсері, энергия тиімділігін, сондай-ақ жарықтандырудың көрнекі және психологиялық аспектілерін ескере отырып талқыланады.

Негізгі сөздер: Инфрақұрылым, тас жол, дизайн, жарықты бөлу, жаяу, гармония, прожектор, кеңістік.

Abstract: This article is devoted to the role of lighting in architecture and its influence on the external appearance of buildings, the urban environment, as well as internal architectural spaces. The importance of lighting for highlighting architectural details, creating the mood, comfort and functionality of rooms is considered.

They also discuss aspects of the formation of architectural lighting, including taking into account the form and function of the building, the impact on the environment, energy efficiency, as well as the visual and psychological aspects of lighting.

Key words: Infrastructure, highway, design, light distribution, pedestrian, harmony, spotlight, space.

Архитектурное освещение играет важную роль в создании уникальной атмосферы и выделении ключевых архитектурных элементов здания, как внутри, так и снаружи. Оно оказывает влияние на восприятие здания и его окружения, способно преобразить ночной городской пейзаж, подчеркнуть его красоту и функциональность.

Освещение внешних архитектурных объектов.

Внешнее освещение зданий имеет способность преобразить городскую среду, превратить ночной пейзаж в чудесное пространство. Оно способно подчеркнуть архитектурные детали здания, выразить его функциональное предназначение, а также создать приятную атмосферу для людей, находящихся в окружении освещенных зданий.

При организации освещения транспортных магистралей, безопасность движения на дороге является главным приоритетом. Для этого используются светотехнические решения, которые направлены на:

- Обеспечение необходимого уровня освещенности для четкой видимости дорожной обстановки.
- Создание равномерного освещения.
- Контроль прямой и отраженной блескости на приемлемом уровне.
- Соблюдение требуемых характеристик источников света.
- Обозначение направлений движения для транспорта и пешеходов.

Помимо этих основных принципов, при освещении транспортных магистралей необходимо учитывать особенности различных дорожных ситуаций. Например, при размещении осветительных устройств на уровне глаз важно предотвращать ослепление пешеходов и водителей. Использование экранированных источников света помогает снизить ослепление до минимально допустимого уровня. С увеличением числа любителей активного передвижения на велосипедах, самокатах и роликовых коньках, важно, чтобы освещение обеспечивало хорошую видимость для выявления мелких препятствий на дороге, таких как дефекты покрытия, мусор, или другие предметы, которые могут стать причиной травм для участников этих видов транспорта. Также стоит учитывать, что пешеходы перемещаются медленнее по сравнению с автомобилями, что облегчает адаптацию их зрения к резким изменениям яркости и снижает риск возникновения аварийных ситуаций по сравнению с быстрым транспортом.

В случае, когда безопасность движения на дороге имеет первостепенное значение, для повышения эффективности и экономии предпочтительны консольные и подвесные светильники, устанавливаемые на опорах или подвесках над дорогой. Если в области преобладает пешеходное движение, чаще всего используют венчающие светильники. Для освещения крупных транспортных развязок, автостоянок и промышленных зон применяют прожекторы. Особое внимание уделяется туннельным светильникам, которые специально разрабатываются таким образом, чтобы не создавать временного ослепления водителей даже при низком расположении над дорожным полотном. При проектировании яркости таких светильников учитывается различие освещения внутри тоннеля и за его пределами, разделяя внутреннее пространство тоннеля на световые зоны для удобства адаптации зрения. Оптическая конструкция дорожных осветительных приборов предусматривает равномерное распределение света вдоль оси дороги. Техническое обслуживание таких светильников облегчено благодаря возможности замены ламп и проведения технических работ без демонтажа всего устройства. Все указанные светильники изготовлены с учетом антивандальных мер, что подразумевает прочный корпус и защиту от несанкционированного доступа к его элементам управления.

В жилых районах, где находятся пешеходные зоны и развитая транспортная инфраструктура, наружное освещение в ночное время должно выполнять несколько важных функций:

- Обеспечение безопасности движения транспорта и пешеходов.
- Гарантированная ориентация на местности для легкости перемещения.
- Создание комфортной атмосферы и визуальное улучшение окружающей среды.

Основная цель уличного освещения в жилых районах заключается в обеспечении безопасных условий для передвижения в плотно застроенных зонах, что было подробно рассмотрено ранее. Хорошая ориентация в жилой зоне предполагает способность различать здания, инженерные сооружения, понимание направлений движения и другие элементы окружающей среды. Не менее важно правильно расставить световые акценты для улучшения восприятия графической информации, такой как указатели, вывески с названиями улиц, номера домов и другие элементы, важные для ориентации и удобства жителей и посетителей района.

В ночное время увеличивается вероятность противоправных действий, поэтому при планировании освещения жилых районов необходимо учитывать уровень преступности. Освещение в темное время суток должно обеспечивать возможность различать лица людей на расстоянии, достаточном для избежания нежелательного контакта или для предпринятия мер самозащиты. Исследования психологов показали, что люди чувствуют себя увереннее, находясь на расстоянии не менее 4 метров от потенциальных источников опасности. Исследования европейских компаний, производящих светотехническое оборудование, показали, что с увеличением уровня освещенности в городских районах снижается количество мелких преступлений на улицах. Важное значение имеет охранное освещение, которое не должно ослеплять наблюдателей и необходимо избегать направления света в окна жилых зданий, чтобы недопустить негативного влияния на освещение внутри помещений. В случае невозможности избежать этого, нужно использовать специальные устройства или приборы для направленного светораспределения. Важным фактором для комфортности световой среды является цветовой спектр света, поэтому при выборе светильников важно обращать внимание на тип используемых ламп и их характеристики. На сегодняшний день для жилых и пешеходных зон доступен широкий выбор светильников различных видов и способов распределения света. При использовании естественного дневного освещения, дизайн светильника и его гармония с окружающей архитектурой являются ключевыми факторами. Принцип открытой установки светильников в современных общественных центрах предоставляет дизайнерам большие возможности, позволяя светильникам играть значимую роль в художественной композиции пространства.

Прожекторы используются для заливающего освещения важных объектов в городской среде, которые требуют повышенного внимания из-за своей культурно-исторической ценности или функциональной важности. Главные области использования заливающего прожекторного освещения включают производственно-транспортные зоны, значимые архитектурные сооружения, ландшафтные районы и спортивные комплексы.

Простейший прожектор состоит из корпуса-цоколя для лампы-фары с различными углами распределения света. Существуют три основных группы прожекторов в зависимости от схемы светораспределения: с круглосимметричным, симметричным или ассиметричным распределением света. Используются различные источники света в прожекторах, такие как галогеновые лампы, ртутные или натриевые лампы, выбор которых зависит от требований к освещению: качеству, цветовой температуре и эффективности.

Прожекторы широко применяются для различных целей, освещая большие рабочие площади и объекты, используя высокие прожекторные мачты. Рациональная высота мачт составляет обычно 20-30 метров, чтобы обеспечить оптимальное освещение и экономию на конструкциях и оборудовании. Высота мачт свыше 30 метров применяется в случаях, когда форма территории требует определенного размещения опор. Для освещения промышленных зон рядом с водоемами важно учитывать адаптацию глаз операторов к

низкому уровню освещенности и исключать слепящее воздействие света при размещении мачт. Определение необходимого уровня освещенности поверхностей проводится на основе соответствующих нормативных документов, за исключением специфических зон, где осуществляются работы, требующие особого внимания к освещенности.

Значение освещения в оценке эстетических аспектов архитектуры трудно переоценить. Визуальная структура здания в течение дня зависит от направления солнечного света, создавая игру света и теней, которая выделяет формы архитектурного объекта. Через тщательный анализ естественного освещения и понимание концепции архитектора, хорошо спроектированная система освещения выделяет ключевые архитектурные элементы для правильного акцентирования. Ночное освещение архитектурных сооружений продлевает время их видимости, позволяя увидеть архитектурную красоту даже в условиях недостаточной освещенности, внося новый эстетический элемент в городскую среду. Искусственное освещение формирует эстетически значимую составляющую визуальной структуры города. Примером объемного декоративного освещения архитектурного объекта можно назвать подсветку Храма Христа Спасителя. В данном случае была использована мачтовая схема размещения осветительных приборов. Четыре прожекторные батареи, установленные по сторонам света, выделяют красоту и архитектурные детали Храма. Для этого проекта было использовано оборудование от компании Siteco, которая является частью концерна Siemens.

В архитектурном освещении объектов возможны два основных подхода: либо создание освещения, повторяющего "дневной" образ здания, либо формирование уникального ночного освещения, которое не имитирует природное освещение, а придаёт объекту новые выразительные качества. Для памятников архитектуры и культуры, которым уже присущи определённые зрительные стереотипы, более соответственно первое направление. Примером этого может служить архитектурное освещение Московского Кремля, православных храмов и монастырей. В случае современных сооружений более продуктивным является второй путь. Например, Новый Андреевский мост или бизнес-центр на Красной Пресне отличаются оригинальным ночным освещением. Архитектурное освещение Москвы, реализованное в рамках общей концепции светового оформления города по постановлению Правительства Москвы от 02.08.94 г. №644, вечером придаёт особый характер старому городу через подсветку кремлевских построек и сталинских высоток, а также воссоздаёт древние монастыри и храмы с изящными деталями и куполами. Воплощение концептуальных идей в архитектуре сопровождается использованием новых методов освещения. Комбинации различных приёмов освещения помогают выделить форму здания, подчеркнуть ключевые элементы композиции и достичь художественной выразительности даже на современных строениях. Примерами могут служить освещение цирка на проспекте Вернадского, спортивных сооружений в Лужниках и Дворца молодёжи на Комсомольском проспекте, где новые подходы к освещению помогают создавать уникальные ночные образы и выделять архитектурные детали.

Другой важной причиной, по которой следует уделять внимание декоративному наружному освещению, является его ключевая роль в информационно-имиджевой системе общественных мест, деятельность которых активна в вечернее и ночное время. Освещение становится мощным инструментом рекламы и светового дизайна, особенно в развлекательных заведениях и торговых центрах, где коммерческий аспект играет значительную роль. Важно сохранять баланс между функциональностью и эстетикой декоративного света, особенно в исторических районах.

Анализ рынка наружного освещения в Казахстана показывает доминирование крупных мировых производителей, таких как Siteco (Siemens), Philips, General Electric, iGuzzini, а также LIVAL, HALLA, ARES, DISANO, FAEL LUCE, LANZINI, BEGHELLI. Они предлагают

широкий выбор продукции с разной типологией, что упрощает выбор оборудования для конкретных задач. Среди отечественных производителей лишь Лихославский завод светотехнических изделий предлагает разнообразное наружное осветительное оборудование. Хотя российская продукция уступает зарубежным аналогам в дизайне и технологичности, она привлекательна доступной ценой.

При выборе комплектации светотехнического оборудования важными факторами являются цель использования прибора, его тип, способ монтажа, конструкция и тип крепления, а также выбор лампы с учётом требуемых уровней защиты, таких как электробезопасность, пыле- и влагозащита, климатическое исполнение и защита от механических повреждений.

Эффективное освещение объектов городской инфраструктуры требует не только применения современного оборудования, но и специализированных знаний и навыков в области светотехники. Совместная работа архитекторов и инженеров-светотехников на этапе проектирования поможет создать оптимальную систему освещения для различных зон городской застройки.

В современном городском окружении крупные объекты, такие как торговые центры, спортивные комплексы, бизнес-центры, стремятся привлечь внимание и выделиться. Однако со временем становится сложнее выделяться на фоне конкуренции и обеспечить удобство ориентации для посетителей. Эффективное освещение вечером позволяет подчеркнуть уникальные формы и акценты зданий, облегчает ориентацию, снижает напряжение и помогает привлечь внимание.

Для коммерческих зданий, банков, офисов и других объектов важно обеспечить хорошее освещение в тёмное время суток, выделив их индивидуальные черты и провокативные детали. Освещение всего фасада в специально подобранных тонах помогает привлечь внимание и создать уникальный облик объекта. Это помогает не только улучшить ориентацию, но и подчеркнуть индивидуальность и уникальность здания.

Освещение внутренних архитектурных пространств

Внутреннее освещение архитектурных объектов играет ключевую роль в создании уюта, комфорта и функциональной эффективности пространства. Правильное освещение внутренних помещений значительно влияет на восприятие интерьера, выделяет архитектурные детали здания и повышает производительность и благополучие людей, находящихся внутри здания.

Аспекты формирования архитектурных освещений

При формировании архитектурных освещений учитываются различные аспекты: форма и функция здания, окружающая среда, визуальные и психологические аспекты, а также энергоэффективность. Тщательное планирование освещения позволяет создавать гармоничное и функциональное пространство, учитывая потребности пользователей и внешнюю среду.

Современные технологии в архитектурном освещении

Современные технологии позволяют создавать инновационные и уникальные решения в области архитектурного освещения. Они учитывают не только эстетические, но и экологические и энергосберегающие аспекты, обеспечивая комфорт и безопасность для пользователей, снижая энергопотребление и влияние на окружающую среду.

Современные технологии светотехники позволяют решать разнообразные и сложные задачи, включая освещение олимпийского стадиона "Лужники" с упором на надежную работу оборудования и обеспечение безопасности зрителей в экстремальных ситуациях. Применение компьютерных систем управления и современного оборудования (например, от Siteco) обеспечивает автономность освещения при сбоях в электроснабжении и гарантирует возможность эвакуации через аварийное освещение. Надёжность работы всех

систем обеспечивается высококачественными компонентами от компаний Siemens, OSRAM, CEAG.

Заключение

Создание качественного освещения в архитектуре является неотъемлемой частью современного проектирования. Освещение способно преобразить архитектурное пространство, выделить его красоту, создать уют и комфорт для пользователей. Тщательное планирование освещения и использование современных технологий позволяют создавать уникальные и инновационные архитектурные решения.



Publisher.agency: Proceedings of the 5th International Scientific Conference «Progress in Science» (February 22-23, 2024). Brussels, Belgium, 2024. 217p

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