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PARAMETERS OF WATER REGIME AND DETERMINATION OF PHOTOSYNTHETIC PRODUCTIVITY IN WINTER TRITICALE SAMPLES UNDER CONDITIONS OF WATER DEFICIENCY

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Abstract

In 24 winter triticale samples, the parameters of the water regime (water deficiency, relative water content, water-holding capacity) and the content of photosynthetic pigments were determined. It has been established that with a lack of water, the water-holding capacity increases, water deficiency increases, and the relative water content decreases. The highest stability of water regime indicators, which practically did not change under conditions of irrigation and water deficit, was noted for the TRL-63 sample. The content of photosynthetic pigments in the leaves of triticale samples was determined by the SPAD method. In most samples, chlorophyll degradation occurred to varying degrees. Samples TRL-1, TRL-9, TRL-25, TRL-41, TRL-52, TRL-54, TRL-56, TRL-58, TRL-60, TRL-77/2 can be considered more stable compared to others samples in terms of water holding capacity and relative water content, and the TRL -25 and TRL -60 variants also showed an increase in the content of photosynthetic pigments.

Keywords: triticale, water regime, water-holding capacity, chlorophyll

The current task of agriculture is the selection of varieties of cereal plants that are resistant to adverse environmental factors and are capable of producing high yields and high-quality grain in various climatic and soil conditions. In difficult environmental conditions, the productivity of agricultural plants decreases and their quality decreases. Therefore, for the production of high-quality products, an important condition is to obtain stable varieties and forms that can withstand extreme environmental conditions. Triticale is a hybrid of wheat and rye. This plant combines the grain quality of wheat and the resistance of rye to adverse environmental conditions [1]. Not much research has been done on the stress tolerance of triticale, an evolutionarily new grain crop. Drought tolerance has been studied even less. The development of drought-resistant and productive varieties and lines based on determining the parameters of the water regime deserves special attention. As is known, the water regime of plants is the most important indicator of their resistance to soil and climatic conditions [8]. By studying the water regime of cultivated plants, it is possible to determine the degree of their adaptation to agroclimatic factors [5]. The characteristics of the water regime of triticale, together with photosynthetic productivity and resistance to unfavorable conditions, have not been sufficiently studied.

Since the parameters of the water regime characterize the resistance of plants to water deficiency, in this regard, the purpose of the research work was to determine photosynthetic activity and study the parameters of the water regime under conditions of water deficiency.

Materials and methods

Triticale accession seeds were provided by the Department of Molecular Cytogenetics and grown under irrigated conditions (soil moisture 70%) and water deficiency (soil moisture 35%) under field experiment conditions of the Institute of Genetic Resources. For 24 triticale samples: TRL-1, TRL-4, TRL-7, TRL-9, TRL-16, TRL-24, TRL-25, TRL-26/2, TRL-29/2, TRL-41, TRL -43/1, TRL-44/2, TRL-47, TRL-48, TRL-50, TRL-52, TRL-54, TRL-55/1, TRL-56, TRL-58, TRL-60, TRL -63, TRL-70, TRL-77/2 parameters of the water regime (water deficiency, relative water content, water-holding and water-absorbing capacities) were determined according to the method of N.N. Kozhushko. [4, p.49].

The level of chlorophyll in the leaves of the upper tier of triticale samples was determined using a portable device SPAD-502PLUS. The device determines spectral absorption in two ranges and, based on the data obtained, determines the total indexed value of chlorophyll in the leaves. The ratio of the content of photosynthetic pigments in experimental and control plants was determined as a percentage, and this ratio was taken as the unit of measurement when identifying stress-resistant samples: the higher the indicators, the more resistant the sample was considered.

Results and its discussion

The parameters of the water regime were determined under the conditions of Absheron, characterized by long, hot summers. The hottest months are July and August with an average monthly air temperature of 30°C, reaching 42°C on some days. Annual precipitation on irrigated fields falls mainly in autumn, winter and spring. In summer there is almost no precipitation, and the need for water in the agricultural zones of the republic is satisfied only through irrigation. Based on weather conditions and the impact of water deficiency on crops, studying the parameters of the water regime makes it possible to predict the resistance of plants to water stress.

Determining the magnitude of water deficiency in the leaves of plants grown under irrigated conditions

showed that the level of water deficiency in most of the studied varieties under these conditions is lower than under conditions of water deficiency. Water deficiency in control triticale plants grown under irrigation conditions (70% soil moisture) was 3-18%, and in experimental plants (35% soil moisture) it was within 8-23% (Fig. 1).

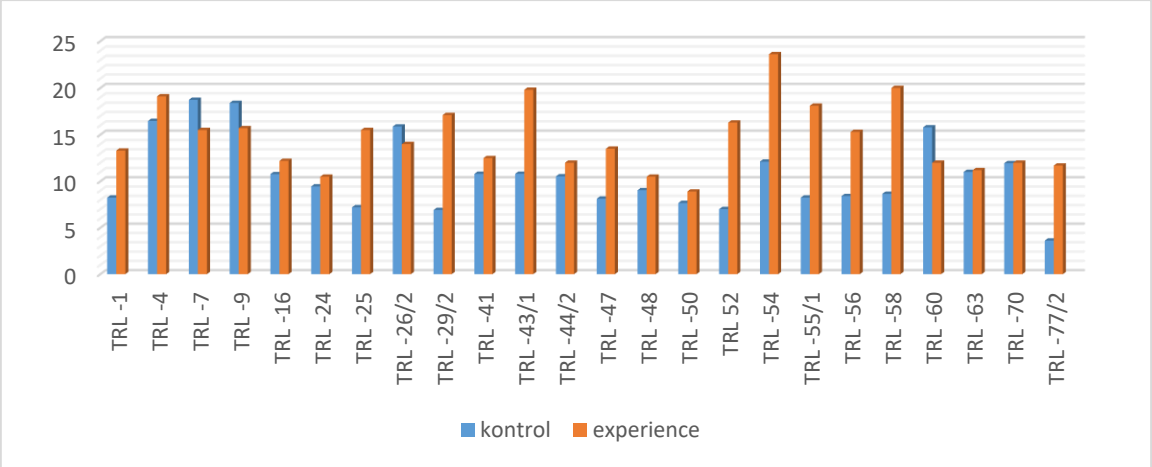

Figure 1. Water deficiency in leaves of triticale samples.

Plants exposed to identical drought conditions and maintaining higher tissue water content create better conditions for the occurrence of all physiological processes in plants [7]. Determination of the water content of leaves of plants grown under irrigated conditions showed that the level of relative water content in most of the studied genotypes under these conditions is higher than under conditions of lack of water. The relative water content in triticale plants was 81.0-96.0% in the control and 76.0-91.0% in the experimental variants. This parameter was 9.0-11.0% lower in experimental plants: TRL – 54 (11%), TRL – 43/1 (9%), TRL – 54 (11%), TRL –55/1 (10 %), TRL –58 (11%) compared to control. However, in some experimental variants an increase in the relative water content was observed. In genotypes TRL – 7, TRL – 9, TRL – 26/2, TRL – 60 this figure was higher by 2.0-3.0%. According to Ionova et al., under conditions of water shortage, the relative water content in the leaves of winter wheat decreased by 3.0-18.0%, while in our study the decrease in this indicator in triticale plants was 3.0-11.0% [7].

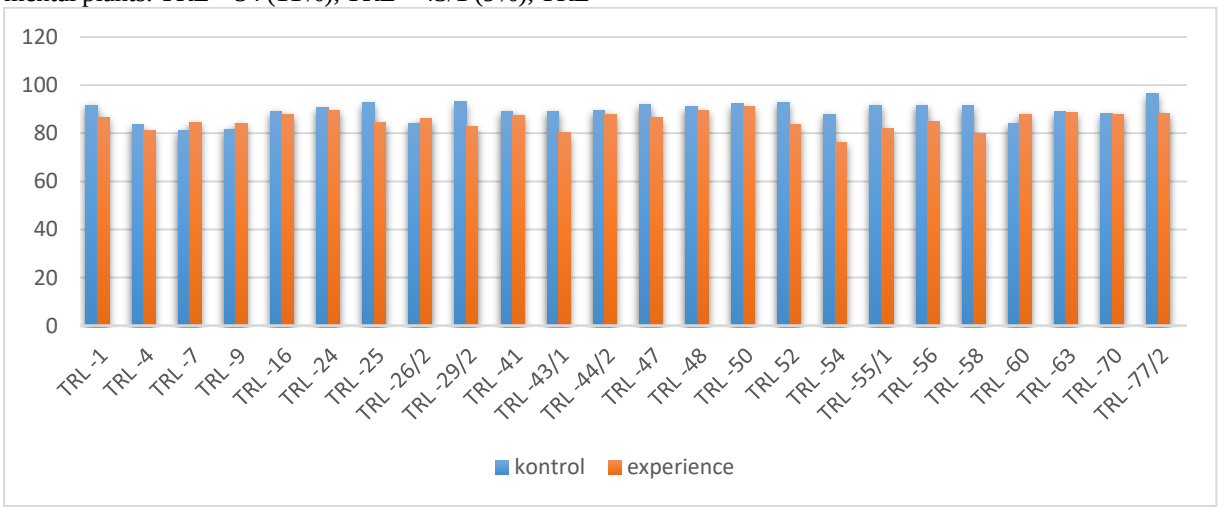

Figure 2. Relative water content in leaves of triticale samples.

The water-holding capacity of plants plays an important role in the regulation of water metabolism and reflects the plant's resistance to drought and high temperatures, since its value is determined by the amount of osmotically active substances collected in the cell, the ability of colloids to swell due to bound water, and the permeability of membranes [2]. When water is scarce under drought conditions, the amount of water bound to osmotic substances (such as proline) increases and water holding capacity increases. As water deficiency increases, water-holding capacity increases rapidly in more resistant samples [3].

Determination of water-holding capacity in our studies showed that for most samples grown under irrigation conditions, this indicator is lower than under conditions of water deficiency (Fig. 2). Under irrigation conditions, the water-holding capacity of control plants ranged from 41.78 to 84.48%. In case of water shortage, this indicator increased and varied in the range of 49.0 - 92.5%.

In some experimental triticale varieties, the retention of a significant amount of water in the cells was observed: the water-holding capacity increased by 40.0% in triticale samples TRL -54; by 39.0% in the

experimental version TRL -43/1; by 28.0% in the TRL -9 option; by 20.0% in TRL -41 and by 17.0% in TRL-70. The remaining genotypes were characterized by an increase in water retention by 4.0-15.0% compared to the control. Along with this, according to various sources, in wheat, which is one of the parent forms of triticale, under water stress the ability to retain water increases by 8.0-29.0% and 8.0-13.0% (6,8). However, in our experiment there were samples in which the water-holding capacity decreased: 65.3% (in the control 69.2%) for TRL - 26/2, 49.0% (in the control 67.33%) for TRL - 29/2, 78.2% (in control 84.48%) for TRL – 55/1.

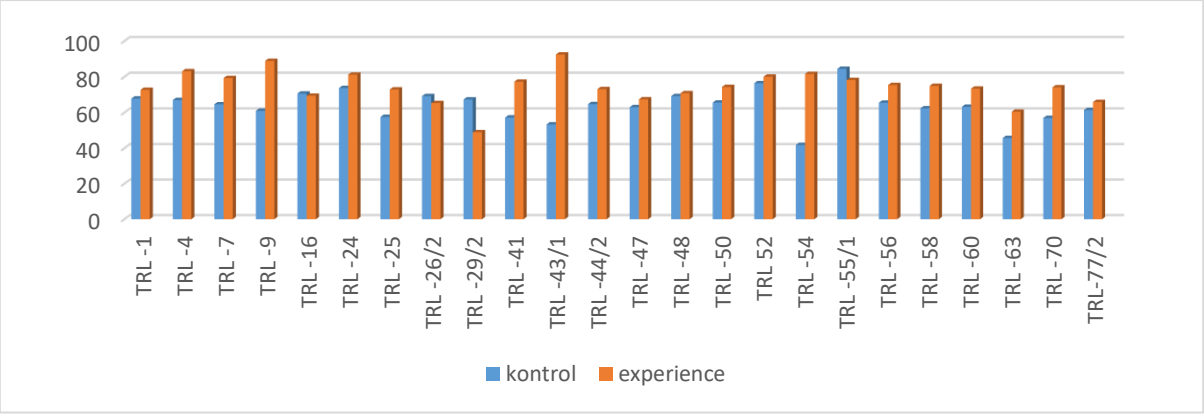

Figure 3. Water holding capacity in leaves of triticale samples.

The content of photosynthetic pigments in the leaves of triticale samples was determined by the SPAD method. With the exception of experimental variants TRL -24, TRL -29/2, TRL -58, most samples exhibited chlorophyll degradation to varying degrees. Under conditions of water deficiency, xl (a+b) in control plants ranged from 33.8 to 57.8, and in experimental plants - from 36.5 to 55.2.

In more drought-resistant varieties and accessions of various plant species, an increase in the content of green pigments is observed against the background of water deficiency [2]. In experimental triticale varieties TRL -24, TRL -29/2, TRL -58, an increase in the content of photosynthetic pigments by 4-17% was observed. However, as water stress continues, degradation of chlorophyll in leaves occurs.

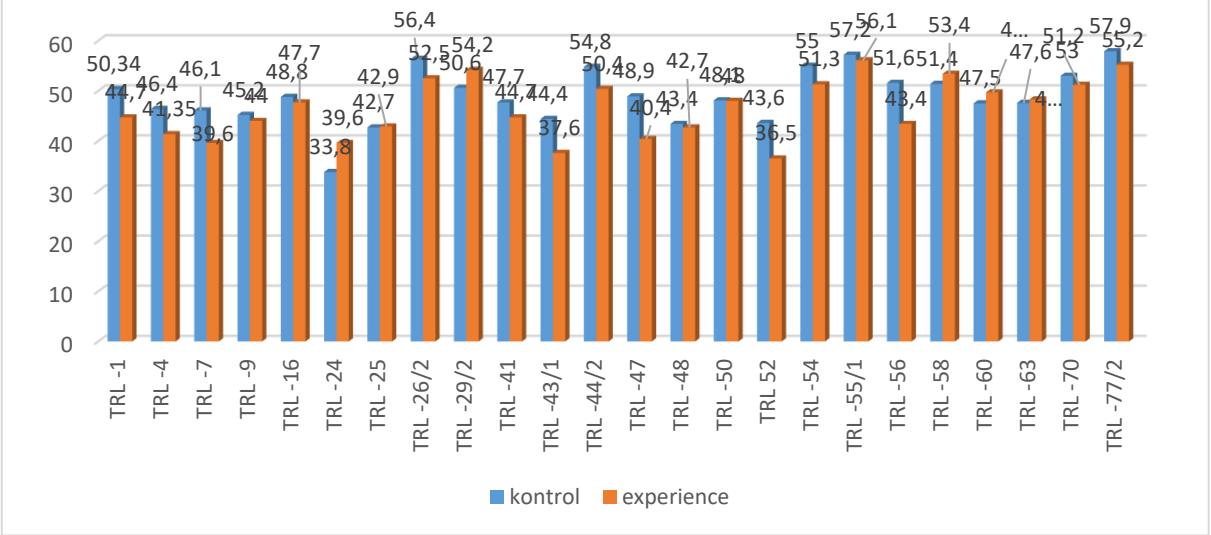

Figure 4. Chlorophyll content in leaves of triticale samples.

The physiological parameters of triticale samples under conditions of irrigation and water deficiency are shown in Table 1. Under conditions of water deficiency, an increase in water-holding capacity indicators indicates a high resistance and ability to self-heal under stress of the studied triticale samples. An increase in water-holding capacity under stress was observed in samples TRL -1, TRL - 9, TRL - 25, TRL - 41, TRL - 52, TRL - 54, TRL - 56, TRL - 58, TRL - 60, TRL - 77 /2. The water deficit in these samples did not exceed 20.0%. The exception was the triticale sample TRL - 54, whose water deficit was 23.6%. A minimal water deficit was observed in the experimental version TRL - 77/2. In two triticale genotypes (TRL - 25, TRL - 60), under conditions of water deficiency, along with an increase in water regime indicators, an increase in the content of photosynthetic pigments was noted.

Table 1

Physiological parameters of triticale samples under conditions of irrigation and water deficiency: WHC – water holding capacity, RWC – relative water content, WD – water deficiency, K – control, LW – lack of water

Samples	chlorophyll		WHC		RWC		WD	
	K	LW	K	LW	K	LW	K	LW
TRL -1	50,34	44,7	67,84	72,7	91,74	86,7	8,25	13,3
TRL -4	46,4	41,35	67,01	83,1	83,53	81,0	16,47	19,1
TRL -7	46,1	39,6	64,61	79,3	81,27	84,5	18,73	15,5
TRL -9	45,2	44,0	61,0	88,9	81,61	84,2	18,39	15,7
TRL -16	48,8	47,7	70,64	69,4	89,23	87,8	10,77	12,2
TRL -24	33,8	39,6	73,72	81,2	90,54	89,5	9,45	10,5
TRL -25	42,7	42,9	57,56	72,9	92,8	84,5	7,2	15,5
TRL -26/2	56,4	52,5	69,19	65,3	84,11	86,0	15,88	14
TRL -29/2	50,6	54,2	67,33	49,0	93,1	82,8	6,91	17,1
TRL -41	47,7	44,7	57,22	77,3	89,2	87,5	10,8	12,5
TRL -43/1	44,4	37,6	53,38	92,5	89,19	80,2	10,81	19,8
TRL -44/2	54,8	50,4	64,72	73,1	89,45	88,0	10,54	12
TRL -47	48,9	40,4	63,0	67,4	91,87	86,5	8,13	13,5
TRL -48	43,4	42,7	69,2	70,8	90,95	89,5	9,04	10,5
TRL -50	48,1	48,0	65,6	74,3	92,33	91,1	7,67	8,9
TRL 52	43,6	36,5	76,41	80,1	92,99	83,7	7,01	16,3
TRL -54	55,0	51,3	71,78	81,6	87,87	76,3	12,12	23,6
TRL -55/1	57,2	56,1	84,48	78,2	91,75	81,9	8,25	18,1
TRL -56	51,6	43,4	65,49	75,4	91,58	84,7	8,41	15,3
TRL -58	51,4	53,4	62,34	74,9	91,34	79,8	8,65	20
TRL -60	47,5	49,7	63,23	73,4	84,21	88,0	15,79	12
TRL -63	47,6	48,3	45,7	60,5	88,98	88,7	11,01	11,2
TRL -70	53,0	51,2	57,0	74,1	88,1	88,0	11,95	12
TRL -77/2	57,9	55,2	61,4	65,9	96,38	88,2	3,62	11,7

Conclusions: 1. It has been established that the water-holding capacity of leaves of drought-resistant triticale plants increases with a lack of water.

2. Samples: TRL-1, TRL-9, TRL-25, TRL-41, TRL-52, TRL-54, TRL-56, TRL-58, TRL-60, TRL-77/2 included in the study, can be considered more stable compared to other samples in terms of water holding capacity and relative water content, and the TRL -25 and TRL -60 variants also demonstrated an increase in the content of photosynthetic pigments. The triticale sample TRL -63 showed high stability; the water regime of this sample did not change under conditions of irrigation and water deficiency. The remaining samples can be classified as moderately resistant.

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BIOLOGICAL SCIENCES

EVALUATING THE NH_3 AND H_2S DEODORIZING PERFORMANCE OF MICROBIAL PRODUCTS IN LIVESTOCK FACILITIES: A SMALL-SCALE FARM STUDY

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Abstract

This study evaluates the efficacy of microbial additives in mitigating ammonia (NH_3) and hydrogen sulfide (H_2S) odors in poultry and pig pens on small-scale family farms. The results indicate a significant reduction in odor within the poultry pens following the application of microbial additives. Specifically, the H_2S concentration decreased by 95.22%, while NH_3 decreased by 99.19%, with effects lasting up to 2 days. Conversely, in pig pens, the reductions in NH_3 and H_2S concentrations were less pronounced. After 3 hours of microbial additive spraying, the H_2S and NH_3 concentrations decreased by 51.27% and 53.10%, respectively. Further comprehensive research efforts are needed to facilitate the widespread implementation of odor reduction in livestock operations using microbial additives.

Keywords: Ammonia, hydrogen sulfide, deodorization, microorganisms, animal waste, microbial products.

INTRODUCTION

Air pollution, particularly odor pollution originating from livestock, remains a significant concern and source of complaints in regions with thriving animal husbandry industries (Matusiak et al., 2016; Mariuzza et al., 2022; Conti et al., 2020). Livestock odors arise from a complex mixture of gases, primarily originating from the decomposition of organic matter in animal waste. Studies have identified over 170 odor-causing gases generated during this decomposition process, with hydrogen sulfide (H_2S) and ammonia (NH_3) being the primary offenders (Doan, 2011; Piccardo et al., 2022; Conti et al., 2020).

NH_3, a colorless gas with a pungent odor, readily dissolves in water, causing irritation, tearing, nasal congestion, laryngospasm, and coughing. NH_3 emissions from enclosed pigpens can exceed acceptable levels by 30 to 40 times (Doan, 2011; Chau and Long, 2008). The average NH_3 concentration in cowshed exhaust gases has been measured at 3700 μg/m3, surpassing the odor threshold of 27 μg/m3, leading to persistent odor issues in livestock facilities (Phung et al., 2005).

H_2S, also colorless with a characteristic rotten egg odor, is produced during the reduction of sulfur-containing compounds in waste. Even trace amounts of H_2S, ranging from 0.01 to 0.7 ppm, can produce noticeable odors, while concentrations of 3 to 5 ppm result in a strong odor (Chen et al., 2022; Deng et al., 2023). Additionally, H_2S is toxic, posing health risks to both animals and humans, even at low concentrations (Doan, 2011; Chen et al., 2022; Oesterhelweg and Püschel, 2008). Systemic effects induced by H_2S include the inhibition of respiratory enzymes, leading to suffocation and death at concentrations of 150 ppm. Therefore, NH_3 and H_2S gases have detrimental effects on livestock growth and human health, with prolonged exposure exacerbating their harmful impacts.

In response to these challenges, numerous studies have explored the utilization of microbial products to enhance air quality in livestock operations. These products harness the capabilities of beneficial microorganisms, such as Bacillus spp, Actinomyces spp, Mucor spp, and Pseudomonas spp (Kanagawa et al., 1989; Durka et al., 2010; Hien, 2012; Matusiak et al., 2016; Park, 2006), aimed at reducing the concentration of odorous compounds in livestock waste.

Recent research endeavors have been directed towards microbial consortia possessing deodorizing properties, encompassing purple photosynthetic bacteria, Thiobacillus (sulfur bacteria), lactic acid bacteria, and yeast bacteria. These microorganisms exhibit potential in substantially diminishing hydrogen sulfide H_2S) odors by converting them into elemental sulfur or sulfate compounds. Lactic acid bacteria contribute to odor reduction by creating an acidic environment, thereby inhibiting the proliferation of putrefactive bacteria and diminishing ammonia (NH_3) odors. Additionally, yeast bacteria, in synergy with other microbial species, facilitate decomposition processes and ameliorate odors emanating from livestock waste. Consequently, exploring combinations of these microbial groups holds promise for effective deodorization of livestock waste.

This study focuses on evaluating the efficacy of microbial preparations for mitigating odors in livestock operations. These preparations encompass a consortium of efficacious microorganisms, including photosynthetic bacteria, nitrogen-fixing bacteria, actinomycetes, lactic acid bacteria, and yeast. The primary objective of this research is to assess the deodorizing effectiveness of microbial preparations against livestock odor-causing gases, specifically hydrogen sulfide (H_2S) and ammonia (NH_3), thereby offering insights into enhancing air quality in livestock facilities.

MATERIALS AND METHODS

MATERIALS:

Fecal samples: Swine and poultry excreta were collected from a family-owned livestock farm located in the Kuangminh commune, Viet Yen district, Bac Giang province, Vietnam. Stool samples were obtained in June 2023.

EMRO - Vietnamese probiotics, transferred and produced in Vietnam by EMRO - Japan. EMRO comprises the EM1 product line, in liquid form, with a yellow-brown color, pleasant odor, and sweet-sour taste. The pH is < 3.5. It consists of approximately 80 species of microorganisms belonging to 10 different genera, including photosynthetic bacteria, nitrogen-fixing bacteria, actinomycetes, lactic acid bacteria, and yeast. The microorganisms in the composition form a microbial system, supporting each other, and growing and developing together.

METHOD:

Preparation of working microorganisms:

The preparation of EM2 solution from EM1 involves mixing 0.1 liters of EM1 preparation with 0.1 liters of molasses and 1.8 liters of chlorine-free water, resulting in 2.0 liters of EM2. This solution is then stored in a sealed container, placed in a cool environment devoid of direct sunlight, for a duration of 3-5 days. As gas formation occurs during fermentation, causing expansion of the container, it is imperative to periodically release the gas by opening the lid, followed by resealing. The resultant EM2 secondary fermentation solution exhibits a floating foam and emits a pleasant aroma.

The preparation of EM Bokashi C from EM1 involves combining 20 ml of EM1 preparation solution with 20 ml of molasses, 200 ml of chlorine-free water, and 400 g of carrier material (rice bran, rice husk, ash in a 1:1:1 ratio), yielding EM Bokashi C with a moisture content ranging between 20-30%. This mixture is then incubated in a sealed container for approximately 5-7 days until a sweet fermentation odor develops, accompanied by the appearance of white mold on its surface.

Check the Deodorizing Ability:

For the treatment of cages (such as chicken coops and pigsties), the EM2 solution should be diluted with clean, chlorine-free water at a ratio of 1:10. Subsequently, the working solution is sprayed onto the barn at a rate of 1 L/15 m2.

Regarding experimental samples, swine manure is stored in two round plastic containers with lids, each having dimensions of diameter (d) by height (h) = 0.5 x 0.7 meters. Each container is filled with 3 kg of swine manure. Box 01 is designated as the control batch, while Box 02 serves as the experimental batch, to which EM Bokashi C is added at a dosage of 30 g/kg.

Gas Sampling:

Gas samples are collected both before and after the application of the EM2 inoculant and EM Bokashi C. Sampling intervals include 3 hours post-application in pigsties, 24 hours in chicken coops, and within plastic containers.

The Kimoto HS7 gas sampler is positioned centrally within the chicken coop or adjacent to the pig toilet, approximately 30 cm above ground level. For samples contained within plastic containers, only the suction tube is inserted, with the lid secured, to collect gas samples.

Ammonia (NH_3) and hydrogen sulfide () gases are collected at a rate of 1 L/min for a duration of 10 minutes. The NH_3 gas absorption solution comprises 0.1N H_2SO_4 acid, while the solution for H_2S gas absorption comprises 1% $AgNO_3$.

Gas Concentration Determination:

The concentration of NH_3 gas is assessed in accordance with the Vietnamese standard TCVN 6179-1:1996 (Ministry of Science, Technology, and Environment, 1996).

For the determination of H_2S gas, the methodology relies on the principle of gas absorption by a solution, as outlined by Linh and Nghiem (2019).

RESULTS AND DISCUSSION

Deodorizing capacity of experimental samples

After periodic gas sampling in the experimental and control batches, the concentrations of H_2S and NH_3 gases were determined accordingly. The results are presented in Table 1.

Table 1

Concentrations of H_2S and NH_3 in Experimental and Control Samples (mg/m^3)

Day	Control sample		Experimental sample		Decrease in concentration (%)	
	H_2S	NH_3	H_2S	NH_3	H_2S	NH_3
The first day	15,42	0,19	14,46	0,11	6,23	42,11
The second day	12,90	0,35	2,90	0,18	77,52	48,57
The third day	12,53	0,38	2,11	0,08	83,16	78,95
The fourth day	12,26	0,26	2,04	0,07	83,36	73,08

The obtained results demonstrate a significant reduction in the concentration of gaseous H_2S within the experimental group compared to the H_2S levels observed in the control group after a 4-day period. The deodorizing efficiency of the EM Bokashi C product reached 83.36% after 4 days.

Conversely, the concentration of gaseous NH_3 in the control group exhibited a tendency to increase throughout the experiment, while in the experimental group, a significant decrease in NH_3 concentration was observed on the 3rd and 4th days.

The deodorizing effect of the NH_3 EM Bokashi C preparation reached 78.95% compared to the control group after 3 days and 73.08% on the 4th day. These findings align with the results reported by Pham Bich Hien (2012), who utilized microbial strains including Streptomyces uredospore's, Bacillus licheniformis, Lactobacillus plantarum, and Bacillus subtilis for the treatment of solid livestock waste. In that study, the concentration of gaseous NH_3 decreased by 73.1%, and H_2S decreased by 78% after 3 days (Hien, 2012).

Ability to deodorize air in the cowshed withmicrobial products

The capacity to mitigate odors within the chicken coop was assessed. Gas samples were collected both before and after the periodic application of the EM2 microbial inoculant solution. The findings regarding the concentrations of H_2S and NH_3 gases are detailed in Table 2

Table 2

The concentrations of H_2S and NH_3 in the air of the chicken coop (mg/m^3)

Before treatment		**After treatment**							
		The first day		**The second day**		**The third day**		**The fourth day**	
H_2S	NH_3	H_2S	NH_3	H_2S	NH_3	H_2S	NH_3	H_2S	NH_3
10,45	24,60	0,5	0,12	0,5	0,20	0,64	0,23	1,12	0,89
Deodorization efficiency (%)		95,22	99,51	95,22	99,19	93,88	99,07	89,28	96,38

The results presented in Table 2 indicate that prior to the application of the inoculant solution, the concentrations of H_2S and NH_3 gases within the chicken coop were relatively elevated, at 10.45 mg/m^3 and 24.60 mg/m^3, respectively.

Following the spraying of the modifying solution, there was a noticeable decrease in the concentrations of both H_2S and NH_3 gases. Specifically, the concentrations of gaseous H_2S and NH_3 measured after 1 day decreased by 95.22% and 99.51%, respectively.

The deodorizing effect of the modifier solution remained evident for up to 2 days. However, by the 3rd day, gas concentrations within the chicken coop began to rise. Nevertheless, after 4 days, the deodorizing effect of the inoculant solution reached 89.28% and 96.38% for H_2S and NH_3, respectively. Consequently, to mitigate odor within the chicken coop, it is recommended to apply the inoculant solution every 2 days.

Research on the Elimination of Sulfur and NH_3 Volatile Compounds

The potential for odor reduction within the pigsty was investigated. Gas samples were collected both before and after the application of the modifying solution, with measurements taken 3 hours post-application. The outcomes of quantifying the concentrations of H_2S and NH_3 gases are detailed in Table 3.

Table 3

Concentrations of H_2S and NH_3 in the air of a pigsty (mg/m^3)

Before treatment		**After treatment**		**Decrease in concentration (%)**	
H_2S	NH_3	H_2S	NH_3	H_2S	NH_3
18,88	1,45	9.20	0,68	51,27	53.10

The findings depicted in Table 3 illustrate a decrease in the concentration of H_2S and NH_3 gases within the pigsty following a 3-hour application of the EM2 microbial inoculant solution, in comparison to the initial concentrations. However, a challenge associated with pig manure management is its high water content, comprising 65-80% of the manure's weight. This elevated water content, coupled with abundant organic matter, fosters an environment conducive to the proliferation of spoilage-causing microorganisms, thereby generating malodorous byproducts [1].

The measured results indicate a reduction in H_2S gas concentration within the pigsty after application of the microbial inoculant solution, by 51.27%, while the NH_3 concentration decreased by 53.10% compared to the initial gas levels. These findings are consistent with observations from numerous studies conducted by various authors (Kanagawa et al., 1989; Gutarowska et al., 2014; Yan et al., 2013; Matusiak et al., 2016; Chen et al., 2022) employing odor-mitigating microorganisms. Specifically, these studies reported reductions in gaseous H_2S concentrations within cowsheds ranging from 47.2% to 70.1%, and decreases in gaseous NH_3 content ranging from 35% to 68.7%.

CONCLUSIONS

The microbial solutions EM2 and EM Bokashi C are derived from the EMRO-Vietnam microbial product (EM1). They exhibit the ability to mitigate both H_2S and NH_3 odors, yielding favorable results in laboratory experiments and household applications.

The concentrations of H_2S and NH_3 gases, known environmental pollutants, were reduced by approximately 50% compared to initial gas concentrations in the absence of microbial products.

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ON THE ISSUE OF STUDYING AND PRESERVING THE BIODIVERSITY OF THE FOREST-STEPPE OF KAZAKHSTAN

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К ВОПРОСУ ИЗУЧЕНИЯ И СОХРАНЕНИЯ БИОРАЗНООБРАЗИЯ ЛЕСОСТЕПИ КАЗАХСТАНА

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Abstract
This article is concider the current state of biodiversity of flora and fauna of the forest-steppe zone of Kazakhstan. The species compositions of plants and animals of the forest-steppe of Kazakhstan are characterized with an analysis of their habitats, including in specially protected natural territories of the Republic of Kazakhstan over the past 10 years. Rare and endangered species of flora and fauna of the forest-steppe are particularly indicated. The approaches to further conservation of biodiversity based on careful nature management in accordance with the provisions of the Concept for the Conservation and Sustainable Use of Biological Diversity of the Republic of Kazakhstan until 2030 and the Land Code of the Republic of Kazakhstan are considered.

Аннотация
В данной статье рассматривается современное состояние биоразнообразия флоры и фауны лесостепной зоны Казахстана. Охарактеризованы видовые составы растений и животных лесостепи Казахстана с анализом их мест обитания, в том числе в особо охраняемых природных территориях Республики Казахстан за последние 10 лет. Особо указаны редкие и исчезающие виды флоры и фауны лесостепи. Рассмотрены подходы дальнейшего сохранения биоразнообразия на основе бережного природопользования в соответствии с положениями Концепции по сохранению и устойчивому использованию биологического разнообразия Республики Казахстан до 2030 года и Земельного кодекса Республики Казахстан.

Keywords: biodiversity, flora, fauna, species, forest-steppe, introduction, specially protected natural areas
Ключевые слова: биоразнообразие, флора, фауна, вид, лесостепь, интродукция, особо охраняемые природные территории

Актуальность исследования. Мировая наука с тревогой оценивает возможные последствия для нашей планеты, тех глубоких изменений природной среды, которые вызваны индустриальной и земледельческой деятельностью человека. На сегодняшний день сохранение биологического разнообразия является одной из главных проблем человечества. Именно биота наиболее уязвима ко всем стрессовым факторам и в особенности, антропогенным. Вот почему мировое сообщество встревожено последствиями научно-технического прогресса, оказывающего зачастую разрушающее воздействие на условия существования человека, на биоту, являющуюся источником пищи, кислорода, чистого воздуха, сырьевым ресурсом, основным регулятором

стабильности биосферы. Биологическое разнообразие включает виды, внутривидовые формы и популяции всех типов растений, микроорганизмов и животных, а также разнообразие экосистем, распространенных как в естественных условиях, так и созданных, выращиваемых и разводимых человеком. Исчезновение многих видов животных и растений с лица земли вызывает особую тревогу – уходят в небытие звенья жизни, созданные миллионами лет эволюции.

Казахстан, занимая девятое место по масштабам земельного фонда (272 490 тыс. га), является одной из самых землеобеспеченных стран мира, и сохранение биоразнообразия природных ландшафтов весьма актуальная проблема современности для нашей страны. Республика Казахстан подписала в 1992 году и ратифицировала в 1994 году Конвенцию ООН о биологическом разнообразии, а в 1998 году завершила разработку Национального плана действий по охране окружающей среды, в котором биоразнообразие является важнейшим компонентом. Территория Казахстана, согласно ботанико-географическому районированию Евразии, расположена в крупной Евроазиатской степной области, в Причерноморско-Казахстанской подобласти. Она разделена на три провинции: равнинные – Западно-Сибирская лесостепная, Заволжско-Казахстанская степная (с 5 провинциями) и горная Алтайская (с 3 провинциями). На территории Казахстана зона лесостепи представлена только на севере страны в пределах Западно-Сибирской низменности. Для лесостепи характерно чередование березовых и осиново-березовых лесов с безлесными участками, занятыми степями, остепненными лугами, а также заболоченными лугами и болотами. По природному районированию зона лесостепи Казахстана может быть подразделена на две подзоны – южная лесостепь и колочная лесостепь. По данным Т. М. Брагиной, в южной подзоне леса занимают местами до 50% площади водораздельных равнин, средняя облесенность территории южной лесостепи составляет 20–30%. Межлесные пространства заняты злаково-разнотравными и разнотравно-злаковыми луговыми степями и остепненными лугами по опушкам. Колочная лесостепь распространена на плоских озерно-аллювиальных равнинах и в районах с гривным рельефом в пределах Западно-Сибирской низменности. Для этой подзоны характерна меньшая облесенность (до 25–30% площади водоразделов), и леса находятся преимущественно в условиях дополнительного увлажнения [1, с. 12].

Растительный покров лесостепи представлен лесами и богато разнотравными преобразованными степями. Лесные растительные сообщества представлены широким видовым составом деревьев (более 20 видов) и кустарников (более 40 видов). В работах А. А. Иващенко описаны следующие виды: осина (тополь дрожащий) (*Populus tremula*), береза повислая (*Betula pendula*), береза пушистая (*B. pubescens*), береза киргизская (*B. kirghisorum*). Характерны кустарники: шиповник иглистый (*Rosa acicularis*), вишня степная (Prunus fruticosa), калина обыкновенная (*Viburnum opulus*), жимолость татарская. (*Lonicera tatarica*), кизильник черноплодный (*Cotoneaster melanocarpus*) и др. [2, с.150]. Осиново-берёзовые леса по западинам на солодях чередуются с богаторазнотравно-красноковыльными и морковниково-красноковыльными степями. Здесь представлены следующие виды: ковыль красный (*Stipa rubens*), ковыль перистый (*S. pennata*), пырей ползучий (*Elytrígia repens*), тимофеевка луговая (*Phleum pratense*), кострец безостый (*Bromus inermis*), овсяница валлисская (*Festuca valesiaca*). Среди злаковых растений встречаются зонтики мелких беловато-зеленых цветков морковника (*Silaum silaus*), кисти золотистых цветков подмаренника настоящего (*Galium verum*) с медовым ароматом [3, с. 133]. Редкими видами растений лесостепной зоны Казахстана являются брусника обыкновенная (*Vaccinium vitisidaea*), грушанка круглолистная (*Pirola rotundifolia*), багульник болотный (*Ledum palustre*), клюква болотная (*Oxycoccus palustris*), росянка круглолистная (*Drosera rotundifolia*) и др. К крайне редким растениям относятся башмачок пятнистый (*Cypripedium guttatum*), башмачок крупноцветковый (*C. macranthon*), можжевельник обыкновенный (*Juníperus communis*), ольха черная (*Alnus glutinosa*), гриб спарассис (*Sparassis*), водяной орех (*Trapa natans*) и др. [4, с. 152]. Также к исчезающим отнесены виды, численность которых снизилась в результате распашки степных территорий за последние 50 лет: ковыль перистый (*Stipa pennata*), тюльпан Шренка (*Tulipa schrenkii*), прострел раскрытый (*Pulsatilla patens*), горицвет весенний (*Adonis vemalis*) и др. [5, с. 128].

Для лесостепной зоны характерны особенности и в структуре фауны. На территории Республики обитает 835 видов позвоночных животных, в том числе млекопитающих - 178 видов, птиц – 489 видов (396 из них гнездятся в Казахстане, прочие прилетают только на зимовку или улетают весной и осенью), рептилии – 49 видов, амфибии – 12 видов, рыбы - 104 и круглоротые – 3 вида. В пределах лесостепной зоны Казахстана насчитывается в общей сложности свыше 340 видов позвоночных животных, из них: млекопитающих -48, птиц -270, пресмыкающихся-3, земноводных - 5, рыб -14 видов [6, с. 167].

В лесостепной зоне насчитывается 48 видов млекопитающих. Наибольшее число видов млекопитающих относится к отряду грызунов (*Rodentia*) – 21, затем следуют хищные (*Carnivora*) – 10, насекомоядные (*Insectivora*) – 7, рукокрылые (*Chiroptera*) – 5, парнокопытные (Artiodactyla) – 3 и зайцеобразные (Lagomorpha) – 2. Рыжая лесная полевка (*Clethrionomys glareolus*) из отряда грызунов встречается только в лесостепи, остальные вышеуказанные виды распространены на территории двух или более природных зон. Наряду с лесными формами, как, например, косуля (*Capreolus pygargus*), лось (*Alces alces*), обыкновенный еж (*Erinaceus europaeus*), лесная мышовка (*Sicista betulina*), в лесостепи встречаются и обитатели открытых (степных) ландшафтов – степной хорь

(*Mustela eversmanni*), корсак (*Vulpes corsac*) и др. Из земноводных наиболее распространенными являются зеленая жаба (*Bufo viridis*) и остромордая лягушка (*Rana arvalis*). Специфичными видами для лесостепной зоны являются сибирский углозуб (*Hynobius keuserlingii*) и травяная лягушка (*Rana temporaria*). По количеству видов среди пресмыкающихся преобладают змеи (7 видов). Выявлено около 3500 видов насекомых, однако их вероятное число не менее 5–7 тыс. видов.

Однако необходимо отметить: лесостепные ландшафты Северного Казахстана, характеризующиеся специфичным фаунистическим составом, подверглись масштабной трансформации за постцелинный период. В то же время показатели контрольного списка, включающего все когда-либо отмеченные в области виды, а также виды, регулярно и случайно посещающие территорию лишь на время миграций, несколько выше. Фауна включает виды, обитающие здесь постоянно и проходящие полный цикл своего развития. Виды в крае, посещающие его эпизодически в единичных экземплярах или небольших количествах, в фауну не включены. К таковым относятся белая сова, стрепет, кречетка, а также рысь, в отдельные годы заходящая в область из таежных районов России; по реке Ишим - бобр. Еще недавно к подобным видам относилась и норка, в настоящее время успешно заселившая лесные экосистемы и включенная в список фауны области [7, с. 78].

В зоне лесостепи гнездится 270 видов птиц или 69,4 % от общего числа гнездящихся в республике (389) видов. В систематическом отношении эти птицы принадлежат к 10 отрядам: ржанкообразные (*Charadriiformes*), куриные (*Galliformes*), гусеобразные (*Anseriformes*), хищные (*Falconiformes*), совообразные (*Strigiformes*), голубеобразные(*Columbiformes*),кукушковые (*Cuculiformes*), козодоеобразные (*Caprimulgiformes*), дятлообразные (*Piciformes*) и воробьиные (*Passeriformes*). В большинстве своем это лесные птицы, связанные с древесно-кустарниковой растительностью. Ключевыми орнитологическими территориями следует считать лесные массивы АманКарагай и АраКарагай Костанайской области. Лесостепные озера и хвойно-лиственные леса с озерами – Боровое, Щучье, Большое и Малое Чебачье, Шалкар, Имантау, Зерендинское, Селетытениз, Шаглытениз, Теке, Улькен Караой также относятся к орнитологическим территориям. Особо следует отметить отряд *гусеобразных*, из 19 видов регулярно отмечается 16. Среди всех представителей отряда, самыми многочисленными во все годы были *красноголовый нырок* и *свиязь*, еще один вид – *красноносый нырок.* Для 5 видов характерны сильные колебания численности по годам, обусловленные не только состоянием озер в пределах лесостепи, но и какими-то другими факторами [8, с. 207].

В наиболее плачевном состоянии находятся млекопитающие и птицы. Их численность уменьшается из-за сокращения ареала, недостатка еды и бесконтрольной охоты. Некоторые животные Казахстана, такие как кулан и туранский тигр, исчезли в результате прямого истребления. Так,например, кулан (*Equus hemionus kulan*), когда-то был одним из ключевых видов животных в евразийских степях. В Казахстане они полностью исчезли в 1930-х годах. Раннее, благодаря реинтродукции, получилось восстановить вид на двух охраняемых территориях. Дальнейшая реинтродукция куланов в степи Центрального Казахстана должна быть направлена на выпуск более крупных групп и скорейшее создание свободно размножающейся популяции, увеличивая вероятность встречи куланов с собратьями для успешного размножения и повышения их шансов на выживание [9, с. 250].

К сожалению, многие виды животных оказались под угрозой, некоторые популяции более стабильны, другие находятся на грани исчезновения. Из-за деятельности человека большинство представителей фауны оказались в уязвимом положении, а многие знаковые местные виды попали на страницы Красной книги. Из млекопитающих в Красную книгу занесены 31 вид (джейран, кулан, архар, гепард, снежный барс, тянь-шаньский бурый медведь, барханный кот, европейская норка и др.), из пернатых – 49 видов (обыкновенный фламинго, кудрявый и розовый пеликан, черный и белый аист, лебедь-кликун, беркут, дрофа, фазан, улар и др.), из пресмыкающихся 8 видов, а также некоторые виды земноводных и рыб [10, с. 73]. Среди представителей фауны лесостепи занесенными в Красную книгу Казахстана являются: лесная куница (*Martes martes*), европейская норка (*Mustela lutreola*), выхухоль (*Desmana moschata*), сокол-балобан (*Falco cherrug*), дрофа (*Otis tarda*), из насекомых – червец карминоносный польский (*Porphyrophora polonica L.*)

Экологическая ситуация в РК характеризуется в значительной мере деградацией природных систем, что ведет к дестабилизации биосферы, утрате ее способности поддерживать качество окружающей среды, необходимое для жизнедеятельности общества. Ухудшающее состояние биоразнообразия связано с хозяйственной деятельностью, загрязнением природной среды и стихийными бедствиями, а также незначительной площадью охраняемых экосистем. Отмечено истощение биоразнообразия и деградации экосистем на 66% площади республики, особенно в зоне пустынь и степей, при распашке земель и перевыпасе. Луговые и степные участки лесостепи распаханы на 60–90%. Сложной остается ситуация по вопросу обеспечения охраны лесов от пожаров и незаконных рубок на территории государственного лесного фонда, основными причинами возникновения которых являются: природные факторы – 39%, антропогенные – 61% [11, с.].

Сохранение биологического разнообразия является одним из приоритетных направлений, включенных в стратегические документы страны и международные проекты. Ряд основных национальных документов, таких, как «Концепция по сохранению и устойчивому использованию биологического разнообразия Республики Казахстан до 2030 года»

охватывают вопросы сохранения и устойчивого использования биологического разнообразия. Национальная стратегия и план действий по сохранению биоразнообразия является одним из важнейших компонентов Национального плана действий по охране окружающей среды, который является инструментом реализации долгосрочной стратегии – 2030 «Экология и природные ресурсы». Принятие Стратегии – 2030 создает объективные предпосылки для успешного выполнения положений Конвенции о биологическом разнообразии [11, с. 38]. Сохранение биологического разнообразия названо в качестве одного из приоритетов перехода к устойчивому развитию. В общей площади, занятой объектами особо охраняемых природных территорий республиканского значения, на долю государственных природных заповедников приходятся 6,6 %, государственных национальных природных парков – 11,1 %, государственных природных резерватов – 12,7 %. Основные площади особо охраняемых природных территорий (ООПТ) занимают государственные заповедные зоны – 46,0 % и государственные природные заказники – 23,87% и показаны в таблице 1. При этом, согласно статье 122 Земельного кодекса Республики Казахстан земельные участки государственных заповедных зон и государственных природных заказников находятся в составе других категорий земель без изъятия их у собственников земельных участков и землепользователей [12, с. 215].

Таблица 1

Особо охраняемые природные территории республиканского значения

Наименование	2020 год		На 1 января 2024 года	
	количество объектов	площадь, тыс. га	количество объектов	площадь, тыс. га
Государственные природные заповедники	10	1 613,7	10	1 613,7
Государственные национальные природные парки	14	2 667,4	14	2 726,4
Государственные природные резерваты	6	3 122,1	7	3 465,1
Государственные природные заказники	50	5 837,3	50	5 837,3
Государственные заповедные зоны	5	11 311,9	5	11 311,9
Государственные памятники природы	25	6,5	25	6,5
Ботанические сады	7	0,8	7	0,8
Государственные дендрологические парки	-	-	1	365,4
Всего	**117**	**24 559,7**	**118**	**24 903,1**

Выводы: В заключение следует сказать, что в целях сохранения биоразнообразия лесостепной зоны Казахстана необходима реализация мер по оценке состояния и инвентаризации объектов биоразнообразия, расширению сети особо охраняемых природных территорий и сохранению природных популяций редких видов животных и растений с помощью их интродукции и восстановления на нарушенных территориях с учетом современных природных и антропогенных процессов, включению особо охраняемых природных территорий в списки Всемирного природного и культурного наследия ЮНЕСКО и биосферных территорий в рамках программы «Человек и биосфера».

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CHEMICAL SCIENCES

CHARACTER OF CHEMICAL INTERACTION IN THE Bi_2Se_3-$CuCr_2Te_4$ SYSTEM AND X-RAY STUDY OF THE OBTAINED COMPOSITE MATERIALS

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Abstract

Using physical and chemical analysis methods (DTA, MSA, X-raydifraction, as well as density and microhardness measurements), the nature of the chemical interaction in the Bi_2Se_3-$CuCr_2Te_4$ system was studied and phase diagram was constructed. It has been established that the phase diagram of the system is quasi-binary and eutectic. The binary eutectic formed between the compounds Bi_2Se_3 and $CuCr_2Te_4$ has a content of 25 mol % $CuCr_2Te_4$ and temperature 530°C. According to the results of microstructural analysis, in a system based on the Bi_2Se_3 compound, a 5 mol % $CuCr_2Te_4$ solid solution region is formed, and based on the $CuCr_2Te_4$ compound, 8 mol % Bi_2Se_3 is dissolved. X-ray phase analysis of solid solutions $(CuCr_2Te_4)_{1-x}(Bi_2Se_3)_x$ (x=0.02; 0.05; 0.08) was carried out and their lattice parameters were calculated. It has been established that alloys containing 2, 5 and 8 mol % $CuCr_2Te_4$ crystallize in the cubic syngony, lattice parameters: a=11.245 Å, a=11.288 Å, a=11.346 Å, respectively.

Keywords: composite material, system, phase diagram, topological insulator, density

Introduction

Recently there has been some interest in complex chalcogenide compounds. This is due, first of all, to the extensive study of the chemistry and physics of these compounds and the increase in their practical application. It is known that bismuth chalcogenides, compounds and solid solutions based on them are valuable thermoelectric materials that convert electrical energy into thermal energy [1-9].

Recently, the attention of researchers working in the field of semiconductors has been attracted by new topological insulator materials based on layered compounds, including bismuth chalcogenides [10-14]. Therefore, the search for thermoelectric materials to create alternative energy sources is of scientific and practical importance. A large number of ternary and more complex systems have been studied based on bismuth chalcogenides [15-19]. Spinel-type compounds $CuCr_2X_4$ (X-S,Se,Te) based on copper and chromium chalcogenides are widely studied as ferromagnetic materials [20-22].

The purpose of this work is to study the nature of the chemical interaction in the Bi_2Se_3-$CuCr_2Te_4$ system, construct its phase diagram and x-ray studies of the resulting composite materials.

The Bi_2Se_3 compound melts congruently at 706°C and crystallizes into rhombohedral syngony with a lattice parameter a=9.832 Å. α=24º10′, sp. gr. P3m-D^5_{3d}, density ρ=8.0 g/cm^3, microhardness Hμ=850 MPa [23]. The $CuCr_2Te_4$ compound melts congruently at 1155°C and crystallizes in the cubic syngony, lattice parameter a = 11.134 Å [24]. The phase transition of the $CuCr_2Te_4$ compound occurs at a temperature of 810°C.

Experimental part

Alloys of the Bi_2Se_3-$CuCr_2Te_4$ systems were synthesized from the components Bi_2Se_3 and $CuCr_2Te_4$ in the temperature range 800-1200°C in a single-temperature vertical furnace using the ampoule method.

The alloys were subjected to heat treatment for 240 hours at a temperature of 500°C to homogenize them. Then the alloys of the Bi_2Se_3-$CuCr_2Te_4$ systems were studied by methods of physical and chemical analysis: differential thermal analysis (DTA), X-ray diffraction (XRD), microstructural analysis (MSA), as well as methods of measuring density and microhardness.

Differential-thermal analysis (DTA) was carried out using a TERMOSCAN-2 thermograph. The Al_2O_3 compound was taken as standard, the heating rate was 5 K/min.

X-ray phase analysis was carried out on a D2-PHASER X-ray diffractometer. The study used CuKα radiation and a Ni filter.

Microstructural analysis (MSA) was carried out on a MIM-8 microscope. To do this, the alloys were polished and given shine, and their structure was examined under a microscope. To clarify the phase boundaries, a solution of 10 ml of H_2SO_4 + 5 ml of $K_2Cr_2O_7$ was taken. Microhardness was measured with a PMT-3 metallographic hardness tester. The compositional dependence of microhardness for each phase was measured. The density of the samples was determined by the pycnometric method; toluene was used as a filling solution.

Results and its discussion

Alloys of the Bi_2Se_3-$CuCr_2Te_4$ system have a compact mass of bright gray color. Samples rich in the $CuCr_2Te_4$ compound are black in color.

The results of differential-thermal analysis show that endothermic effects are similar to those obtained from thermograms of alloys. There are two and three endothermic effects in the thermograms of alloys. As a result of microstructural analysis of the alloys, it was established that there is a single-phase region around the Bi_2Se_3 and $CuCr_2Te_4$ compounds in the system, while the remaining alloys are two-phase.

Based on the results of physicochemical analysis methods, the microstructure of alloys of the Bi_2Se_3-$CuCr_2Te_4$ system is presented in Fig. 1.

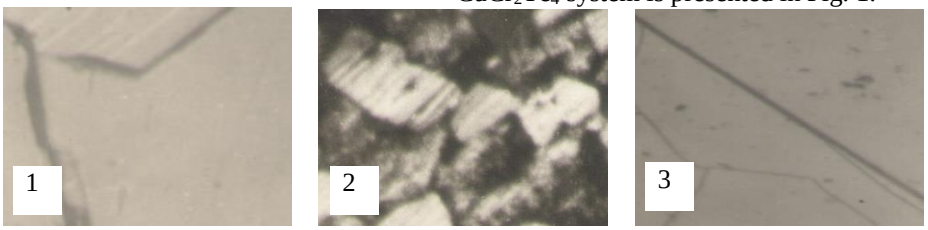

Fig. 1. Microstructures of alloys of the Bi_2Se_3-$CuCr_2Te_4$ system. 1-5 mol %, 2-70 mol%, 92 mol % $CuCr_2Te_4$,

Samples containing 5 and 92 mol % $CuCr_2Te_4$ are single-phase solid solutions based on Bi_2Se_3 and $CuCr_2Te_4$ compounds, respectively. A sample with a concentration of 70 mol. % $CuCr_2Te_4$ is two phase.

To confirm the results of differential thermal and microstructural analysis, X-ray phase analysis of samples containing 5, 70 and 92 mol % $CuCr_2Te_4$ of the Bi_2Se_3-$CuCr_2Te_4$ system of the same composition (Fig. 2). The X-ray patterns of the samples were then compared with the X-ray patterns of the original components. As can be seen from Fig. 2, diffraction lines present in the diffraction patterns of samples 5 and 92 mol % $CuCr_2Te_4$ are identical to the diffraction patterns of the compounds Bi_2Se_3 and $CuCr_2Te_4$, respectively. That is, these samples are solid solution alloys based on Bi_2Se_3 and $CuCr_2Te_4$ compounds. Diffraction lines in the diffraction pattern of a 70 mol % $CuCr_2Te_4$ sample are a two-phase alloy consisting of a mixture of diffraction lines of the original compounds.

Thus, X-ray phase analysis confirms the results of DTA and microstructural analysis.

Based on the results of physical and chemical analysis methods, a T-x phase diagram of the system was constructed, which is presented in Figure 3. The phase diagram of the Bi_2Se_3-$CuCr_2Te_4$ system is quasi-binary, eutectic type. The composition of the eutectic formed between the compounds Bi_2Se_3 and $CuCr_2Te_4$ is 25 mol % $CuCr_2Te_4$, temperature 530°C.

The liquidus of the Bi_2Se_3-$CuCr_2Te_4$ system consists of the primary crystallization curves of the δ-solid solution formed based on Bi_2Se_3 and the α-solid solution based on $CuCr_2Te_4$. In the system at room temperature on the basis of the compound Bi_2Se_3, the solubility of 5 mol % $CuCr_2Te_4$, was detected and on the basis of the compound $CuCr_2Te_4$, the area of the solid solution is 8 mol % Bi_2Se_3. In the Bi_2Se_3-$CuCr_2Te_4$ system, two-phase alloys consisting of (δ + α) crystallize below the solidus line.

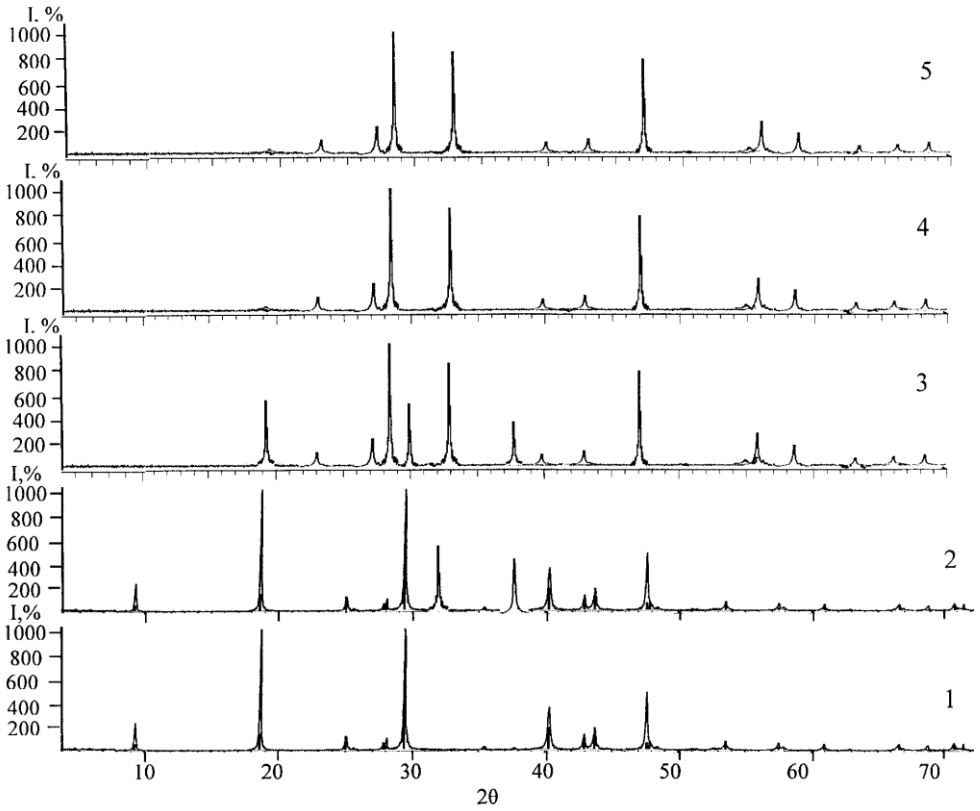

Fig. 2. X-ray diffraction patterns of alloys of the Bi_2Se_3-$CuCr_2Te_4$ system. 1-Bi_2Se_3, 2-5 mol %, 3-70 mol %, 6-92 mol %, 5-100 mol % $CuCr_2Te_4$

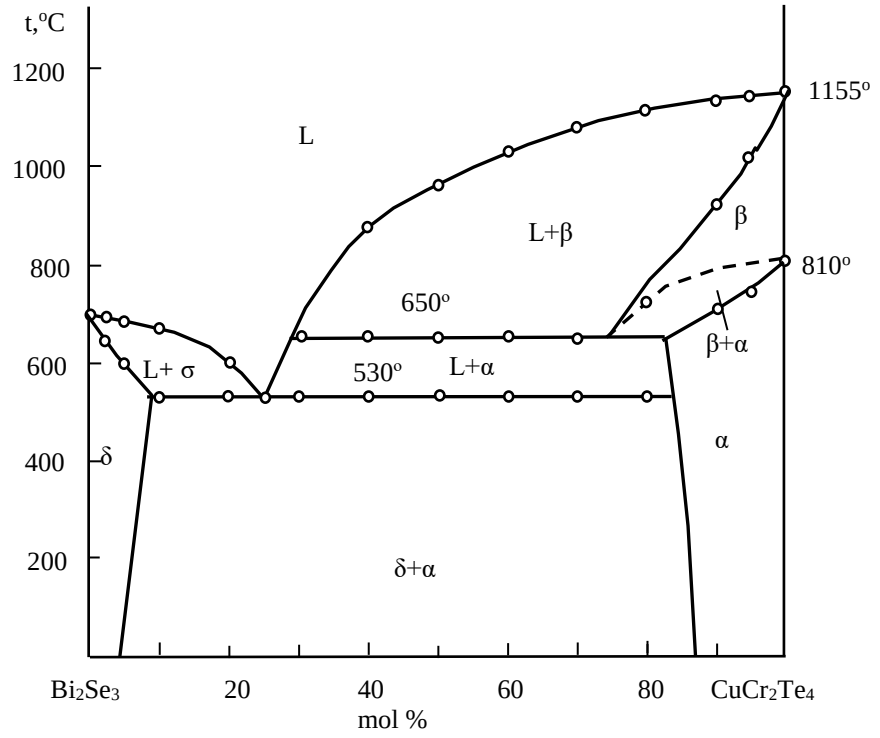

Fig.3. T-x phase diagram of the Bi_2Se_3-$CuCr_2Te_4$ system.

Table 1.

Composition of alloys of the Bi_2Se_3-$CuCr_2Te_4$ system, results of DTA, density and microhardness measurements

Composition, mol %		Thermal effects, °C	Density, q/sm^3	Microhardness, MPa	
Bi_2Se_3	$CuCr_2Te_4$			δ	α
				P=0,10 N	P=0,15 N
100	0.0	706	8,00	850	–
97	3,0	650,700	8,06	890	–
95	5,0	600,690	8,12	900	–
90	10	530,675	8,00	900	–
80	20	530,600	7,90	900	–
75	25	530	7,72	–	–
70	30	530,650	7,55	Eutek.	Eutek.
60	40	530,650,880	7,40	–	2000
50	50	530,650,970	7,30	–	2000
40	60	530,650,1040	7,10	–	2000
30	70	530,650,1080	6,95	–	2000
20	80	530,725,1120	6,80	–	2000
10	90	710,925,1140	6,65	–	2000
5,0	95	750,1025,1150	6,58	–	1870
0,0	100	810, 1155	6,51	–	1850

The dependence of the microhardness of alloys of the Bi_2Se_3-$CuCr_2Te_4$ system on composition has been studied and it has been established that there are two different values of microhardness. Some physicochemical properties of the system are given in Table 1. The microhardness value (850-900) MPa corresponds to the microhardness of δ-solid solutions based on the Bi_2Se_3 compound. The microhardness of α-solid solutions based on the $CuCr_2Te_4$ compound varies within the range (1850-2000) MPa.

To clarify the region of the $(CuCr_2Te_4)_{1-x}(Bi_2Se_3)_x$ solid solution, X-ray phase analysis of alloys containing 2, 5 and 8 mol % $CuCr_2Te_4$, and their lattice parameters were calculated. The results of X-ray phase analysis show that solid solution alloys based on $CuCr_2Te_4$ also crystallize in the cubic syngony. As a result, it was found that with an increase in the amount of Bi_2Se_3 compound 2, 5 and 8 mol % $CuCr_2Te_4$ lattice parameters increase significantly in lattice parameter for: a=11.245 Å, a=11.288 Å, a=11.346 Å, Crystallographic results of samples containing 3, 5 and 8 mol % $CuCr_2Te_4$ are given in table. 2.

Table 2.

X-ray data of solid solutions $(CuCr_2Te_4)_{1-x}(Bi_2Se_3)_x$ (x=0,02; 0,05; 0,08)

$CuCr_2Te_4$ a=11,134 Å					98 **$CuCr_2Te_4$** -2 % **Bi_2Se_3** a= 11,245 Å				
I,%	$d_{эс.}$, Å	h	k	l	I,%	$d_{эс.}$, Å	h	k	l
8	3,9386	2	2	0	9	3,9726	2	2	0
23	3,3588	3	1	1	25	3,3928	3	1	1
100	3,2158	2	2	2	100	3,2498	2	2	2
95	2,7850	4	0	0	95	2,8190	4	0	0
3	2,2739	4	2	2	3	2,3079	4	2	2
8	2,1439	5	1	1	8	2,1779	5	1	1
90	1,9693	4	4	0	3	2,0033	4	4	0
2	1,6988	5	3	3	2	1,7328	5	3	3
35	1,6794	6	2	2	35	1,7134	6	2	2
18	1,6079	4	4	4	20	1,6519	4	4	4
2	1,4886	6	6	2	3	1,5226	6	6	2
3	1,4503	7	5	1	5	1,4843	7	5	1
11	1,3925	8	0	0	12	1,4255	8	0	0
95 **$CuCr_2Te_4$** -5 % **Bi_2Se_3** a=11,288 Å					92 **$CuCr_2Te_4$**-8 % **Bi_2Se_3** a=11,346 Å				
I,%	$d_{эс.}$, Å	h	k	l	I,%	$d_{эс.}$, Å	h	k	l
9	3,9846	2	2	0	9	3,9903	2	2	0
25	3,4048	3	1	1	25	3,4105	3	1	1
100	3,2618	2	2	2	100	3,2675	2	2	2
95	2,8310	4	0	0	95	2,8367	4	0	0
3	2,3199	4	2	2	5	2,7909	4	2	2
8	2,1898	5	1	1	8	2,1956	5	1	1
90	2,0153	4	4	0	90	2,0210	4	4	0
2	1,7558	5	3	3	4	1,7505	5	3	3
35	1,7254	6	2	2	35	1,7311	6	2	2
20	1,6539	4	4	4	20	1,6596	4	4	4
3	1,5346	6	6	2	3	1,5403	6	6	2
5	1,4963	7	5	1	7	1,5020	7	5	1
12	1,4385	8	0	0	12	1,4442	8	0	0

Conclusion

Using complex methods of physicochemical analysis, the chemical interaction in the Bi_2Se_3-$CuCr_2Te_4$ system was studied and its T-x phase diagram was constructed. It has been established that the phase diagram of the Bi_2Se_3-$CuCr_2Te_4$ system is a quasi-binary section of the quasi-ternary system Bi_2Se_3-$CuCr_2Te_4$ and belongs to the eutectic type. Cocrystallization of the Bi_2Se_3 and $CuCr_2Te_4$ compounds ends at the double eutectic point, coordinate: 25 mol % $CuCr_2Te_4$, temperature 530°C. In the Bi_2Se_3-$CuCr_2Te_4$ system at room temperature, solid solutions based on the Bi_2Se_3 compound make up 5 mol % $CuCr_2Te_4$, and on the basis of $CuCr_2Te_4$ up to 8 mol % Bi_2Se_3. X-ray phase analysis of solid solutions $(CuCr_2Te_4)_{1-x}(Bi_2Se_3)_x$ (x=0.02; 0.05; 0.08) was carried out and their lattice parameters were calculated. It has been established that alloys containing 2, 5 and 8 mol % $CuCr_2Te_4$, crystallize in a cubic syngony with lattice parameters: *a*=11.245 Å, *a*=11.288 Å, *a*=11.346 Å, respectively.

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ECONOMIC SCIENCES

WAYS TO SOLUTION PROBLEMS OF EMPLOYMENT, UNEMPLOYMENT AND POVERTY IN THE REPUBLIC OF UZBEKISTAN

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ПУТИ РЕШЕНИЯ ПРОБЛЕМ ЗАНЯТОСТИ, БЕЗРАБОТИЦЫ И БЕДНОСТИ В РЕСПУБЛИКЕ УЗБЕКИСТАН

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Среди важнейших проблем глобального характера на современном этапе социального и культурного развития страны, на передний план выдвигается проблема преодоления бедности населения. В связи с распадом мировой социалистической системы произошел крупнейший социальный взрыв с неизбежным трансформационным спадом. Последнее, безусловно, отразилось на масштабах, структуре и эффективности трудовой деятельности населения, т.к. значительно сократилось количество рабочих мест. Занятость населения – одна из ключевых государственных задач. Достижение высокого уровня занятости - одна из основных целей макроэкономической политики в любой стране, и в первую очередь в такой, как Узбекистан. Проблема обеспечения трудоспособного населения Узбекистана рабочими местами находила сложное решение ещё в советские времена, когда государство гарантировало работу всем трудоспособным жителям. Именно поэтому в нашей стране развивались сравнительно трудоемкие производства: получили развитие овощеводство и хлопководство, хлопкоперерабатывающие и другие промышленные предприятия. Однако и тогда этих мер было недостаточно. Миграция имела значительные размеры, и граждане республики в массовом порядке уезжали на работу за пределы республики. При переходе к рыночной экономике существенно меняется точка зрения на эффективную занятость. На смену идеологии всеобщей занятости всего трудоспособного населения, подкрепляемой обязанностью человека участвовать в общественном производстве, приходит концепция обеспечения желаемой занятости и свободного выбора формы и вида занятости. Иначе говоря, правительство должно гарантировать каждому человеку возможность трудиться, а человек вправе избирать место и вид трудовой деятельности и принимать решение об участии в ней. Проблема занятости в Узбекистане усилилась с объявлением независимости страны и началом рыночных реформ в связи с массовым спадом производства и в настоящее время стала одной из болевых точек национальной экономики. Из-за остановки и частичной работы большинства промышленных предприятий значительное количество людей оказалось без средств на существование. Причем неравномерность этого процесса привела не только к снижению занятости, а и к возникновению застойной безработицы, способствующей социальной деградации населения. Отличительной чертой современного узбекского общества стало обнищание значительной части населения, низкий уровень его экономической и правовой защищенности. Рост цен на потребительском рынке Узбекистана значительно сократил реальные доходы трудящихся. Индекс средней реальной заработной платы в 2023 году по сравнению с 2015 годом возрос в 2,1 раза при росте индекса цен на товары народного потребления (ТНП) 4,2 раза. Этот показатель свидетельствует о резком снижении жизненного уровня населения. К сожалению, эта тенденция имеет место и сегодня. В декабре 2022 года по сравнению с декабрем 2019 года индекс реальной заработной платы возрос в 1,4 раза, тогда как рост индекса цен на ТНП составил 1,9 раза. В январе 2023 года население республики составляло 34304,8 тыс. человек. Из них к трудовому населению отнесены 14797,9 тыс. человек. Численность экономически активного населения - 13239,6 тыс. человек. Всего в народном хозяйстве в январе 2023 года фактически было занято всего 73,9% общей списочной численности занятых, т.е. 26,1% списочного занятого населения фактически было безработным, поскольку оно не было обеспечено работой и заработной платы не получало[1]. Согласно данным официальной статистики, в республике зарегистрировано на 1 января 2024г. 1558,4 тысячи безработных, что несколько ниже показателей прошлых лет и составляет 10,5 % от общего количества экономически активного населения республики. В то же время в других странах, в том числе развитых рыночных странах и в странах с переходной экономикой, этот

[1] Узбекистан в цифрах.-2024, с. 26-27; 52-53; 57

показатель был заметно выше. К примеру, этот показатель в России составил - 8,9%, Испании -18,1, Италии - 7,5, США - 9,6, Польше -11,8[2]. Такое разнообразие показателей, когда у стран с разным уровнем производства и жизни населения доля безработных различна, объясняется целым рядом факторов, связанных со структурой экономики, текущей экономической политикой и используемой методикой учёта. Человек числится безработным, если он нигде не работает и занимается поиском работы. Недостаточно лишь не иметь работу - человек должен пытаться активно её найти. Многие люди не имеют работы и при этом не числятся безработными. К ним относятся: пенсионеры, женщины, воспитывающие дома детей; выпускники школ и других учебных заведений, которые не смогли трудоустроиться, пали духом и прекратили всякие поиски; люди, получившие бессрочный отпуск по месту своей основной работы; люди, проходящие период профессиональной подготовки к новой работе; работники сельскохозяйственных предприятий в период межсезонья; беженцы из других районов республики; лица, ранее участвовавшие в боевых действиях и не включенные в официальные части вооруженных сил страны и др. В Узбекистане не имеющие работы лица из районов, где ранее проходили боевые действия, при финансовой поддержке гуманитарных организаций заняты общественными работами (восстановлением своего жилья, ремонтом дорог, очисткой каналов). Работники промышленных предприятий, функционирующих несколько месяцев в году, в период бездействия предприятий числятся в бессрочном неоплачиваемом отпуске и не относятся к безработным. Нельзя отнеси к занятому населению лиц, например работников строительных, проектных и иных организаций, администрация которых загрузила их работой, но, в то же время, не гарантировала выплату заработной платы. Большое число людей выехало за пределы мест своего постоянного местожительства на заработки, занято куплей и перепродажей различных товаров, обработкой участков земли, трудятся в различных секторах «теневой» экономики, объём производства которой, по официальным данным, достигает 25% от ВВП. В учитываемую численность безработных эти лица не включены, несмотря на то, что постоянного дохода большинство из них не имеет. Поэтому показатель 2-4% безработных в общей численности экономически активного населения Узбекистана не может считаться достоверным. Также и в других странах СНГ, использующих не совсем точную методику учёта безработных, официальный показатель безработицы не является реальным. Как видно, различия в методиках подсчета количества безработных могут привести к значительному искажению фактического состояния дел. Поэтому, если учесть специфические факторы и уровень фактической безработицы в развитых рыночных странах, превышающий в среднем 5%, в странах СНГ, в том числе в Узбекистане, этот показатель отношений незанятого трудоспособного населения к общей сумме трудоспособного населения фактически намного выше (не менее 30%, по оценкам МВФ в Узбекистане).

Изучение динамики безработицы и роста реального производства в развитых странах показало, что коэффициент потерь реального производства от безработицы равен 3, то есть увеличение безработных на 1% приведет, при прочих равных условиях, к сокращению реального объёма производства на 3%. При этом прирост производства на 3% сохранит прежний уровень безработицы, но каждый последующий процент прироста потребует увеличения занятости на 0,5% (для расчета использованы данные удельного веса заработной платы в ВВП, равные 75%). Для Узбекистана, где удельный вес заработной платы в ВВП не превышает 30%, рост безработицы на 1% уменьшит ВВП в среднем на 0,25-0,35%. Рост безработицы в республике сопровождается явлением, которое должно быть учтено в социально обоснованной экономической политике государства. Только признаком сохранившегося социалистического менталитета людей можно считать факты такого рода, когда имеется рынок безработных и одновременно сохраняются вакансии рабочих мест в декабре 2023 г. в Узбекистане таких вакансий было 10,5 единицы[3].

В целом значительно сократились не только доходы населения, но и другие социальные показатели. Ранее по показателю индекса человеческого развития (ИЧР), который учитывает ВВП на душу населения, продолжительность жизни, грамотность населения, детскую смертность, безопасность и обеспеченность населения работой и другие социальные показатели, Узбекистан с его показателем ВВП на душу населения за 2022 год, равным 1850 долларов США, находился на 132 месте. Для сравнения: Пакистан и Гвинея с ВВП на душу населения, равными 540 и 650 долларам в год, находились соответственно на 138 м и 145 местах[4].

Политика занятости и политика доходов, рассмотренные совместно, приводят к следующему выбору: неполная занятость или переход в ряды полностью безработных. Ответ на этот вопрос неоднозначен и требует конкретного анализа. В Национальной Стратегии Развития РТ на период до 2025 года предусматривалось использовать оба пути – закрытие нерентабельных предприятий и полная безработица, использование скрытой безработицы и предоставление неполной занятости на государственных предприятиях. Однако фактически до сих пор ни одно предприятие государством не было объявлено банкротом, однако большинство предприятий предоставили своим работникам неоплачиваемые бессрочные отпуска, что вуалирует факт их увольнения. Низкий уровень доходов населения отразился на структуре доходов домашних хозяйств. Это объясняет, почему при массовой безработице в республике сохраняются вакансии: низкий уровень заработной платы не прельщает безра-

[2] Интернет. Страны мира / cnfnbcnbrf cnhfy vbhf/. Tabl-569/

[3] Узбекистан в цифрах. 2024, с. 52-53; 57.

[4] Интернет table/667, 10 января 2024.

ботное население, которое не смогло бы найти дополнительные источники выживания при такой низкой зарплате и длительной занятости. Это объясняет невысокую эффективность сельскохозяйственного производства, осуществляемого на базе государственной и негосударственной собственности и при низком уровне заработной платы: как и в советские времена, крестьяне держатся за свое место не для получения заработка от основного места работы, а для обеспечения своей семьи за счет доходов от приусадебных участков. Это объясняет также сравнительно низкую эффективность системы государственного управления со сравнительно высокими, но крайне недостаточными размерами заработной платы, не сопоставимой с заработной платой в частном секторе. Может ли помочь в этом вопросе принятие правительственного решения об установлении достаточного размера минимальной заработной платы? Такого рода решения, принятые в отношении достаточно благополучной бывшей Восточной Германии, привели к 35-процентному уровню безработицы. Жесткая произвольная структура заработной платы, политика обеспечения полной занятости, существование льгот и пособий, практически не связанных с производительностью труда, подорвали в этой стране всякие стимулы к эффективному труду. Руководители накапливали на предприятиях, наряду с другими ресурсами, оборудованием, лишнюю рабочую силу, так что открытая безработица была ничтожна по размерам. Ни работники, ни руководители не были заинтересованы в научно-техническом прогрессе и выпуске новой продукции, поэтому прогресс осуществлялся медленными темпами. Это связано с тем, что при росте затрат на фактор труда, в целях обеспечения прибыльности производства, предприятия были вынуждены уволить с работы значительное число людей. Между тем соседняя Чехия, сохранив низкий уровень минимальной заработной платы при относительно высокой производительности труда, сумела сдержать рост безработицы в стране. В качестве направления для снижения уровня безработицы в Узбекистане может использоваться метод увеличения государственных закупок продукции узбекских предприятий. Это оживит деятельность действующих предприятий, а государство, в свою очередь, по договоренности с другими странами, могло бы гасить свою внешнюю задолженность не валютными денежными средствами, которые нужны для инвестирования в собственную экономику, а поставкой товаров, в том числе не только традиционных экспортных товаров. Этот процесс медленно начинает функционировать, чему способствуют сравнительно новые государственные структуры. Однако в их функционировании существует множество проблем, как связанных с их торговыми методами, так и с медленным ростом удельного веса закупок государственных органов через эти специализированные ведомства. Другим способом является введение патентной системы налогообложения индивидуальных предпринимателей. Установив низкие ставки патента, обеспечив патентованием максимальное число лиц, государство предоставляет право предпринимателям осуществлять любую предусмотренную законами деятельность в целях получения личного дохода. Таким образом, не имея гарантированного государством рабочего места, патентики занимаются своим делом, и государство может некоторое время не тратить своих средств на их трудоустройство и обучение. Наиболее реальным способом трудоустройства безработного населения страны явилась реорганизация сельскохозяйственного производства и распределение земли между гражданами страны. Следует, правда, отметить, что и в рыночной и в нерыночной экономике обычно существуют два явления: безработица людей и «безработица» рабочих мест, то есть, наряду с людьми, не имеющими работы, имеются незанятые рабочие места. Но обычно в рыночной экономике количество безработных людей намного превышает количество не соответствующих их запросам рабочих мест, тогда как в нерыночной экономике и даже в экономике переходного типа чаще наблюдается обратная картина. Таким образом, в обозримой перспективе, без достижения финансового оздоровления экономики, невозможно решение одной из главных проблем использования трудового потенциала общества - проведение активной политики капиталовложений, направленной на создание новых и обновление действующих рабочих мест. Как показывает опыт других стран, 5-10 процентный уровень безработицы характерен для любого рыночного государства. Пожизненный наемна работу, который до сих пор ещё сохранился в Узбекистане, не гарантируется даже в самых развитых странах. Поэтому населению Узбекистана, даже в случае значительных успехов экономической реформы, следует свыкнуться с тем, что определенная доля трудоспособного населения при любых обстоятельствах будет безработной. Успех экономических преобразований, рост инвестиций, повышение производительности труда, развитие предпринимательства приведут к формированию большого числа, рабочих мест и обеспечат максимальную занятость населения страны, ориентированную на сокращение бедности в Узбекистане.

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CHARACTERISTICS OF THE DEVELOPMENT OF STRATEGIC MANAGEMENT IN THE ACTIVITIES OF SECOND TIER BANKS IN KAZAKHSTAN

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Abstract

This article examines the characteristics of strategic management development typical for the activities of second-tier banks in the Republic of Kazakhstan. It highlights certain management mechanisms of commercial banks, which are adapted to the current realities of the country's economic development. The study also explores the impact of external factors on banking activities.

Keywords: strategic management, management mechanism, banking activity, commercial bank, financial service.

Strategic management is an integral part of the overall organizational management system. The strategic management cycle has a long-term period and includes several cycles of operational and current management, ensuring the continuity of the strategy implementation process. Creating an effective management mechanism is, along with strategy development, the most important result of strategic management.

Strategies and management mechanisms condition each other: management mechanisms are adapted to the newly formed strategy, and if this is not possible, the strategy is adapted to the real management mechanism.

The core of modern strategic management becomes the organization's strategy, or more precisely, a system of strategies that includes a set of interconnected specific marketing, entrepreneurial, and functional strategies. A correctly chosen strategy is the first and most important result and an effective mechanism of strategic management, as it directs and mobilizes the use of the organization's full potential in specific directions, ensuring success.

Overall, strategic management is tasked with fundamentally determining the qualitative state a particular organization should be in from a strategic perspective; the principal position the organization should occupy in the corresponding market; how to qualitatively change the organization’s market niches in all areas of activity, and so on.

Ultimately, all the work of strategic management may boil down to fully justifying the strategic competitive advantage that is desirable for a specific organization in a given perspective, as well as setting corresponding strategic goals to achieve it.

Strategic management in a commercial bank is a managerial process of defining and achieving the bank's long-term goals, considering its available resources and opportunities while complying with legal requirements [1].

The strategy should consider the external conditions of banking activity and define the result the bank aims to achieve. It can be said that the strategy is a part of the overall system, an element, a factor of success in banking activity.

When defining the role and place of strategic management in the management system of a commercial bank, it is important to note that within the financial management block, strategic management serves as the main subsystem and performs the primary and foremost function of banking management [2, p. 117].

Alongside the strategic orientation of a bank, which determines the success of banking activities, the quality and qualification of management and its marketing activity should be highlighted. Western banks have been able to make a qualitative leap in their development, primarily thanks to well-established marketing and management. A focus on modern management methods, technology, and the bank's extensive connections with external structures can undoubtedly give a powerful impetus for the development of our banks as well.

The strategy of a commercial bank is inconceivable without addressing the banking staff. The bank manager is not merely a bureaucratic position; he is a banker in the truest sense of the word, a professional with commercial and analytical skills. When people speak of a good bank, they primarily refer to a bank with highly qualified staff. This is no coincidence. In a modern bank (of course, with a sufficiently developed network of credit institutions), clients come not just to obtain a financial service, but to seek advice on how

best to organize their business. Naturally, to ensure such quality of service, a strong team capable of maintaining its high professional reputation must be formed in the bank [3, p. 26].

These are the strategic factors that ensure the success of banking activities. In addition to these, there are other factors, which could be called operational.

Success can only be achieved when the bank's policy is oriented towards certain values that inevitably lead to the desired outcome. Among the operational factors leading to success, one should highlight a commercial bank's orientation towards the client. The client is always right; this is not just a slogan, but a genuine philosophy of the bank's behavior, aimed at generating income. In our conditions, this is not so simple. For a long time, the economy was dictated by the bank, not vice versa. Nonetheless, where a bank manages to "overcome" itself and finally take the only correct path, success is inevitable.

Emphasizing the comprehensive development of trustful and partnership relations with the client should coexist practically with the philosophy of motivation and sales of the banking product, and a market orientation responsive to its changing needs [4, p. 5].

A crucial operational factor in the success of banking activities is the cost strategy, focusing on labor cost savings and reducing the cost of banking services. Unfortunately, our banks have lost the sense of economizing their own expenses, and concepts such as the cost of credit in rubles have disappeared, without which effective policy cannot exist. Surviving in a tough competitive battle and achieving substantial income is only possible based on economizing, prudent resource management, and accelerating the turnover of funds. Consequently, banks need not only to overcome themselves but also to create a mechanism that would ensure the economization of incurred costs and the reduction of the cost of the banking product [5, p. 45].

The following factors can be highlighted as ensuring the success of a commercial bank:

· Creation of comprehensive information systems;

· Collaboration with foreign banks;

· Diversification of banking risk (across industries, ownership forms, and types of services);

· Organization of internal bank audits;

· Transition to new banking service technology.

The strategic plan of a bank can be difficult to define in terms of the type of information included in it. The content varies among different banks. However, regardless, a strategic plan should include the following components:

A) The bank's mission is determined at the very first stage of conducting marketing activities and serves as the starting point in strategic planning. It establishes what the bank aspires to and touches upon the level of organizational units, outlining their scope of activities.

The mission of the bank, or its primary task, is a clearly formulated reason for its existence. Based on the organization's main task, a whole hierarchical ladder of the bank's tasks is constructed. The mission is formulated at various organizational levels of the bank, but there is always a clear subordination of the tasks of structural units to the general task of the organization. The overall bank mission should describe the direction of the organization's activities in terms of the services it provides and the consumer groups it serves.

Some organizations and enterprises may achieve a certain level of success without expending much effort on formal planning. Moreover, strategic planning in itself does not guarantee success. Nevertheless, formal planning can create a number of important and often substantial favorable factors for an organization.

Analyzing the external environment helps to control external factors relative to the firm, achieve significant results (time to develop an early warning system in case of potential threats, time to forecast opportunities, time to devise a contingency plan, and time to develop strategies). For this, it is necessary to determine where the organization is currently, where it should be in the future, and what the management needs to do to get there. The threats and opportunities that a bank faces can be categorized into seven areas:

a) Economic factors play a crucial role in shaping a bank's strategic direction, as the state of the economy influences the bank's objectives. Factors such as inflation rates, international balance of payments, and employment levels must be constantly monitored and assessed, as each can represent either a threat or a new opportunity for the enterprise.

b) Political factors also significantly affect business operations. Active participation of entrepreneurial firms in the political process highlights the importance of state policies for the organization. Thus, it is essential for firms to keep track of regulatory documents from local bodies, state authorities, and the federal government, which can directly impact their operations.

c) Market factors present ongoing risks for banks. Factors influencing organizational success or failure include the income distribution of the population, the level of industry competition, changing demographic conditions, and the ease of market penetration.

d) Technological factors are increasingly critical, with changes in manufacturing technology, the use of computers in design and service delivery, and advancements in communications technology. Bank leaders must ensure that their organizations are not caught off guard by future technological disruptions that could undermine their operations.

e) Competition factors require any organization to carefully examine the actions of its competitors. This includes analyzing competitors' future goals, assessing their current strategies, reviewing assumptions about the competitors and the industry in which these companies operate, and thoroughly studying competitors' strengths and weaknesses.

f) Social behavior factors involve changing relationships, expectations, and mores of society, such as the role of entrepreneurship, the role of women and minorities in society, and consumer protection movements.

g) International factors are particularly important for banks operating in the global market. Leadership must continually evaluate and monitor changes in this broad environment, adapting strategies to address global challenges and opportunities.

Conducting a realistic analysis of the strategic planning practices of Kazakhstani commercial banks is extremely difficult, as such planning is only beginning to be implemented. At the same time, strategic approaches in the development of the banking sector of our economy have recently begun to undergo significant changes. Alongside the expansion that underlies the development strategy of regional Kazakhstani banks, an orientation is also being employed by large Kazakhstani banks towards strengthening positions by addressing internal issues. This includes changes in the credit portfolio, transformation of organizational structures in line with new tasks, and disengagement from clients that do not fit the new strategy of the bank.

Thus, the role of strategic planning in the banking activities of Kazakhstan lies in ensuring effective and sustainable economic development of the bank under modern conditions.

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THEORETICAL ASPECTS OF ETHICS AND THE IMPACT OF ETHICAL BEHAVIOR ON THE ACTIVITIES OF THE ENTERPRISE

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Abstract
This article provides an analysis of the impact of ethical behavior on enterprise management. The main ethical principles and models used in modern enterprises were considered, the features of business ethics in different countries of the world were analyzed, and research on this problem was carried out.

Keywords: ethics, behavior, ethical behavior, business ethics, organizational ethics, ethical norms and values, national ethical norms, business negotiations, organizational culture.

Introduction. The relevance of the topic is due to both the increased importance of ethical behavior in the management system itself, and the importance of correctly studying the features of the formation of such behavior in enterprises.

In modern times, the development of society is more organizational in nature, the vast majority of social and personal problems are discussed and resolved while working at enterprises. Enterprises created on the basis of joint activities of people implementing a common program or goal exist and develop on the basis of certain norms, rules and procedures that change under the influence of society and culture.

Each enterprise operating in a rapidly changing economic environment needs to form a culture within the organization, regulate relations between managers and employees, and improve the management structure [Solonitsina A.A. (2020)].

Material and method. In a broad sense, ethics refers to the field of philosophical science, the object of research of which is morality. Ethics - in the field of moral culture - in the field of goodness, justice, humanity, material culture - is a large and important part of world culture, morality, which has developed over many centuries by all peoples in accordance with their ideas about beauty, order, improvement, household expediency. [Akhundova N.F. (2014).].

Currently, much attention is paid to the study of business ethics and management in order to improve the level of culture. He analyzes the relationships of business partners from the standpoint of moral assessment of the reasons for success or failure in any activity, especially in commercial and managerial.

In a broad sense, business ethics is a set of ethical principles and norms that organizations and their employees should be guided by in their activities in the field of management and production. This includes issues of various levels: ethical assessment of both domestic and foreign policy of the enterprise as a whole; moral principles of employees of the organization, that is, professional morality; [Aliyev T.F., Mejnunov R.M. (2015)].

Organizational ethics are the rules, beliefs, and values that determine how managers and employees should behave in situations where their activities can help or harm other people, both inside and outside the enterprise. Morality increases the general well-being (happiness, health and prosperity) of individuals, groups and organizations, and sometimes the well-being of the wider external environment in which the enterprise operates, and determines the goals in which the enterprise operates and how workers should behave to achieve them [Akhundova N.F. (2014).].

Every self-respecting manager must comply with the ethical standards of the enterprise in which he works.

Consider some examples:

- When hiring, each employee, especially managers, undertakes ethical and legal obligations not to share confidential information or information representing trade secrets, even if in the future he decides to leave the organization. Similarly, if your previous worker worked for another organization, they should know they have no right to distribute their previous worker's confidential information.

- the manager of the enterprise must work with full care and responsibility in accordance with the interests of the enterprise in which he works, and expect moral values. From an ethical point of view, it is not considered normal to have the interests of an external business in order to divert a significant part of their time or attention from fulfilling their duties in the enterprise or otherwise negatively affect the activities of the enterprise.

- each manager should avoid external financial or other relations that may adversely affect the interests of the enterprise, create duality in relation to the enterprise or its interests and prevent the effective performance of its official duties, and should not lead to a conflict of interest.

- it is not allowed to accept invitations to entertainment, tourist, sports events related to work, as well as accept gifts, tickets, paid rest, personal presentations in the form of money, etc. Such actions can be considered by others as an acceptance of a certain obligation by the enterprise and involving you in a conflict of interest.

Business ethics is based on respect for the interests of not only your enterprise, but also partners, customers and society as a whole. Violation of property rights, misappropriation of confidential information, inaccurate advertising, violation of consumer freedom of choice, commercial espionage lead to deformation of market relations, increase risks and transaction costs. Unfair information provokes clients, discrimination on

the grounds of unprofessionalism and "brain tricks" distort relations in the labor market.

Buying profitable orders not on a competitive basis, but through respect, bribery or blackmail and threats also destroys the market. Therefore, to avoid all these problems, many enterprises create corporate ethical codes, in writing form the ethical principles of the corporation, the ethical values of the enterprise, the rules of conduct, the responsibility of management in relation to their employees.

Thus, based on the above, it can be said that the importance of business ethics is difficult to overestimate. It not only contributes to the formation of ethical values necessary for each person and a freer orientation of entrepreneurs in complex problems that arise when making decisions, but also allows the correct conduct and processing of the market economy and market relations in general. To do this, you need to consider and understand the basic concepts, norms and rules of business ethics when studying this issue.

Result. As a result of our research, we can note that along with material factors, ethical factors also play an important role in regulating the activities of each enterprise. At the same time, an organizational culture formed on the basis of moral factors, ethical values and norms also plays a significant role in the efficiency of the enterprise.

Ethical training, remuneration for ethical behavior, the definition of internal ethics is a necessity of modern management, since in the presence of ethical relations, services are improved, costs are reduced, and an atmosphere of cooperation and development is formed.

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THE ROLE OF INFRASTRUCTURE INVESTMENTS IN THE ECONOMIC DEVELOPMENT OF AZERBAIJAN

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Abstract

Infrastructure is the foundation of every country's economic development, serving as the foundation upon which growth and prosperity are built. In the example of Azerbaijan, a country with a rich cultural heritage and rich natural resources, strategic investments in infrastructure have played an important role in accelerating economic progress and improving the quality of life of its citizens. Azerbaijan has taken important steps in the development of its infrastructure to support sustainable development and attract investments in modern transport networks, social infrastructure projects and other areas.

Keywords: Azerbaijan, infrastructure, investment, social, transport, oil, development.

Introduction

The term "infrastructure" has recently become entrenched within the lexicon of the Azerbaijani language. Originating in military science in early 20th-century Europe, it derives from the Latin roots "infra," meaning "under" or "below," and "structure," denoting construction or arrangement. Despite its pervasive usage, a universally accepted definition remains elusive. Some conceptualize infrastructure as a service domain catering to both production and societal needs, while others restrict its scope solely to industrial services. Alternatively, it is construed as an amalgamation of domains facilitating societal activities. In our interpretation, infrastructure comprises diverse economic sectors, entities, organizations, and legal and physical entities collectively aimed at attaining overarching objectives. Integral to any system, whether economic, political, or military, infrastructure constitutes an essential component, encompassing various elements ensuring the system's functionality. The establishment of infrastructural domains correlates with the advent of social division of labor, progressively expanding and deepening its reach.

Since the 1980s, a growing number of economists have demonstrated heightened interest in assessing the economic ramifications, trajectory, and potency of infrastructure investment. While the correlation between augmented infrastructure capacity and economic expansion is widely acknowledged, the extent and magnitude of this positive influence on economic growth are subject to debate. The perspectives among economists regarding the essence of infrastructure are far from unequivocal. Over time, diverse scholars have approached infrastructure from varying angles, resulting in a multitude of viewpoints regarding its intrinsic nature and attributes.

The establishment, evolution, and enhancement of new infrastructures aimed at addressing socio-economic development objectives within a nation should be tailored to advancements and market dynamics. Infrastructure within each country has been shaped in response to societal demands and evolving needs. Infrastructures embody a spectrum of sectors and facilities that furnish services to other domains by virtue of their distinctive attributes [4, s.18]. Infrastructure is categorized into production, social, communal-household, and market infrastructures. This classification encompasses secondary and sometimes tertiary subgroups or components within each infrastructure category, rendering it a comprehensive typology in the domain of infrastructure studies [6, s.8]. In delineating the "infrastructure" domain, it is imperative to delineate social infrastructure distinctively, subsequently distinguishing between production and institutional infrastructures. Social infrastructure encompasses activities such as commerce, public catering, domestic services catering to the populace, housing and communal services, transportation, communication, among others. These pursuits are directed towards satisfying individual needs within society, facilitating life endeavors, fostering intellectual development, and promoting elevated social and political engagement. Social infrastructure is construed as a composite assembly of tangible entities serving societal functions [5, s.10]. Within the domain of infrastructure, particular emphasis is placed on market infrastructure, delineating it as a conglomerate of distinct yet interlinked markets and managerial frameworks. This composite entity serves to facilitate the unimpeded flow of goods and services from producers to consumers [1, s.19].

The developmental trajectory of infrastructure sectors in Azerbaijan has been characterized by periods of uneven progress. Historical discrimination dating back to the Soviet era has perpetuated disparities in infrastructure development, resulting in Azerbaijan lagging behind neighboring republics for centuries. However, recent years have witnessed a gradual improvement in both the scale and territorial distribution of infrastructure projects. Since the 1990s, Azerbaijan has asserted its political sovereignty and pursued economic independence, facilitating the ongoing comprehensive development of various infrastructure domains.

The commencement of a new phase in Azerbaijan's infrastructure development has been catalyzed by the involvement of foreign corporations in the extraction of oil and gas reserves from the Caspian Sea. This

endeavor has spurred the establishment of the "Silk Road," facilitating the nation's integration into the global market, alongside the concurrent development of numerous regional and local infrastructural projects interconnected with it. Notably, the implementation of communication technology services and sophisticated management methodologies has been prominent, marking a significant progression. Consequently, there has been a pronounced surge in investment within the realm of infrastructure at an accelerated pace.

The significance of foreign and joint enterprises in Azerbaijan's infrastructure development is burgeoning, with an expanding utilization of their business acumen, technical advancements, and notably, investment potentials.

The socio-economic development paradigm of Azerbaijan, as conceptualized by Heydar Aliyev and subsequently advanced by his successor President Ilham Aliyev, has facilitated remarkable modernization within a brief timeframe, propelling the nation into a formidable global player. Central to this strategic trajectory was the formulation and execution of a national oil strategy, a visionary initiative pioneered by Heydar Aliyev. Recognizing the transformative potential of Azerbaijan's natural resources, particularly its oil and gas reserves, Aliyev envisaged leveraging these assets to rapidly bolster the country's economy and enhance the populace's financial well-being. The inception of the "Contract of the Century" marked a pivotal juncture, catalyzing substantial foreign investments and galvanizing efforts to diversify the economy. Crucially, a key imperative emerged: to judiciously channel the escalating revenues from oil and gas towards nurturing a robust non-oil sector, thus fostering a more balanced and sustainable economic landscape.

The decrees and directives issued by the head of state, Ilham Aliyev, aimed at advancing the socio-economic development of the regions of the republic, are geared towards fostering the continuous expansion of the non-oil sector within the nation, promoting economic diversification, and enhancing the overall welfare of the populace. A primary objective of the policy framework in this domain is the establishment of an enabling business and investment climate, fostering the attraction of both domestic and foreign capital, and perpetually augmenting the contribution of the non-oil sector to the gross domestic product.

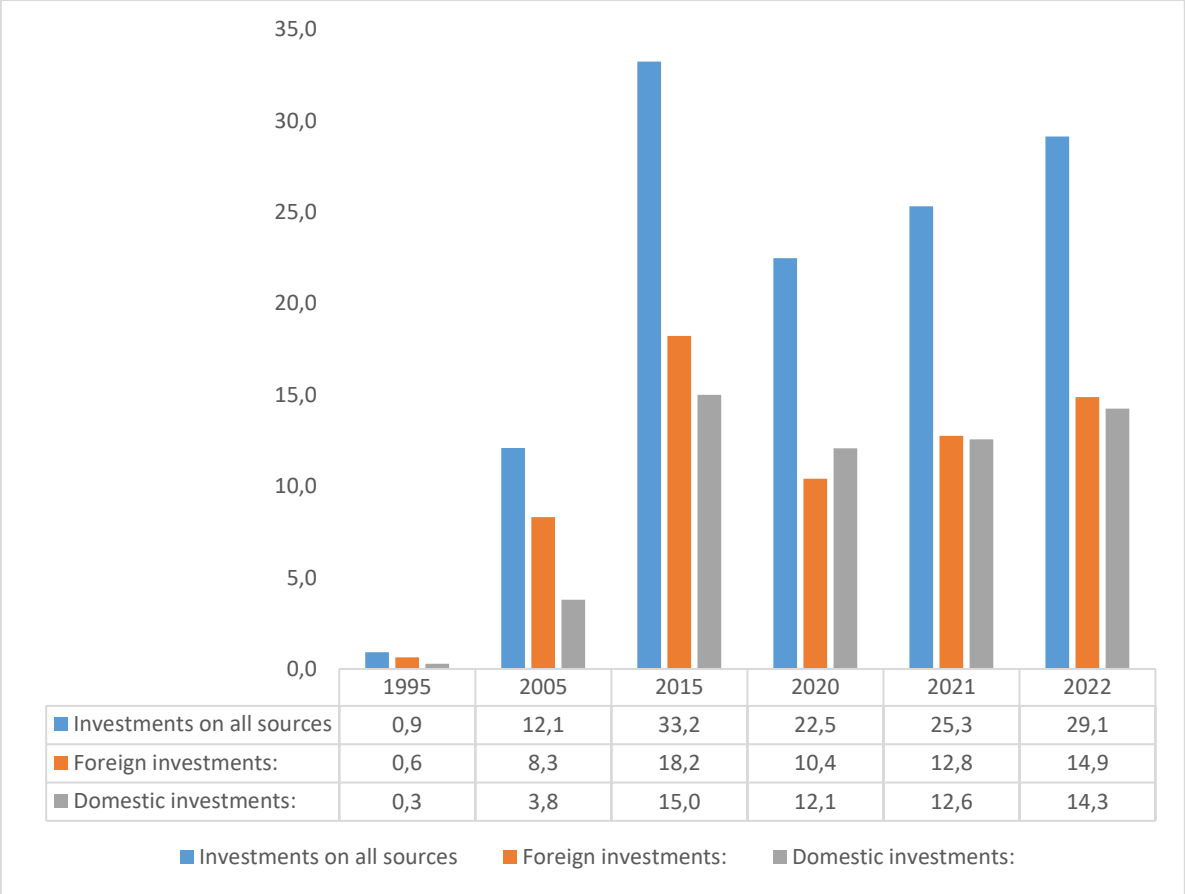
Contents of the study

Presently, the strategic allocation of capital for economic advancement within our nation is governed by the legislation titled "On Investment Activity of the Republic of Azerbaijan." Investments encompass a spectrum of resources including financial capital, material assets, and intellectual property, channeled towards domestic and international business ventures with the overarching objective of generating returns and enhancing productivity [3, s.14]

The centrality of the state in investment activity underscores its pivotal role in facilitating investment initiatives and, concurrently, participating directly in such endeavors. Particularly in locales characterized by low income levels, private entities often exhibit reluctance to engage in investment ventures, thereby necessitating state intervention as the principal investment actor. These locales typically encompass social spheres aimed at enhancing populace welfare, encompassing domains such as education, culture, environmental conservation, and allied sectors. [2, 53-58]

In recent years, there has been a notable surge in the significance attributed to infrastructure investments concerning economic development within Azerbaijan. This trend is particularly pronounced in the allocation of investment resources towards the Karabakh and East-Zangezur economic regions.

Investments directed to the economy (billion manats)



	1995	2005	2015	2020	2021	2022
Investments on all sources	0,9	12,1	33,2	22,5	25,3	29,1
Foreign investments:	0,6	8,3	18,2	10,4	12,8	14,9
Domestic investments:	0,3	3,8	15,0	12,1	12,6	14,3

Source: prepared by the author based on data from the statistics committee. [9]

In scrutinizing the diagram, it becomes evident that foreign investments channeled into the Azerbaijani economy surpass domestic investments across all periods, save for 2020. Notably, investments directed towards the economy have exhibited a consistent upward trajectory since 1995 and 2005, albeit with fluctuations. For instance, while the economy received ₼18,2 million in investments in 2015, this figure dwindled to ₼10,4 million by 2020. Nevertheless, between 2020 and 2022, there was a notable surge of 42.84%, culminating in investments amounting to ₼14,9 million. This pattern of oscillating growth persisted similarly in the case of domestic investments.

Moreover, investments targeting the advancement of transportation, the oil sector, and social infrastructure in Azerbaijan significantly contribute to its economic development.

The prioritization of modern transport infrastructure development throughout Azerbaijan underscores a concerted effort aimed at enhancing the country's connectivity and transit capabilities. In recent years, substantial investments have been directed towards the establishment of comprehensive road and transport networks, emblematic of the state's robust political and financial backing. This support stems from Azerbaijan's strategic position as an attractive hub for international transit transport, bolstered by its socio-political stability, geographical location with access to both land and water routes, and abundant economic resources. Notably, the convergence of East-West and North-South corridors within Azerbaijani territory has garnered significant attention for its potential to streamline global transit operations. While over 10 countries have joined efforts to establish these corridors, Azerbaijan stands out as the sole contributor to both initiatives, thus amplifying their functional efficacy.

Investments in the transport sector, million manats

	2000	**2010**	**2020**	**2021**	**2022**
Total	41,9	2 090,0	1 969,8	2 800,0	4 513,6
Railway transport	3,9	3,4	1,2	0,4	0,1
Other road transport	2,6	162,9	266,8	109,2	108,6
Water transport	1,0	13,2	53,3	40,3	31,5
Air transport	9,0	214,1	109,7	147,1	89,3
Warehousing and auxiliary transport activities	25,4	1 696,4	1 538,8	2 503,0	4 284,1

Source: prepared by the author based on data from the statistics committee. [9]

Numerous initiatives aimed at advancing the transport sector have been undertaken in Azerbaijan, accompanied by significant investment inflows. As delineated in Table 1, the trajectory of investment allocation to the transport sector exhibited a pronounced upward trend from 2000 to 2022, propelled by economic growth. Notably, the investment quantum surged nearly a hundredfold during this period, escalating from 41.9 million manats in 2000 to 4513.6 million manats in 2022. Although investment levels remained relatively steady from 2010 to 2020, a marked upswing ensued from 2021 onwards, attributable to extensive reconstruction endeavors in Karabakh and the East-Zangezur economic regions.

The surge in investments predominantly targeted the establishment of production infrastructure, particularly evident in the substantial allocation towards warehouse creation. In 2022, this segment accounted for 94.9% of total investments, mirroring a consistent trend observed from 2000 to 2021. This strategic emphasis underscores the concerted efforts towards bolstering production infrastructure, particularly in regions undergoing redevelopment efforts.

Transport corridors, in which Azerbaijan actively participates, are poised to catalyze the country's transition into a regional hub, substantially amplifying its role as a transit nation and augmenting its revenue streams. The East-West transport corridor, traversing Azerbaijan from East to West and linking Europe, the Caucasus, and Central Asia, represents a highly advantageous route characterized by economic viability and robust infrastructure. Leveraging the potential of this corridor effectively holds the promise of bolstering economic and trade ties among the diverse array of nations spanning this expansive geography, thereby furnishing a supplementary momentum to regional development at large. At the state level, Azerbaijan exhibits a notable political resolve to enhance the functionality of this corridor, including endeavors towards reviving the ancient Silk Road. Noteworthy international events hosted within the republic have served as platforms for deliberating various aspects pertinent to the restoration of the historic Silk Road.

Since its inauguration, the Baku-Tbilisi-Kars railway has garnered significant international attention despite its relatively brief operational history. This railway network has not only facilitated transportation within the participating nations but has also attracted the interest of Kazakhstan. Uzbekistan has indicated its intent to leverage the capabilities of this corridor, while Afghanistan has demonstrated substantial interest in utilizing the "Lapis Lazuli" transport route, which traverses Azerbaijan en route to Europe. Consequently, cargo originating from Turkmenistan will be conveyed to European destinations via the Baku-Tbilisi-Kars railway.

The inauguration of the New Baku International Sea Trade Port in Alat represents a substantial advancement in the transit capabilities of the region. Azerbaijan's investment in this port underscores its pivotal role in bolstering the transportation and logistical infrastructure within the area. Situated advantageously, the Alat port is poised to address transportation security concerns in Azerbaijan, while also positioning Baku as a prominent and contemporary hub for logistics and transportation within the Caspian basin. Moreover, it is anticipated to foster deeper collaboration among the Caspian littoral nations and facilitate the realization of the North-South and East-West transport corridors. Consequently, the establishment of the port offers propitious prospects for robust collaboration and commerce.

The transportation infrastructure within our republic, with aspirations to emerge as an indispensable transit hub within Eurasia, is currently undergoing comprehensive revitalization efforts. The emphasis is notably placed on the advancement of railway transportation systems. Substantial investments have been allocated in recent years towards bolstering the physical and technological foundations of this sector, alongside the execution of several ambitious projects.

National Leader Heydar Aliyev outlined an oil strategy aimed at catalyzing the transformation of independent Azerbaijan into a modern, resilient economic powerhouse. This strategic blueprint, devised to serve as the cornerstone for comprehensive political and economic reforms, encompassed key initiatives such as the engagement of foreign investors in the exploitation of Azerbaijan's oil reserves, the diversification of transportation channels for crude oil, the efficient administration of oil-derived revenues, and the ushering of Azerbaijan into a new era of progress and prosperity.

Under the auspices of National Leader Heydar Aliyev, a seminal agreement, the "Contract of the Century," was inked on September 20, 1994, marking a pivotal milestone in the annals of Azerbaijan's 20th-century history due to its profound political, economic, and strategic ramifications. This accord pertained to the joint exploitation and production allocation of the "Azeri," "Chirag," and "Guneshli" oil fields situated within the Azerbaijani territorial waters of the Caspian Sea. Participating in this historic pact were 11 international oil corporations representing seven nations across the globe, including Azerbaijan, the United States, the United Kingdom, Russia, Turkey, Norway, and Saudi Arabia. The agreement, valued at $7.4 billion, witnessed the involvement of renowned entities such as Amoco, BP, McDermott, UNOCAL, SOCAR, Lukoil, Statoil, Turkish Petrol, Pennzoil, Ramco, and Delta. Following the accord's ratification by the Azerbaijani Parliament on December 12, 1994, operational mechanisms such as the Steering Committee, the Azerbaijan International Operating Company (AIOC), and the Advisory Council were promptly established to oversee the contractual arrangements and operational endeavors [8].

On September 14, 2017, a new accord was ratified in Baku for the collaborative exploitation of the "Azeri", "Chirag" fields, and the deeper strata of the "Guneshli" field within the Azerbaijani sector of the Caspian Sea, along with the equitable distribution of production output. This event heralded a new phase in the development of the expansive oil field block known as "Azeri-Chirag-Guneshli". The agreement was en-

dorsed by representatives from the Azerbaijani government, SOCAR, BP, Chevron, IMPEX, Statoil, ExxonMobil, TP, ITOCHU, and ONGC Videsh. Subsequent to this accord, in 2019, an understanding was reached regarding the establishment of an additional production platform within the contractual domain of the "Azeri-Chirag-Guneshli" field block. As per the revised production sharing arrangement, which has been extended until the culmination of 2049, BP retains its role as the project operator, while SOCAR's ownership stake has been augmented from 11 percent to 25 percent, with 75 percent of the resultant oil profits accruing to Azerbaijan [7].

By the conclusion of the third quarter of 2023, Azerbaijan had executed 38 production sharing agreements (PSAs) with foreign oil corporations. The execution of the "Contract of the New Century" marked the inception of a novel phase in Azerbaijan's oil strategy. This milestone heralds the advent of a distinct epoch in modern Azerbaijani history, offering supplementary assurances for the nation's political and economic stability, fostering fresh investment opportunities, stimulating GDP expansion, generating employment opportunities, and ameliorating social welfare.

On October 18, 2018, the inaugural ceremony of the "Star" oil refinery was convened in Izmir, Turkey, with the attendance of Presidents Ilham Aliyev of Azerbaijan and Recep Tayyip Erdogan of Turkey. Boasting a collective oil refining capacity of 11 million tons, the "Star" facility possesses the capability to yield varying quantities of diesel fuel, aviation fuel, light naphtha, and assorted refined products. Proficient in catering to a substantial portion of Turkey's aviation fuel requisites, the refinery stands as a significant asset to the nation's energy infrastructure.

Investing exclusively in the Caspian basin area is deemed imperative for several reasons. Firstly, the region is renowned for its abundant oil resources, attracting the interest of the world's most developed nations since the early 20th century. Furthermore, our recently independent republic has grappled with economic downturn across all sectors, including the oil industry. The reconstruction of dilapidated establishments necessitates substantial financial resources, rendering their revitalization economically unfeasible. Hence, garnering initial profits for the state becomes pivotal in fostering overall economic prosperity.

In the context of fostering political and economic stability within a region, there emerges a significant imperative to garner increased attention from major global powers. This necessity was underscored by Heydar Aliyev's adept and forward-thinking approach, which strategically elevated the prominence of the oil factor—central to both regional and national interests—in Azerbaijan. Notably, in October 1994, an international accord was concluded to facilitate the collaborative exploitation of the Azeri, Chirag, and Guneshli oil fields situated in the Caspian region of Azerbaijan, aiming to augment oil production. This agreement culminated in the establishment of an international consortium, which, in turn, entered into the landmark "Agreement of the Century" with the State Oil Company of Azerbaijan Republic (SOCAR) for a duration of 30 years. Among the signatories to this pivotal contract were prominent entities such as Amoco, Unikal, Pennzoil, McDermott from the United States, BP and Remco from the United Kingdom, Lukoil from Russia, Delta from Saudi Arabia, and the Turkish Petroleum Corporation (TPAO), thereby solidifying Azerbaijan's position at the nexus of global relations.

Following the signing of the Azeri-Chirag-Gunashli Project Production Sharing Agreement (PSA) in September 1994, Azerbaijan experienced a notable surge in global attention, particularly directed towards its abundant national resources, notably the Caspian oil reserves. This agreement marked a pivotal moment in the nation's economic trajectory, fostering a conducive environment for foreign direct investment. Over the period spanning from 1995 to 2008, the country witnessed a substantial influx of foreign capital, totaling 125.5 billion USD according to the national economy's DSK data. Remarkably, the lion's share of these investments, amounting to 96% or 120.6 billion USD, transpired between 2000 and 2017. Specifically, within the aforementioned timeframe, foreign investments in Azerbaijan amounted to 29.2 billion USD, underscoring the nation's growing allure as a destination for international investment.

The decrees and directives endorsed by the head of state, Ilham Aliyev, aimed at the expedited advancement of the socio-economic landscape across the regions of the nation, epitomize an ongoing commitment to fortifying the non-oil sector, fostering economic diversification, and enhancing the quality of life for the populace. These initiatives, delineated within the framework of the Second State Program for the Socio-Economic Advancement of Regional Territories, underscore a strategic imperative to sustainably develop regional areas, overhaul social infrastructure, and mitigate the nation's reliance on oil-centric economic paradigms through the expansion of non-oil industries. Furthermore, this program engenders favorable conditions for entrepreneurial endeavors, signifying President Ilham Aliyev's astute comprehension of economic dynamics, coupled with a judicious acknowledgment of the pivotal role played by entrepreneurs in driving socio-economic prosperity, thereby accentuating his unwavering support for their endeavors.

One of the principal objectives of the policy framework in this domain revolves around fostering a conducive business and investment climate, aimed at enticing both domestic and foreign capital inflows, while consistently augmenting the contribution of the non-oil sector to the overall gross domestic product (GDP). The establishment of the State Investment Company in 2006 represented a significant milestone in centralizing state-directed investment policy and bolstering the investment appeal of the nation. The primary mandate of this entity is to facilitate investment promotion within the national economy and address prevailing challenges within this sphere. Concurrently, the company engages in collaborative ventures with foreign investors, thereby fostering enhanced levels of trust and confidence. Notably, Azerbaijan presently stands as a global frontrunner in investment allure, a fact which elicits considerable national pride.

During the first quarter of 2023, a total allocation of 546 million manats was directed towards state investment expenditures, facilitating the financing of significant investment endeavors. Within this allocation, a sum of 78 million manats was specifically allocated to the construction and renovation of various socio-cultural amenities, encompassing education, healthcare, culture, and sports infrastructure, among others. Additionally, a designated portion amounting to 9.4 million manats was earmarked for the construction of residential accommodations and analogous social amenities aimed at benefiting war-disabled individuals and families of martyrs. Furthermore, an allocation of 5.5 million manats was dedicated to the construction and enhancement of sports complexes and related facilities across different regions, indicative of a concerted effort towards societal development and welfare initiatives.

During his address at the plenary session of the parliament convened on December 5, Prime Minister Ali Asadov articulated that a significant allocation of 890.4 million manats from the 2024 state budget, earmarked originally for investment expenses, will be channeled towards the funding of social and infrastructure initiatives. This redirection of funds underscores a strategic shift in governmental priorities towards bolstering social welfare and enhancing essential infrastructure development. Asadov's announcement highlights a deliberate policy maneuver aimed at addressing pressing socio-economic needs, reflecting a pragmatic approach towards resource allocation within the context of national development objectives.

The Yasamal Residential Complex initiative, spearheaded by the State Agency for Housing Construction, aims to ameliorate housing accessibility for the populace through favorable conditions. As part of a public-private partnership, the "ENGINET" company emerged as a private investor following its success in the investment competition administered by "MIDA" LLC, an entity operating under the Agency, in June 2017. Tasked with the deployment of communication, television, and internet infrastructure within the Yasamal Residential Complex premises, as well as the provision of corresponding telecommunication services to its inhabitants, "ENGINET" fulfilled its obligations within the stipulated framework.

Result

In conclusion, infrastructure investments stand as the cornerstone of Azerbaijan's economic development strategy, fostering growth, stability, and prosperity. Infrastructure investments aimed at the economy play a crucial role in enhancing Azerbaijan's global standing, consolidating its position as a robust and forward-thinking state.

The notable socio-economic advancements in Azerbaijan underscore the significance of President Ilham Aliyev's strategic decisions and state initiatives, positioning him as a proficient inheritor of the legacy of National Leader Heydar Aliyev. President Aliyev's commitment to national progress is evident through the effective execution of primary state programs. These endeavors not only foster socio-economic advancement but also demonstrate the government's persistent dedication to addressing the needs and aspirations of the Azerbaijani populace.

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ANALYSIS OF THE PROFITABILITY OF PRODUCTION

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АНАЛИЗ РЕНТАБЕЛЬНОСТИ ПРОИЗВОДСТВА

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Abstract

The article is devoted to the concepts of profit, profitability and their factor analysis. Profit is the financial result of an organization and refers to the absolute performance indicators of the organization. The profitability indicator reflects the amount of profit received by the organization for each tenge of capital, assets, income and expenses. Factor analysis is a method of economic analysis that allows you to detail and measure the impact of individual factors that affect the studied performance indicator.

Аннотация

Статья посвящена понятиям прибыль, рентабельность и их факторному анализу. Прибыль является финансовым результатом организации и относится к абсолютным показателям деятельности организации. Показатель рентабельности отражает, какая сумма прибыли получена организацией на каждый тенге капитала, активов, доходов и расходов. Факторный анализ – метод экономического анализа позволяющий детализировать и измерить влияние отдельных факторов, оказывающих воздействие на изучаемый результативный показатель.

Keywords: analysis, assets, liabilities, financial statements, profitability, profit, profitability, factor analysis

Ключевые слова: анализ, активы, обязательства, финансовая отчетность, рентабельность, прибыль, доходность, факторный анализ

В условиях рыночных отношений организации, будучи субъектами бизнеса, формируют и предоставляют финансовую информацию, ориентированную на широкий круг внутренних и внешних пользователей для принятия управленческих решений. Финансовая информация отражается в финансовой отчетности. Финансовая отчетность – эта единая система данных об имущественном и финансовом положении организаций и финансовых результатов ее деятельности за отчетный период. Информационной базой анализа доходов и расходов является отчет «О прибылях и убытках». Прибыль – финансовый результат деятельности организации за период, представляющий собой превышение доходов над расходами. За счет прибыли организация имеет возможность расширить масштабы деятельности, осуществляет дополнительные вложения в производственную базу, в разработку новых технологий производства, в освоении новой конкурентоспособной продукции, а также пополняет оборотные активы. Оборотные активы формируются за счет оборотного капитала. Финансовым источником оборотных активов является собственный капитал. Остальная часть оборотных активов формируется за счет привлечения заемных средств, в частности банковских кредитов. Средства, вложенные в активы организации, постоянно находятся в обороте и обеспечивают бизнес процессы с целью получения прибыли. Ниже приводится кругооборот денежных средств, вложенных в оборотный капитал.

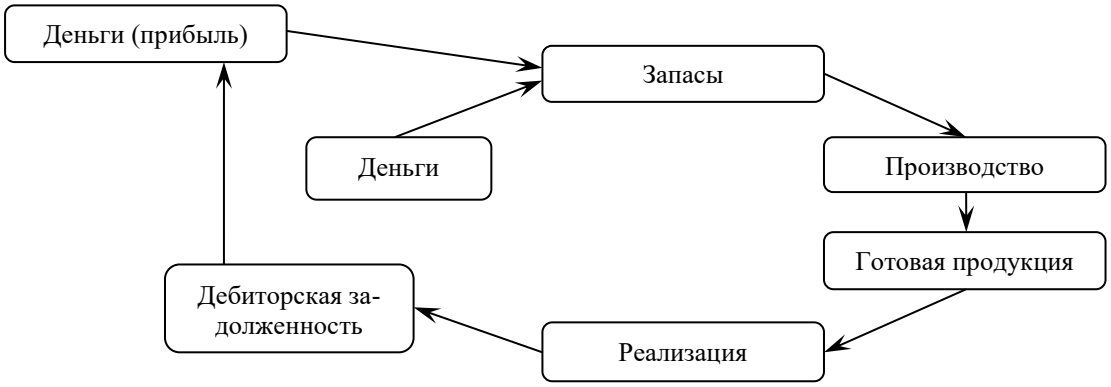

Рисунок 1. Кругооборот средств, вложенных в активы производства.

Таким образом, прибыль является финансовым результатом организации и относится к абсолютным показателям деятельности организации. Рентабельность – относительный показатель экономической эффективности деятельности организаций, отражающие прибыльность (доходность). Доходность характеризует отношение дохода к авансированному капиталу или его элементам; источникам средств или их элементам; общей величине текущих расходов или их элементам. Показатель доходности отражает, сколько тенге дохода получила организация на каждый тенге капитала, активов, расходов.

Показатель рентабельности отражает, какая сумма прибыли получена организацией на каждый тенге капитала, активов, доходов и расходов. К наиболее важным показателям оценки эффективной деятельности производства относится:

- рентабельность продукции;
- рентабельность продаж;
- рентабельность собственного капитала;
- рентабельность совокупных активов.

Рентабельность продукции определяется отношением прибыли, полной себестоимостью продукции. Рентабельность единицы продукции определяется отношением разности между ценой реализации и полной себестоимости к полной себестоимости единицы продукции. [1]

Рентабельность продаж (Returnonsales, ROS) отражает долю операционной прибыли (финансового результата обычной деятельности) в совокупной величине выручки от продаж (без косвенных налогов – НДС, акцизов) и рассчитывается по формуле:

$$ROS = \frac{\text{Операционная прибыль}}{\text{Выручка от продаж}} * 100\% \quad (1)$$

Рентабельность совокупных активов (Returnonassets, ROA) показывает какая величина прибыли до налогообложения и финансовых расходов приходится на каждый тенге, вложенного в совокупные активы производства:

$$ROA = \frac{\text{Прибыль до налогообложения и финансовых расходов}}{\text{Совокупные активы}} * 100\% \quad (2)$$

Рентабельность собственного капитала (Return on share holders' equity, ROE) показывает, какая величина чистой прибыли приходится на каждый тенге капитала, принадлежащей собственникам:

$$ROE = \frac{\text{Чистая прибыль}}{\text{Собственный капитал}} * 100\% \quad (3)$$

Высокий уровень рентабельности продаж, активов, собственного капитала свидетельствует об укреплении ее рыночных позиций, повышении инвестиционной привлекательности, росте прибыльности капитала. [2]

Для анализа рентабельности ТОО «Сакура» рассчитываем показатели финансовых результатов деятельности исходя из формы №2 «Отчет о прибылях и убытках».

Таблица 1.

Показатели финансовых результатов ТОО «Сакура».

№	Показатели	2021 г.	2022 г.	Отклонение (+/-)
1	2	3	4	5
1.	Выручка, тыс. тг.	704924	962797	+257873
2.	Полная себестоимость реализации продукции, тыс. тг.	615003	836918	+221915
3.	Валовая прибыль, тыс. тг. Доля валовой прибыли в выручке, %	89921 12,7	125879 13,0	+35958 +0,3
4.	Операционная прибыль, тыс. тг. Доля операционной прибыли в выручке, %	55764 7,9	87963 9,1	+32199 +1,2
5.	Прибыль до налогообложения, тыс. тг. Доля прибыли налогообложения в выручке, %	35234 4,9	58091 6,0	+22857 +1,1
6.	Чистая прибыль, тыс. тг. Доля чистой прибыли в выручке, %	20530 2,9	29872 3,1	+9342 +0,2

Данные таблицы 1 показывают, что чистая прибыль ТОО «Сакура» в 2022 году по сравнению с 2021 годом выросла на 9342 тыс. тг. В 2022 году наблюдалась положительная динамика абсолютных величин выручки и всех показателей прибыли. Положительным фактором считается значительное увеличение доли валовой прибыли в выручке 0,3%, что свидетельствует об относительной экономии производственных затрат. Доля операционной прибыли в выручке увеличилась на 1,2%, доля прибыли до налогообложения в выручке составило 1,1%. Доля чистой прибыли в выручке увеличилась на 0,2%, что показывает изменение финансовых результатов предприятия.

Важный этап оценки эффективной деятельности организации это выявление влияния внешних и внутренних факторов на динамику показателей рентабельности. В этой цели используется метод факторного анализа рентабельности.

Факторный анализ – метод экономического анализа позволяющий детализировать и измерить влияние отдельных факторов, оказывающих воздействие на изучаемый результативный показатель. Уровень и динамика рентабельности активов являются главным объектом внимания менеджеров организаций, поскольку этот показатель аккумулирует структуру и движение производственных и финансовых ресурсов, издержек производства и отражение размера, структуры и соответствия рыночному спросу выпускаемой продукции. Показатель рентабельности активов отражает достигнутый в организации баланс экономических интересов внутренних и внешних участников бизнеса.[3]

В следующей таблице проведем факторный анализ рентабельности на примере ТОО «Сакура».

Таблица 2.

Факторный анализ рентабельности.

№	Показатели	2021 г.	2022 г.	Отклонение (+/-)	В том числе за счет изменения	
					уровня рентабельности реализованной продукции	оборачиваемости активов
1	2	3	4	5	6	7
1.	Чистая прибыль, тыс.тг.	20530	29872	+9342	x	x
2.	Доход от реализации продукции, тыс.тг.	704924	962797	+257873	x	x
3.	Совокупные активы ,тыс.тг.	1397526	1589473	+191947	x	x
4.	Уровень рентабельности активов, %	1,46	1,87	+041	0,11	0,3
5.	Уровень рентабельности реализованной продукции, %	2,91	3,10	+0,19	x	x
6.	Коэффициент оборачиваемости общих активов	0,504	0,605	+0,101	x	x

В таблице 2 проведен факторный анализ рентабельности. Определены факторы. Факторы первого порядка рассчитываются приемом цепных подстановок. Условным показателем является уровень рентабельности активов при уровне рентабельности реализованной продукции предыдущего года и в фактическом коэффициенте общих активов отчетного года.

$$P_y = 2,91 * 0,605 = 1,76\%$$

Рассчитываем степень влияния факторов первого порядка. В нашем примере она характеризуется следующими данными:

1) изменение уровня рентабельности реализованной продукции:

$$(187 – 1,76) = 0,11$$

2) изменение уровня рентабельности за счет оборачиваемости активов:

$$(1,76 – 1,46) = 0,3$$

Совокупное влияние двух факторов дает нам общее отклонение:

$$0,41 = 0,11 + 0,3$$

Следовательно, на рост уровня рентабельности активов положительное влияние оказало повышение уровня рентабельности реализованной продукции и оборачиваемости активов. Факторный анализ рентабельности проведен с использованием метода цепных подстановок. Факторный анализ рентабельности используется при прогнозировании прибыли предприятия. За счет чего факторный анализ остается актуальной в анализе в целом.

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MEDICAL SCIENCES

MONITORING AND CLINICAL AND LABORATORY FEATURES OF SEVERE PNEUMONIA IN CHILDREN OF THE CITY OF PAVLODAR

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Abstract
In this work, a retrospective analysis of 20 medical records of an inpatient patient from 2022 to 2023 with severe pneumonia in children was performed.

Keywords: severe course of pneumonia, fever, respiratory failure

Relevance: every year more than 17 million people in the world suffer from pneumonia, children under 5 years old are at special risk. So, according to WHO, about 150 million cases of pneumonia in the world are registered in children of this age every year, of which 20 million have severe pneumonia and require hospitalization. To date, the incidence of pneumonia has not decreased in the Republic of Kazakhstan.

The purpose of the study: to study the clinical and laboratory features of severe pneumonia in children in the Pavlodar region.

Materials and methods of the study: we conducted a retrospective analysis of 20 medical records of inpatient patients with pneumonia for 2022-2023, children who were on inpatient treatment in an infectious diseases hospital in Pavlodar.

Results and discussions: analysis of the data obtained showed that among the patients, children in the age group 0-5 years prevailed – 16 patients (80%), followed by patients aged 5-14 years – 3 patients (15%) , over 14 years – 1 patient (5%)

The primary stage of our study was to study the clinical features of the course of severe pneumonia in children. At this stage, categories such as duration of fever, complications in the form of respiratory failure were assessed. According to the results of the study, the duration of fever from 3 to 7 days was observed in 17 children (85%), more than 8 days in 3 children (15%). Respiratory failure with O2 saturation is below 93% in 19 children (95%)

The second task of our study is to study the laboratory data of children with severe pneumonia. The following indicators were taken as a basis: general blood test, CRP, blood gases. According to the results: leukocytosis is observed in 17 children (85%), according to the leukogram, a shift to the right in 15 children (75%), an increase in the level of CRP in 15 children (75%), according to blood gases, acidosis was in 16 children (80%).

Conclusion: Comparing the medical records of patients for 2022-2023, it can be concluded that the severe course of pneumonia is still an urgent problem, prevailing at the age of 0 to 5 years. The main clinical manifestation is prolonged fever and symptoms of respiratory failure. According to laboratory data, indicators such as leukocytosis, leukogram – right shift, increased CRP in biochemical blood analysis, acidosis prevail mainly in half of children.

The outcomes and prognosis of pneumonia depend on the severity of the course, the presence of complications, and the immune status of the patient. In most cases, with timely and adequate treatment, the prognosis of pneumonia is favorable.

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FEATURES OF THE COURSE OF INFECTIOUS DISEASES AFTER THE COVID-19 PANDEMIC

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ОСОБЕННОСТИ ТЕЧЕНИЯ ИНФЕКЦИОННЫХ БОЛЕЗНЕЙ ПОСЛЕ ПАНДЕМИИ COVID-19

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Abstract

In this work, a retrospective analysis of medical records of patients in a children's infectious diseases hospital from 2021 to 2023 was carried out, with a diagnosis of infectious mononucleosis, scarlet fever, pneumonia, and viral hepatitis. An assessment of the age significance and features of the clinical course of these infectious diseases was carried out.

Аннотация

В данной работе проводился ретроспективный анализ медицинских карт больных детского инфекционного стационара с 2021 по 2023 года, с диагнозом - инфекционный мононуклеоз, скарлатина, пневмония, вирусный гепатит. Проведена оценка возрастной значимости, особенностей клинического течения данных инфекционных заболеваний.

Keywords: infectious mononucleosis, Epstein-Barr Virus (EBV), Cytomegalovirus infection, scarlet fever, viral hepatitis.

Ключевые слова: инфекционный мононуклеоз, Вирус Эпштейна-Барр (ВЭБ), Цитомегаловирусная инфекция, скарлатина, вирусные гепатиты.

Введение. В новейшей истории медицины с 2020 по 2023 годы пандемия коронавирусной инфекции внесла свой распорядок в жизни людей всего мира. На сегодняшний день более 700 млн подтвержденных случаев, 7 млн умерших во всем мире, такова неутешительная статистика [1,2].

В Казахстане, как и во многих странах, вводили режим чрезвычайного положения. Люди соблюдали карантин, ограничивалось передвижение и контакт, соответственно уменьшилось распространение различных инфекций.

Со временем врачи инфекционисты стали замечать, что по мере снятия ограничений большинство населения, и дети в том числе, стали тяжелее переносить банальные, сезонные инфекционные заболевания, нередко в атипичной форме [3,4,5,6].

Эта статья была направлена на изучение течения инфекционных болезней вовремя и после пандемии, таких как - инфекционный мононуклеоз, скарлатина, пневмония, вирусный гепатит [7,8,9,10].

Цель работы. Изучить динамику заболеваемости и клинико-лабораторные аспекты течения инфекционных болезней: скарлатины, инфекционного мононуклеоза, пневмонии, вирусного гепатит, среди госпитализированных в инфекционный стационар Павлодарской областной детской больницы.

Материалы и методы исследования. Нами был проведен ретроспективный анализ медицинских карт с 2021 года по 2023 года - детей, находившихся на стационарном лечении в инфекционном стационаре Павлодарской областной детской больницы.

Критерием включения был диагноз: инфекционный мононуклеоз, скарлатина, пневмония, вирусные гепатиты.

Критерием исключения: микст-инфицирование, неинфекционная фоновая патология.

Статистический анализ полученных данных проведен путем вычисления средних значений в программе MS Excel.

Результаты и обсуждения.

1.Инфекционный мононуклеоз. Среди пациентов, преобладали дети в возрасте до 6 лет – 28 пациентов из 41-го (68,3%), в 3 раза меньше с 6 до 12 лет – 9 пациентов (22%) и 4-м (9,7%) было от 12 до 18 лет. Большинство обращений было в 2022 году – 17 пациентов (41%), чуть меньше в 2023г 15 (37%) и 9 (22%) в 2021 году.

Установлено, что интоксикация отмечалась у всех пациентов, при этом была умеренной, в пределах от 37,5 до 38,8°С длительностью от 5-ти до 11 дней - в половине случаев в 2021 году, тогда как более выраженной до 39,5°С и не менее 10 дней в большинстве случаев 2022 и 2023 годах.

При оценке клинических проявлений преобладала гиперемия зева – у 39 пациентов (95 %), тонзиллит у 38-ми (92,6 %) и затрудненное носовое дыхание у 37-ми (90,2 %). Экзантема является редким клиническим проявлением, встречалась у 5 больных (12,1 %).

Также у 40 пациентов (97,5 %) был выраженный лимфаденит шейных лимфоузлов, у 21 ребенка (52,2 %) наблюдалась гепатомегалия и синдром цитолиза, у 14-ти (34,1 %) спленомегалия (Рис.1).

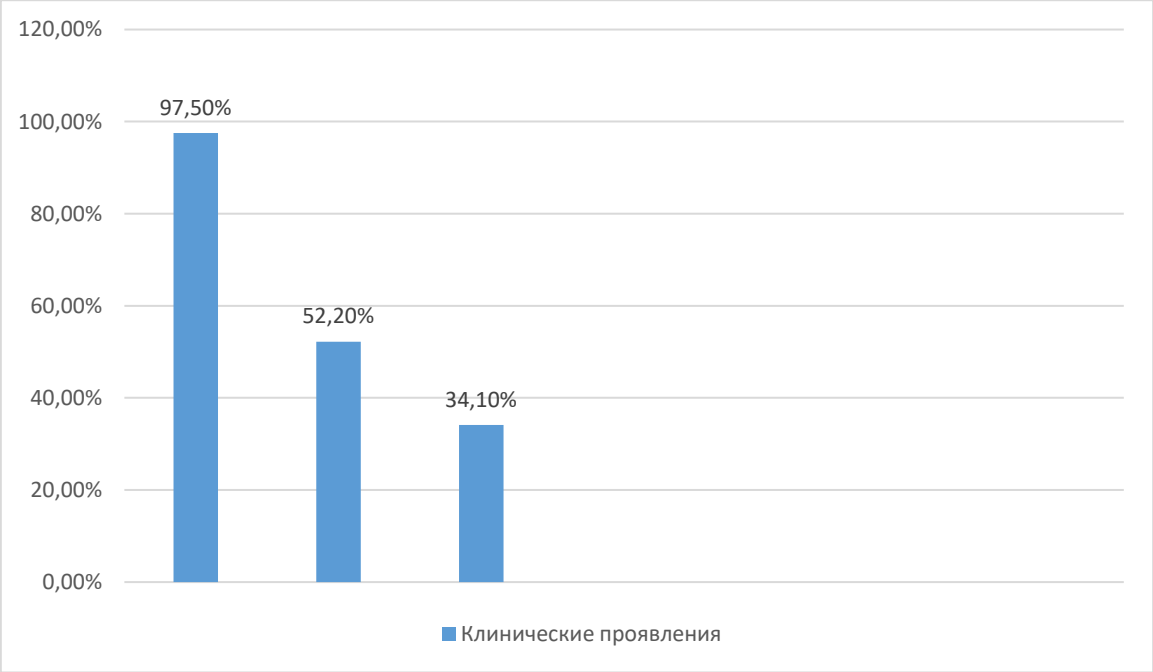

Рис.1. Клинические проявления инфекционного мононуклеоза.

Не менее важным этапом исследования является определение возбудителя инфекционного мононуклеоза. Мы использовали сочетание иммуноферментного анализа, с выявлением специфических антител класса М к ВЭБ, цитомегаловирусу (ЦМВ) и вирусу герпеса человека 6-го типа (ВГЧ-6), а также метод полимеразной цепной реакции, с качественным и количественным определением ДНК герпес-вирусов в биологических жидкостях, таких как кровь и слюна. В нашем исследовании преимущественным возбудителем был ВЭБ - 23 пациента (56 %), ЦМВ встречался у 6-х (14,7 %), ВГЧ-6 у 3-х (7,4 %), в 9 (21%) случаях лабораторно выявить возбудитель не удалось.

2. Скарлатина. Среди госпитализированных было 93 мальчика и 78 девочек, при этом осложненными формами скарлатины (гипертоксической формой) чаще болели девочки - из 49 пациентов 25 девочек (51%). Средняя продолжительность госпитализации была – 9 дней, максимальная продолжительность – 16 дней. Среди госпитализированных лиц детей с 2 до 5 лет - 96 пациентов из 171 (56%), а также школьного возраста - 74 (43%), у детей до года выявлена скарлатина у 1 ребенка (1%). (Рис.5.). Тяжелая форма скарлатины чаще была у детей посещающие детские сады и неорганизованных детей у 42-х из 97 (43%), тогда как у школьников лишь у 7-ми из 74-х (9%) (Рис.2).

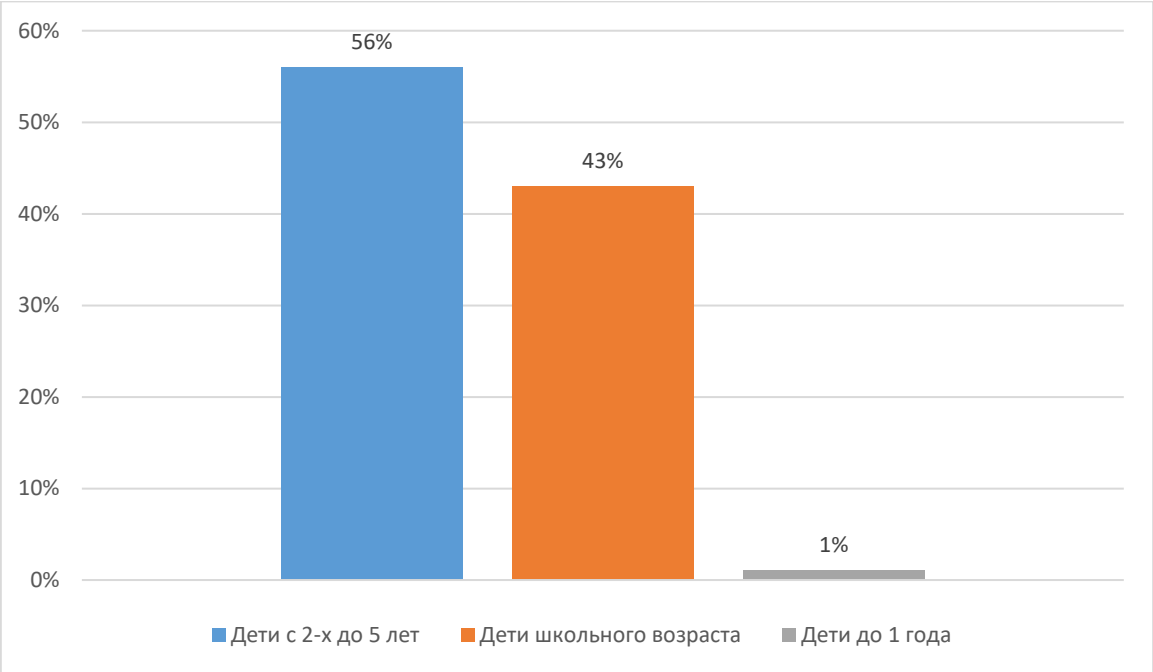

Рис.2. Количество госпитализированных детей по возрастам

Данная статистика не учитывает детей, получавших амбулаторное лечение с диагнозом скарлатины легкой степени. У 122 детей скарлатина протекала в типичной форме, 49 детей с гипертоксической формы. В разрезе по годам отмечается увеличение госпитализированных детей с осложненными формами скарлатины в 2022году: за 2021 год гипертоксическая форма скарлатины зарегистрирована у 9 детей (18%), в 2022 году у 22 детей (45%), за 9 месяцев 2023 года у 18 детей (37%) (Рис.3).

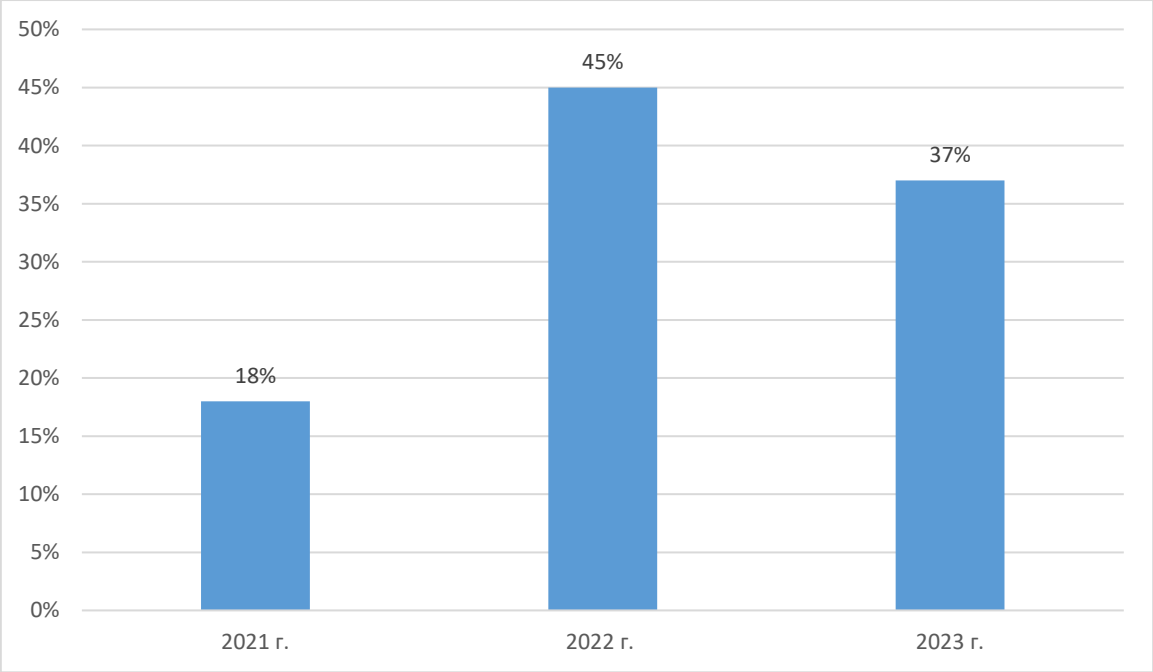

Рис.3. Гипертоксические формы скарлатины.

Среди осложнений скарлатины выявлены токсические гепатиты у 20 детей (12%), вторичные нефриты у 3 детей (2%), пневмонии у 6-х(3,5%), ИТШ - 2 из 171 (1.17%)), и другие осложнения (12 детей из 171 (7%)). При госпитализации у 53 детей из 171 выявлены обезвоживания в различной степени, в ходе лечения этим детям проводилась инфузионная терапия кристаллоидными и коллоидными растворами, 1 ребенку из 171 проводили неоднократную гемотрансфузию эритроцитарными массами. В лабораторных исследований среди госпитализированных лиц с диагнозом скарлатина у 114 детей из 171 отмечалось повышение лейкоцитов крови на уровне 9-15 тыс, у 34 детей из 171 отмечалось повышение лейкоцитов крови на уровне 16-20 тыс, у 8 детей из 171 отмечался лейкоцитоз в дапазоне 21-25 тыс, лейкоцитоз свыше 25 тыс наблюдался у 15 детей из 171. В лечении проводили монотерапию антибактериальных препаратов у 154 детей из 171, 7 детей из 171 получали комбинацию

нерезервных антибактериальных препаратов, 10 детей из 171 получали антибактериальные препараты резерва. Исход лечения у 169 детей из 171 был с улучшением, родители 1 ребенка забрали ребенка без улучшения не дождавшись полного курса лечения под расписку, исход у 1 ребенка из 171 был летальным (Рис.4).

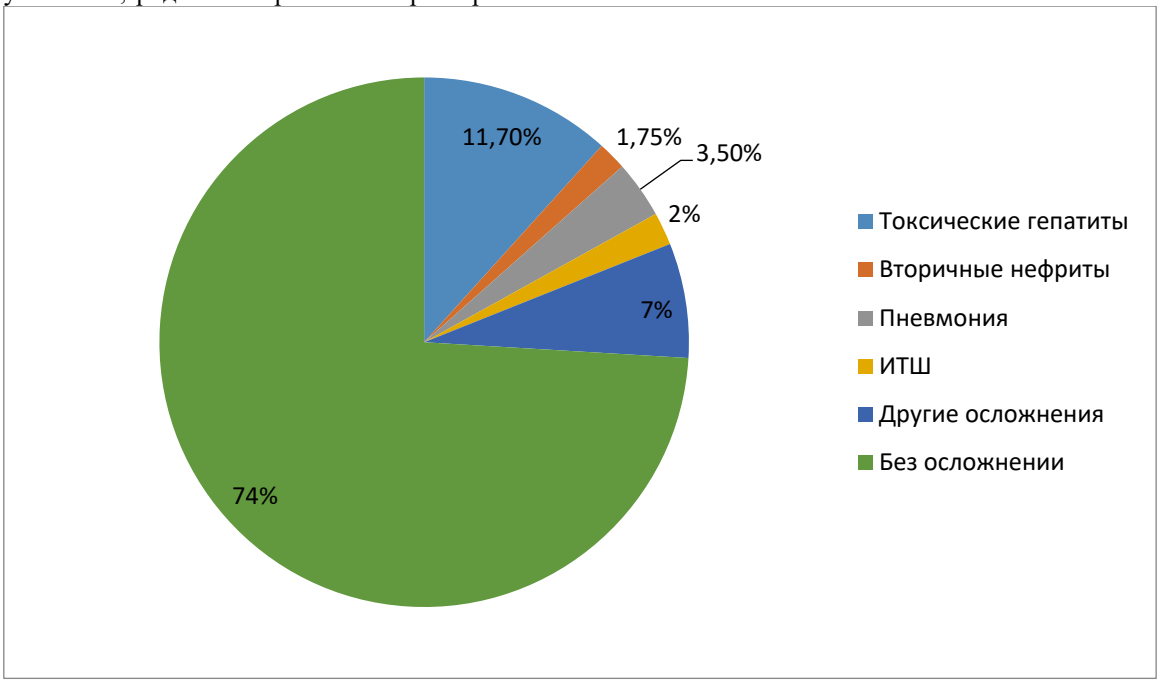

Рис.4. Осложнения у детей со скарлатиной.

3. Пневмония: Среди пациентов, преобладали дети до 5 лет – 16 пациентов (80%), 3 пациента от 5 до 14 лет (15%), старше 14 лет был 1 пациент (5%). По результатам исследования: длительность лихорадки от 3 до 7 дней наблюдалась у 17 детей (85%), более 8 дней у 3 детей (15%). Дыхательная недостаточность с сатурацией О2 – ниже 93% у 19 детей (95 %).

Лабораторные данные детей с тяжелым течением пневмоний. За основу были взяты следующие показатели: общий анализ крови, СРБ, газы крови. По результатам: лейкоцитоз наблюдается у 17 детей (85%), по лейкограмме сдвиг вправо у 15 детей (75%), повышение уровня СРБ у 15 детей (75%), по газам крови - ацидоз был у 16 детей (80%).

4. Вирусные гепатиты.

За два года было госпитализировано более 20-ти детей с клиникой гепатита, но всего 3-и из них были истинно-вирусные гепатиты, большинство же – вторичные гепатиты на фоне тяжелого течения основного заболевания, длительного приема антибиотиков, были и впервые выставленные аутоиммунные состояния. Так в 2022г стационарное лечение получила девочка 5 лет с острым вирусным гепатитом С (ОВГС), безжелтушная форма. В лабораторных данных у нее был цитолиз до 998 Ед/л АЛТ и АСТ 780 Ед/л. В 2023г. Два пациента с вирусным гепатитом А (ОВГА): мальчик 6 лет (АЛТ до 1200Ед/л , АСТ до 870 Ед/л, общий билирубин 70 мкмоль/л, прямой 48 мкмоль/л) и девочка 14 лет (Цитолиз до 3300 Ед/л АЛТ и 2100 Ед/л АСТ, гипербилирубинемия до 140 мкмоль/л, где прямой 64 мкмоль\л). Хотелось бы отметить, что все случаи острых вирусных гепатитов были средней степени тяжести. Дети с ОВГА полностью выздоровели. Ребенок с ОВГС впоследствии получила противовирусную терапию, достигнув стойкого вирусологического ответа.

Выводы. Инфекционные болезни детского возраста не теряют актуальность. По проведенному анализу среди госпитализированных лиц в инфекционный стационар Павлодарской областной детской больницы с 2021 года наблюдается тенденция к увеличению злокачественных форм скарлатины, при несвоевременном обращении за квалифицированной медицинской помощью, возможен летальный исход.

Инфекционный мононуклеоз с тяжелым течением больше встречался в раннем возрасте (возрастная категория 0-6 лет), со всей характерной для него клиникой, и гепатомегалией (гепатитом) в том числе. Преимущественным возбудителем инфекционного мононуклеоза среди детского населения в Павлодарской области является Вирус Эпштейн Барр.

Тяжелое течение пневмоний также характерно для возраста до 5 лет. Ведущими клиническими проявлениями являются длительная лихорадка и симптомы дыхательной недостаточности. У половины детей преобладал лейкоцитоз, со сдвигом вправо, повышение СРБ, явления ацидоза.

Исходы и прогноз пневмонии зависят от тяжести течения, наличия осложнений, иммунного статуса пациента. В большинстве случаев при своевременном и адекватном лечении прогноз пневмонии благоприятный.

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IMPROVEMENT OF METHODS FOR ISOLATING BONY PROTRUSIONS ON THE UPPER JAW

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Abstract

People lose teeth for various reasons. In modern dentistry, complete prosthetics are performed in two ways: implantation followed by prosthetics and restoration of the dentition using removable dentures. Implantation is an expensive procedure. But sometimes it is impossible to carry out due to the clinical picture. An alternative remains a removable prosthesis, affordable, but requiring a certain period of adaptation [1,4]. Sometimes, due to the anatomical and age-related characteristics of the tissues of the oral cavity, complete dentures require functional improvements.

Keywords: removable dentures, bone protrusions, treatment method.

In the practical work of a doctor, there is no methodological approach that takes into account the clinical condition of the torus and its sensitivity, and subsequently high-quality isolation in the prosthesis. It is known that it is necessary to isolate the torus on a removable denture [2]. In addition, due to the physical and mechanical properties of plastic, denture bases cause a lot of trouble for dentists. Solving these problems improves the quality of removable dentures.

The purpose of the study is to study and systematize the clinical manifestations of the torus and evaluate the effectiveness of using two-layer bases in removable prosthetics.

Material and methods

In the orthopedic dentistry clinic, 104 patients were examined and undergo orthopedic dental treatment, 37 of whom made up the comparison group. The majority of those examined were persons aged 60 years (27.9%), 70 years (37.5%) and over 70 years (34.6%). The majority of patients are women (61.5%). In total, we manufactured 191 dentures, including 72 dental units in the comparison group and 119 dental units in the main group. In the main group, 74 (62.2%) dentures were made for patients with complete absence of teeth, and 45 (37.8%) for patients with partial absence of teeth. In the comparison group, there were 43 (59.7%) dentures with complete absence of teeth, and 29 (40.3%) with partial absence of teeth. For patients of the main group with complete absence of teeth, 38 dentures with a soft lining were made from Gossil (Russia), Fuji (Japan) - 19, Mucoprene (Germany) - 17 dentures. With partial absence of teeth, 22 units were made from Gossil, 14 from Fuji, and 9 from Mucoprene. Clinical, morphological and physical-mechanical studies were carried out on patients. Along with generally accepted methods, special studies were carried out (determination of pain sensitivity, gnathodynamometry, physical and mechanical studies of soft pads). Results of the study: 47.9% of those examined in the comparison group and 55.3% in the main group complained of impaired chewing and poor fixation of dentures on upper and lower jaws, depending on the degree of atrophy of the alveolar processes. 39.3% of patients in the control group and 46.8% of the main group noted disturbances in aesthetics, speech, and pain under dentures. Accordingly, 13.8 and 31.9% of patients complained of lack of stabilization, poor-quality prosthesis and the need to replace the old prosthesis with a new one. Thus, almost all patients came with a certain complaint about the removable denture. The nature and frequency of complaints correspond to the degree of atrophy of the alveolar processes, the quality of the manufactured dentures and the hygiene of the oral cavity and dentures. An analysis of complaints from patients with partial absence of teeth showed that the largest number of complaints were made about violation of clasp fixation and chewing disorders: in the comparison group 31.5%, in the main group - 42.1%. Speech and aesthetic disorders occurred in 27.6 and 31.5% of those examined, respectively; pain under the prosthesis and poor quality prostheses – in 6.6 and 13.1%, which depended on the degree of atrophy of the alveolar processes. The main reason for tooth extraction in patients with complete and partial absence of teeth was periodontal disease. There were 81.0% of such patients in the comparison group and 87.0% in the main group. Complications of caries were the cause of tooth loss in 13.0% of patients with partial absence of teeth and in 19% of patients with complete absence of teeth. In patients of the main group (50.0%) with complete absence of teeth, type III atrophy of the alveolar process was often encountered. There were slightly fewer patients (25.0%) with type IV atrophy. In patients with partial absence of teeth, in the presence of removable dentures, gnathodynamometry indicators were significantly higher (40 kg/cm2 or more). In the presence of complete removable dentures, the lowest indicators were recorded with class III atrophy of the alveolar processes according to Oxman (20

kg/cm2) in the area of the chewing teeth. When studying the conditional strength during elongation, the GosSil material had the maximum value - 5.2 + 0.17 MPa. Silicone materials - Fuji, Mucoprene - are somewhat inferior to it in this indicator. The Mucoprene material has the highest relative elongation coefficient (650%), which indicates very high strength. When studying residual elongation, the GosSil material had a higher value - 3%, the minimum value of this indicator was for Fuji and Mucoprene - 1%. Approximately the same values for the material Mucoprene and GosSil were obtained when measuring stress during elongation, while Fuji had a slightly higher elasticity - 1.2 MPa. Thus, all materials used, based on physical and mechanical research, comply with international standards and can be used in orthopedic dentistry. Determination of the pain sensitivity of the mucous membrane of the prosthetic bed showed that the most sensitive areas are sharp bony protrusions, exostoses and the torus area on the upper jaw. In some cases, only touching caused pain in patients, which is an easy basis for classifying the torus according to sensitivity. In the clinic of orthopedic dentistry, we have identified three types of sensitivity of the oral mucosa covering the torus of the upper jaw: Type I – mild sensitivity, existing bone formations without clear boundaries, the mucosa is of sufficient thickness, pain appears with strong pressure; esthesiometry indicators – 10 g/cm2 or more; Type II – bone formation with clearer boundaries, the mucosa is thin, painful on palpation is determined; esthesiometry indicators – up to 10 g/cm2; Type III – the palatine torus has a clear or pronounced border, can occupy a large area of the palatal suture, the mucosa is thin, atrophic, painful when touched, the relief of bone formation is noticeable upon examination, esthesiometry indicators are 0 g/cm2. This classification helped us in the manufacture of the following types of two-layer dentures: with type I of the palatine torus, we consider it possible to manufacture removable dentures from acrylic plastics; only if the patient desired, two-layer bases were made. In the presence of types II-III of the torus severity, we recommended only removable laminar dentures with a soft lining [3]. We have developed the technological features of manufacturing soft linings. Thus, in the presence of a type II palatal torus on the model, the palatal torus was isolated over the entire area of the bone formation using one layer of clasp wax. When type II torus is pronounced, we isolated it with two layers of clasp wax, followed by the production of a two-layer base. After checking the design of the prosthesis in the patient's oral cavity, the dental technician removes the wax base with artificial teeth from the model. On this model, a silicone plate with the thickness of clasp wax is placed in the torus area along the outlined border. A layer of clasp wax (0.4-0.5 mm) is applied to the entire surface of the model along the border of the future prosthesis, taking into account the outlined boundaries. This wax base is then removed from the model and left aside. The base with artificial teeth, which were placed in the patient's oral cavity, is formed, plastered in a cuvette and the wax is boiled. After cooling, a wax substrate made of two-layer clasp wax with a thickening in the torus area made of silicone is installed on the cuvette with a model without artificial teeth. Using a warm hairdryer, press it tightly onto the surface of the model. Acrylic plastic is molded, both parts of the cuvette are connected and placed under a press. Remove from the press, open the cuvette and boil the wax base. The surface of acrylic plastic is treated with adhesive and molded from soft plastic, followed by welding in the usual way. With this type of work, the total thickness of the prosthesis base will correspond to the wax plate. This achieves sufficient isolation of the torus, which ensures painlessness when using removable dentures. This approach is successful for clinicians. This technique was used for sharp bony protrusions, exostoses, pronounced torus and other bone formations that do not allow for the usual traditional orthopedic treatment with removable plate prostheses. In the orthopedic dentistry clinic, we manufactured 38 dentures with a two-layer base from Gossil, 19 from Fuji and 17 from Mucoprene for patients in the main group with complete absence of teeth. In case of partial absence of teeth, 22 dentures were made from Gossil, 14 from Fuji, 9 from Mucopren. A total of 119 dentures were made. Observation was carried out over a period of 1 to 6 months. In the first days of using removable plate dentures with a soft lining, patients anxiously anticipated the sensation of pain. Improved functional qualities allowed patients to fully use prostheses right from the first days. There were complaints of pain in individual points under the prosthesis, which were easily eliminated. The patients fully performed the act of chewing and felt comfortable. After 3-10 days, the patients fully adapted, successfully used the prostheses and had no complaints, noted better fixation of the prostheses, no pain under the prosthesis, but some remained wary of pain or possible breakage of the prostheses. Clinical studies over time (1, 6, 90 and 180 days) showed that the use of soft linings in removable prosthetics led to good fixation of complete removable dentures in 72.7% of cases, satisfactory fixation in 46.9%. In our practice there were 2 negative cases. In the first case, the patient began to smell the smell of laundry soap when using a two-layer base made of Fuji material. The prosthetics are made from Gossil material. In the second case, the soft lining from Gossil along the edges of the prosthesis became frayed, i.e. part of the outer surface of the lining from Gossil moved away from the main mass in the form of wide threads. We cut off the threads and re-polished the prosthesis. The patient successfully uses dentures. Conclusion Analysis of complaints among people using complete removable dentures in the complete absence of teeth about a violation of the act of chewing and poor fixation of dentures are found in 55.3%, and among people with removable dentures with partial absence of teeth, the largest number of complaints about violation of clasp fixation are made by 42. 1%.. Analysis of gnathodynamometry and physical-mechanical studies of soft pads from different countries, such as Gossil (Russia), Fuji (Japan), Mucoprene (Germany), showed their effectiveness and the possibility of using two-layer bases in an orthopedic dentistry clinic.

Conclusion.

A clinical classification of the torus has been developed, which allows clinicians to successfully isolate bone formations while maintaining the quality of manufacturing prostheses using developed and recommended technologies for manufacturing two-layer bases in removable dentures.

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METHODS FOR DETERMINING IMPLANT STABILITY AT DIFFERENT TIMES OF THE OSSEOINTEGRATION PROCESS

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Abstract
In the last decade, dental implantation has taken a strong place among the main dental activities. The main directions of research in dental implantology, according to many scientists, are: the study of osseointegration processes; development of methods for assessing osseointegration; expansion of indications for implantological treatment; development of dental implants from new biocompatible materials; improvement of implantation techniques using means that improve the process of osseointegration [1,2,5,6,8,9,10].

Keywords: implants, osseointegration, methods for determining stability.

One of the most important criteria for the successful and long-term functioning of dental implants and the effectiveness of implantation is the rigidity of their fastening, which changes during the process of osseointegration in the postoperative period and at subsequent stages of operation [3,11]. Osseointegration is a biological phenomenon that means the fusion of a non-living (metal) element with living tissue. R.I. Bagantag [4] defined osseointegration as "the apparent direct attachment or attachment of living bone tissue to the surface of the implant without the introduction of a layer of connective tissue." The possibility of osseointegration has been proven beyond any doubt, but success depends on careful treatment planning, impeccable surgical intervention, the correct selection and manufacture of a prosthetic structure, and the characteristics of the body [2,3,4,5]. Undoubtedly, the most important condition for implant integration is primary stability, and the stability of the implant at different times during the osseointegration process and after its completion is a reflection of the reliability of osseointegration. The first two weeks after surgery are quite important for the development of inflammatory complications and further prognosis for the success of dental implantation [2]. Today, three main options for organizing tissue at the implant-bone interface are known: the first and most optimal is direct contact of bone tissue with the surface of the implant, i.e. osseous integration or (osseointegration); the second option is indirect contact, when a layer of connective tissue is formed between the bone tissue itself and the surface of the implant, consisting mainly of collagen fibers and coarse-fibered bone tissue, i.e. fibroosseous integration or (fibroosteointegration); and third, the most unfavorable is the formation of fibrous connective tissue on the surface of the implant, i.e. connective tissue integration.[2]. Currently, the following research methods are used to assess the degree of osseointegration and stability of dental implants [7,8,10,12]: 1. Clinical assessment of stability: identifying the presence or absence of mobility of the implant and the prostheses resting on it, as well as assessing the condition of the gingival tissue≪ cuffs≫. 2. X-ray examination: the main characteristic is loss of bone tissue. This parameter reflects the degree of vertical and horizontal resorption of the bone tissue surrounding the implant, as well as determining the density of the bone tissue around the implant. 3. Gnathodynamometry and echoosteometry. 4. Torque test using a torque wrench 5. Periotestometry: use of the "Periotest" device to assess the resistance of the implant to horizontal load. 6. Method of frequency resonance analysis. To determine the condition of the bone tissue around dental implants, a number of x-ray examination methods are used [9,10]. Targeted visiography allows a more detailed analysis of the condition of the periapical tissues of the selected segment, and also allows one to determine the so-called optical density of bone tissue, but does not make it possible to assess the functional condition of dental implants load[10]. Today, at the stages of planning dental intraosseous implantation, its implementation and dynamic assessment of results, the method of computed tomography (CT) and magnetic resonance imaging (MRI) is used. X-ray computed tomography - allows you to obtain a layer-by-layer image in a three-dimensional plane of the studied area of bone tissue, in a volumetric ratio of 1:1. The method is based on recording the energy of a beam of X-ray radiation passing through an object at different angles while rotating the tube, using highly sensitive sensors that convert the received information into electrical signals. RCT makes it possible to determine with high accuracy the metric characteristics of the area under study, which is important at the stage of planning and installation of dental implants [12]. Using computed tomography data, it is possible to create an anatomical model of the jaw,

which allows for a detailed study of the area of proposed implantation [10]. To assess the osseointegration of dental implants using this method, the density of the peri-implant bone tissue is determined. However, the use of this method is associated with significant radiation exposure to the patient. Magnetic resonance imaging is a method of radiation diagnostics based on recording the energy emitted by protons of hydrogen nuclei in the internal environments of the human body when they return from an excited state to their original state (so-called relaxation). MRI allows you to obtain images in any plane - frontal, sagittal, axial, etc., which can then be reconstructed into three-dimensional images. This method has advantages in visualizing soft tissues, such as muscle, fat, cartilage, etc., which makes its use especially necessary when studying the TMJ, mucous membranes of the paranasal sinuses and oral cavity, salivary glands and other soft tissue structures of the head and neck . The method is not burdensome for the patient and does not have any harmful effects on his body. In turn, to a certain extent, there are limitations in the use of this method for the dynamic assessment of the results of dental implantation, which is associated with distortion of the research results due to the magnetic resonance effect on metal inclusions [10]. Despite the possibility of obtaining comprehensive information about the state of bone tissue when conducting data research methods and their application in everyday practice are inaccessible to most clinicians, which is primarily due to financial and economic issues. According to the literature, at present, panoramic radiography is most often used when conducting x-ray examinations in clinical practice of dental implantation; cephalometric radiography and intraoral radiography[10,11,12]. Among modern clinical methods for assessing the osseointegration of dental intraosseous implants, attention should be paid to the periotestometry method. This technique involves the use of the "Periotest" device, developed by Siemens and the University of Tuebingen (Germany), which carries out electronically controlled and reproducible percussion of a tooth or implant. The method is based on the registration of mechanical vibrations converted into an electrical impulse [1,7]. The periotestmetry method was developed to assess the attachment strength and damping characteristics of a natural tooth surrounded by the periodontal ligament and only then began to be used to assess the attachment strength of dental implants. This method is now quite widely used to assess the readiness of implants for functional loads during reconstructive operations. Currently, the attention of clinicians and researchers has been attracted by a new method for assessing the stability of implants using the method of frequency resonance analysis [5,6,7]. The method of frequency resonance analysis of implants was proposed by N. Meredith in 1997. The method is based on recording resonant electromagnetic oscillations of the implant and surrounding bone when exposed to an electromagnetic field through a magnetized pin. The resonance frequency, being a measure of the stability of implant fixation (corresponding to the degree of its osseointegration), is calculated based on the response signal. Implant Stability Coefficient ranges from 1 to 100 units. The higher the value, the greater the stability of the implant fixation. A number of scientists have tested the validity of the opinion on the advisability of using tapered implants and drills of smaller diameter than the implant to achieve strong primary stability. 127 implants with both immediate and delayed loading were studied [5,7,8]. The authors experienced a large number of complications after one year (17.3%); more in the upper jaw (19.7%) compared to the lower jaw (5.9%). Failures were more observed in bone types III-IV (27%), less in types I-II (8%). The authors concluded that high primary stability from compression of bone tissue by conical implants and narrow drills is temporary; it decreased due to mechanical relaxation of the bone trabeculae. A number of authors recommend, depending on the primary indicators of frequency resonance analysis, choosing a single or two-phase technique for using implants [1,5,6]. They believe that resonance frequency analysis can reveal the decreasing stability of implants due to overload, which will allow measures to be taken to treat them. An analysis of the few published studies on the use of frequency resonance analysis in implantology shows the promise of the method in determining indications for immediate and early loads and in dynamics for a comprehensive assessment of the effectiveness of implantation. Thus, the frequency resonance analysis method provides the opportunity to clinically measure the stability of the implant and evaluate the effectiveness of dental implantation in conditions of bone tissue deficiency.

Conclusion. Thus, osseointegration is not a frozen process, but a process that changes over time. Therefore, it is very important to know, understand and follow its basic principles when choosing both surgical and orthopedic tactics in order to achieve satisfactory clinical results, as well as to use modern and informative methods for assessing the degree of osseointegration and stability of dental implants.

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PEDAGOGICAL SCIENCES

SUBJECT-ENVIRONMENTAL APPROACH IN TRANSFORMING THE CONTENT OF THE TUTORING MODEL

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Abstract
In the article, the author argues that the subject-environmental approach plays a significant role in transforming the content of the tutoring model. The author examines the definitions of "educational environment" and "subject agency," acknowledging their integrative nature. According to the author, the subject-environmental approach is effective because it focuses on utilizing the potential of the interaction between the environment and the subject, thereby promoting the development of students' universal competencies.

Keywords: tutoring model, transformation, tutoring activity, tutoring process, educational environment, subject agency.

The subject-environmental approach integrates the provisions of environmental and subjective approaches, expanding the scope of their influence in the tutoring process. Addressing the subject-environmental approach emphasizes the interaction and mutual influence between the environment and the subject. From the perspective of the subject-environmental approach, the environment is not only a means of formation but also a means of personality development. The subject-environmental approach is aimed at studying and utilizing the developmental potential of the interaction between the environment and the subject [14, p. 12].

The concept of the educational environment in pedagogical science is considered from two perspectives: in a broad sense, it is an educational space where pedagogically organized development of personality takes place, as a specially created system of organizing the life of an individual according to pedagogical goals, aimed at shaping their attitude towards the world and people; in a narrow sense, it is a multilevel system of factors (circumstances, conditions, influences, opportunities for personality development) that ensures optimal parameters of educational activities for a particular educational subject in all aspects - goal-oriented, resource-based, content-based, procedural, outcome-based, influencing the formation and functioning of individuals in society, their abilities, needs, interests, and consciousness [4; 12; 15; 16].

Researchers who have conducted a thorough analysis of the concept of "educational environment" provide their generalizations regarding the term and its structural components. Thus, O. Petrenko, summarizing his research on the definition of "educational environment," concludes that the term "educational environment" can be referred to as "the natural or artificially created environment of participants in the educational process in the space of education, which includes the content and means of education aimed at ensuring productive creative activity of the individual, their educational development, a system of relations between people united by common pedagogical and educational activities" [8, p. 10].

R. Zhoga analyzed the essence of the concept of "educational environment," based on which we can determine that the common characteristics of explaining the term are: a system or set of influences, opportunities, resources, components - specially created or designed; providing or creating opportunities for personality development [3, p. 168]. L. Karpova substantiates the position that the following features are characteristic of the educational environment: integrity, systematicity, unity, variability, structuredness, organization, flexibility, communicativeness, eventfulness, cultural appropriateness, openness, stability, dialogueness, functionality, adaptability, and the ability for self-organization and self-development, and optimally created educational environment is a means of personality development [4, p. 67]. The researcher also notes that in defining the structural components of the educational environment, repetitive elements such as material-technical, psychological-didactic, social, communicative, educational, content-methodological, etc., are quite common.

O. Mezentseva, based on the works of Ukrainian and foreign scholars, has developed a three-level model of the educational environment of a general secondary education institution, consisting of the following components: content-didactic component (educational content; forms and methods of teaching organization; system of assessment of personal development of students; psychological-pedagogical support; connection with pedagogical science); social component (features of the subjects of the educational environment; community values; communication sphere; activity sphere; organizational conditions and management); subject-spatial component (architectural-aesthetic organization of living space; conditions for movement and placement of students; special attributes of the educational process; organization of extracurricular space) [10, p. 112]. O.

Yezhova identifies the main blocks of the educational environment as material-technical, educational, and communicative. Under the material-technical block, the researcher understands the spatial-object component; under the educational block - content, forms, and methods of teaching and upbringing; under the communicative block - relationships between student and pedagogical collectives in general and within each of them individually [2, p. 149].

Based on the study of theoretical scientific-pedagogical developments, we can conclude that the educational environment is interpreted as a social space in which the interaction of its participants takes place; as a set of influences and means of personality development. The tutoring process requires a variable educational environment to focus on the active position of the participants in this process, stimulate initiative, orientation towards the child, individualization, and personalization (which entails subject-subject relations), and provide opportunities for freedom of choice. It is also noteworthy that in modern conditions, flexibility, openness, and mobility are important characteristics of the educational environment.

Let us specify the subject-environmental approach in transforming the content of the tutoring model. It's essential for us to emphasize that the educational environment of a general secondary education institution is a specially organized complex of conditions for the tutoring process, aimed at developing students' universal competencies. The active and full utilization of the opportunities provided by the school's educational environment ensures the successful development of students' personalities. Thus, it is necessary to organize the educational environment in such a way that every student can master it and participate in its development [11, p. 221]. We agree with the opinions of L. Khimchuk and I. Chervinska that the subject-environmental approach contributes to the methodological orientation of tutors towards improving the developmental potential of the interaction between the subject and the environment and characterizes the integral system of actions of the subject in a particular environment, leading to qualitative transformation of this environment through mutual influence [13, p. 50].

The concept of subject agency in the educational process, particularly in tutoring, is defined by researchers as the active, purposeful, initiative, creative, and constructive position of the individual in everyday life [6, p. 53]. A. Boyko notes that "...the recognition of the uniqueness and intrinsic value of each individual, endowed with their unique natural data, subjective social experience, and competencies, capable of initiative, activity, and independence as the subject-possible basis of human existence" lies at the core of subject agency [1, p. 15]. Thus, the emphasis is placed on the awareness of the individual's right to their own opinion, freedom of choice, freedom of action, i.e., self-awareness as an autonomous, independent subject of social action, and readiness to influence social reality in various spheres of public life, being an active participant in transformative actions within it [19, p. 511].

Let us consider the subject approach from the perspective of the development and self-development of the student's personality: the subjective position is the basis for the self-development of the individual, their individuality; the teacher's agency serves as a catalyst for the development of the student's agency; from the perspective of the tutoring process - the development of the student's agency characteristics [5]. Such characteristics may include: persistent internal motivation for development and self-improvement; the presence of value orientations that determine behaviour and are regulated by internal life goals and values; flexibility in designing one's own individual educational trajectory; the ability to regulate one's behaviour in achieving goals and solving tasks; the ability to evaluate one's decisions, actions, analyze them, compare them with one's own plans and the plans of other people; the ability for equal interaction with the surrounding world [7, p. 106].

The agency of an individual is not a constant characteristic but exists under certain conditions, namely within the societal context, which directly determines the possibility of manifesting the agency-related qualities of the individual or agency of the individual during a specific period [17, p. 16]. In the context of tutoring activities, the formation of subject agency among high school students lies predominantly within the school environment. The educational environment of a general secondary education institution represents a unique socio-cultural space where the formation of students' agency occurs. Within the educational environment of the school, social interactions take place, which are modelled within the educational institution and directly influence the formation of students' agency during tutoring activities [17, p. 16].

We agree with the opinions of O. Yakymovych and Y. Ilchyshyna that the advantages of the subject-environmental approach in educational practice, particularly in tutoring, include: 1) researching the situation of personality development in the conditions of a specially created environment and studying the issue of their integration; 2) the influence on the student is mostly mediated; 3) the subject-environmental approach allows the student to independently navigate in the accelerated flow of information while ensuring maximum adaptation; 4) this approach, by involving the student as a subject in the educational process and utilizing the entire arsenal of tutoring tools, allows the development of a technology that takes into account the impact on all analyzers, promoting integrity and harmony in influencing the personality [18, p. 353].

Therefore, as a methodological approach, the subject-environmental approach in transforming the content of the tutoring model can be a strategy for addressing issues related to the development of students' universal competencies through the transformation of the educational environment [9, p. 193]. Drawing on the research of Ukrainian scholars [9; 13], we identify the following main principles of the subject-environmental approach: principles of humanism, activity, partnership, cooperation, reflexivity, individualization, dynamism, initiative, responsibility, and lifelong learning.

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PHILOLOGICAL SCIENCES

COMPARATIVE-TYPOLOGICAL ANALYSIS OF SLANGS EXISTING IN ENGLISH AND AZERBAIJAN LANGUAGES

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Abstract

Language has a complex concept in historical and social signs, and to this day there are different definitions and ways of giving meaning by many scholars and linguists. Some argue that language is a biological, some psychological, and some sociological phenomenon. Language is a biological, psychological, and sociological phenomenon, playing an important role in how people communicate with each other. Language is the biggest factor that differentiates humans from other living things. Currently, there are many languages in the world, and there is no complete information about the accuracy of this number. But it is thought that there are about seven thousand languages. Today, English is one of the most widely spoken languages in the world. English plays a fundamental role in diplomacy, trade, maritime, scientific and technical fields and information dissemination. In many countries, a foreign language is taught as the main language in educational institutions.

Researcher Naomi Chomsky introduced the theory of "Common Language Grammar" and emphasized the common features of different languages. There are many similarities between English and Azerbaijani languages in terms of grammatical and word-editing processes. Both languages have slang and their basic functions are the same. According to the structure of slang, its types are divided into three types: simple, correction and complex. There is a classification for independent slangs in English, but not in Azerbaijani. Studies have shown that the slangs of the two languages have similar and different aspects.

Keywords: English language, Azerbaijani language, slangs, similarities, differences

INTRODUCTION

Research on different aspects of language has aroused wide interest among linguists. Language has been analyzed from different perspectives by biological, psychological and sociological. There are many languages in the world, but the exact number has not been determined. Language plays a key role in human communication and is the main factor that differentiates humans from other living things. Slangs have attracted attention as an important object for studying language dynamics and social relations. Different characteristics and usage of slangs in English and Azerbaijani languages were investigated. Unlike vulgarisms, slangs represent more informality and help express ideas more concisely. The research is conducted in order to understand the semantic features of slangs and the dynamics of the language. A comparative analysis of slangs in English and Azerbaijani languages gives new ideas about the universality and characteristics of the language. The importance of the research is that it helps us better understand the evolution of language and human relationships. Contextual analysis, cognitive-linguistic analysis form the theoretical methodological base of the research work. With the help of this method, the onomasiological typology of slangs (being a universal and special event) is clarified.

Differences and similarities of slangs used in English and Azerbaijani languages

Language is a very complex concept that has been of interest to many scientists, researchers and linguists throughout the ages. Various definitions and concepts have been formed about language. Some scientists have tried to explain language as a biological phenomenon, some as a psychological phenomenon, and some as a sociological phenomenon. Language is a biological, psychological, and sociological phenomenon and plays a leading role in people's communication with each other. And as many scientists have emphasized to this day, language is the biggest factor that distinguishes humans from other living things. There are many languages in the world. Despite the large number of studies carried out to date, it is still impossible to say exactly the number of languages that exist in the world. After numerous studies, this number is estimated to be around seven thousand. Today, English is one of the most widely spoken languages in the world. English language is famous in the world as the language of diplomacy, commerce, seafaring, scientific-technical and mass information. Currently, English is taught in many educational institutions as the main foreign language in our Republic.

Naomi Chomsky, a researcher of world languages, tried to point out the common features of different languages in his theory of "Universal Grammar".

As we know, the English language belongs to the inflectional language, and the Azerbaijani language belongs to the iltisagi or agglutinative language group. But despite belonging to different language groups, the grammar of these languages has similarities in many aspects. For example, the main parts of speech are the same in both languages: noun, adjective, number, verb, pronoun and adverb. Another similarity is manifested in the process of word correction. Thus, both prefixes and suffixes are used when creating a new word in both languages, etc.

The names of many scientists and researchers who conduct a comparative analysis of the modern English and Azerbaijani languages in Azerbaijan can be mentioned. O.I. Musayev, N. Valiyeva, E. Hajiyev, A. Huseynov, D. Yunusov, J. Akhundov, Z. Verdiyeva, F. Veysalov (Veysalli), N. Yusifov, S. Abdullayev, these are significantly different from each other. conducted a comparative analysis of the two languages and noted interesting facts about this topic in their scientific works.

In this part of the presented thesis, we will try to show the differences and similarities in the use of slang in these comparable languages.

This is where the first similarity between English and Azerbaijani slangs begins. Thus, both in English and in Azerbaijani, slangs are expressions and words created by certain professions and groups of people in society and understood by them. In both languages, most of the slangs belong to non-literary language, informal spoken language, but not to literary language, written language, official spoken language.

In both languages, slang can first be a neologism, then a common word, and finally an archaism, or it can take a fixed position in the language.

In both languages, the functions of slangs in the language are to show one's sincerity to the other party, to create laughter or mockery in the language, to achieve privacy and secrecy in certain groups, to avoid long expressions and to make it possible to say it more briefly, etc.

According to the structure of slangs in both English and Azerbaijani languages, they are divided into three types: simple, correct and complex. Among them, the most used ones are considered complex slangs (Musayev, 2003).

In addition to similarities in the use of slangs in the English language and slangs in the Azerbaijani language, there are also a number of different features. Thus, the slangs used in the English language are only related to the English culture, the unique way of life and thinking, everyday life, customs and traditions of the social classes of the English society. The fact that English slangs are not understood by speakers of other languages, including the Azerbaijani language, is related to these national characteristics (Abu, 2004). These national characteristics have been assimilated by English-speaking peoples over the centuries, polished in their languages and expressed the objects and concepts understood by the representatives of English-speaking societies. Naturally, the words and phrases that express these concepts and realities reflected in the way of life and thinking of English-speaking peoples are not immediately understood by the speakers of other languages, and naturally, the understanding of the meaning they carry requires some explanation. For example, the word toboggan ("a type of ski") of Hindu origin used in the American version of the English language does not have a direct lexical equivalent in the Azerbaijani language, because the object itself, that is, this type of ski, is not typical for the life of Azerbaijanis. For this reason, if it is found in the English text, the translation of this word into Azerbaijani is possible only through description (a type of ski belonging to American Indians) (Hajiyeva, 2014).

Slang is a branch of metaphorical expressions widely used in the English language as well as in variants of the English language. These expressions are used in order to make the speech lively, emotional, effective, and expressive, and because they are distinguished by their conciseness and brevity, they are used by large groups of the English-speaking population and are widely represented in the vocabulary of the English language due to their artistic features. The noted artistic and linguistic importance of slangs opened the way for their in-depth study in Western linguistics and led to the emergence of dictionaries covering slangisms in English-speaking countries. This fact is another nuance that distinguishes slangs in English from slangs in the Azerbaijani language, which is that slangs in the Azerbaijani language have not been studied extensively and dictionaries have not been developed (Boase-Beier, 2004).

Another difference between slangs in the Azerbaijani and English languages is related to their classification, while in English there are general and special types of slangs, there is no such classification in the Azerbaijani language (Hajiyeva, Nacafova, Jafarov, 2014).

There are five types of slangs in English: lively and creative slangs, flippant (non-serious slangs), imitation slangs, slangs created as a result of abbreviations, slangs created by cutting words. Although this division is not carried out in the Azerbaijani language, when we look at the language, we can determine that this division is a common feature for slangs in the Azerbaijani language.

Today, the use of slangs, whether in English or in Azerbaijani, is more noticeable on Internet pages, computer games, that is, in areas related to the development of technology. This is explained by the fact that nowadays the capabilities of the computer have reached such a limit that when using it, people often forget that they are communicating with a machine or an ordinary person. Because in some cases, these machines become a better employee for people than a person. Thus, today, the scope of slang usage is more widespread in the Internet and computer field.

Most of the slangs that are common in the English language on the Internet are acronyms that are the result of shortening words related to quick correspondence. For example, b4 – Before, BBS – Be Back Soon, bf – Boyfriend, BTW – By The Way, DIKU – Do I Know You?), F2F – Face To Face, FAQ – Frequently Asked Question, HAGD – Have a Good Day, L8R – Later, LOL – Laughing Out Loud, SPST - Same Place, Same Time, SYL - See You Later, TC - Take Care, TTYL - Talk To You Later, etc. this list can be extended.

Most of the slangs used in the Internet in the Azerbaijani language consist of borrowed words, some of them are shortened versions of words. For example, admin, link, update, virus eater, online, etc. such words are included in the slang related to this field. Here, the word admin is a shortened version of the word administrator, and it is correct to consider it as slang, as it is known only to people who know this field. Link, up-

date, online are borrowed words and expressions understood by those interested in this field. The word virus eater is used as a substitute for the word antivirus. Examples of slang used by young people nowadays for quick correspondence are: cvb – cavab (reply), uni – universitet (university), tşk – təşəkkürlər (thank you), tmm – tamam (ok), slm – salam (hello), etc. it's like this.

In English, slang words were originally created by the lower social classes, such as criminals, thieves, and beggars. For example, if someone uses the phrase "blowing the peter," the meaning of the phrase is that the environment is safe for theft. If someone says they want to buy some "happy dust", that means they want to buy some cocaine. "Jail arithmetic," literally translated as "həbs hesabı" is slang for an accountant or banker who embezzles money and tries to cover it up, meaning the account could land him in jail. "Rappers" was slang used only for a citizen who complained to law enforcement.

The Azerbaijani language also has its own expressions for criminal and thieving groups. Many of these phrases originated during the Soviet rule. At that time, people from different strata of society - peasants, intellectuals, merchants, officers, etc. different expressions have arisen as people fill the prisons. For example, the slang "to push an empty wagon" was created by miners and meant to talk nonsense. "Volına" - the word pistol comes from the Cossacks. The word "Jigan" means "to burn", "to burn". At first, the word "Jiqan" was used to refer to people who were burned with soot. Later, this word was used for cruel people, fraudsters, and swindlers. The word "Müftə" (xalyava) is a word borrowed from Poland. The word müftə here means the throat of a boot. Fraudsters wore long-necked boots and roamed the markets. One of the swindlers distracted the merchant, and the other threw the stolen goods down the boot's throat. This word is used in modern jargon in the sense of "free", "gift".

We can say that one of the areas most prone to the development of slangs in the language is the field of military service. The strength and meaning of their lexicons are closely related to the constant stress of strict discipline and sometimes the threat of war, as well as the closed, isolated nature of their daily lives. These slangs include "daisy pusher" meaning "a dead man", "N.B.G.", which is an abbreviation of "no bloody good", "(sadly out of luck") "SOOL" with abbreviation can be an example.

Some of the slangs used in the English language also belong to the medical field. Most of the authors conducting research in this field have noted that the vast majority of words in the lexicon of medical professionals consist of abbreviations and acronyms. One of these researchers, PC Colin, divides the lexicon of the medical field into two parts: slangs and abbreviations. "Knee jerk" - the abbreviation of the expression "KJ", "new born" - "NB" instead of the expression "sit out of bed", "SOOB" instead of the expression "sit out of bed", etc. is an example of such slang.

Slangs in the Azerbaijani language and their use are not among the topics that have been discussed a lot. Since this area has recently started to attract the attention of linguists and scientists, it has not been possible to investigate all areas yet. Although dictionaries related to slang words and phrases in British English and American English have been prepared, there is no work done in this direction in our country yet. For this reason, slangs related to medical and military service fields and a number of other fields have not yet been developed and revealed in our language.

CONCLUSION

At the end of numerous studies, it can be concluded that the similarities between the slangs in the Azerbaijani and English languages prevail over their differences. Both languages have the concept of slang and their explanations are compatible with each other. Therefore, the concept of slang is used in the same sense in both English and Azerbaijani languages. The forms of their formation are almost predominant. Similarity was also observed in the features of sentence usage and structural types.

Currently, there is a great need to study the slangs that exist in the Azerbaijani language. Because in order to speak any language, it is important to know its literary language as well as its colloquial language, and the importance of slangs in the colloquial language is undeniable. Especially among today's youth and teenagers, they have become an integral part of everyday conversation.

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TEMPORAL ORGANIZATION OF THE TEXT OF NEWSPAPER PUBLICISM

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Abstract

A text of newspaper publicism within mass communication is considered in relation to social contexts of language use. This paper is primarily concerned with the modern linguistic theory of the text covering very wide range of problems. The research of a text as independent subject of the linguistic analysis is carried out at the different levels, in various directions and aspects both in the theoretical and practical plan. Data on temporal structure of the text, is still currently rather fragmentary, being collected in linguistics, on the one hand, in connection with the latest researches in the field of the category of tense, on the other hand, in connection with studying of genre and functional and semantic features of temporal structure of different types of the text, at last, in connection with a problem of functional and semantic types of speech, and with consideration of the use of time as one of structural grammatical features of this or that functional and semantic type of speech.

Keywords: temporal organization of the text; structural-semantic features of the text; functional-semantic types of speech.

The modern linguistic theory of the text covers very wide range of problems, and a text research as independent subject of the linguistic analysis is carried out at different levels, in various directions and aspects both in the theoretical and practical plan. Data on temporal structure of the text is still currently rather fragmentary being collected in linguistics, on the one hand in connection with the latest researches in the field of the category of tense, on the other hand in connection with studying of genre and functional and semantic features of temporal structure of different types of the text, and at last, in connection with a problem of functional and semantic types of speech, and with consideration of usage of time as one of structural grammatical features of this or that functional and semantic type of speech. In the given paper under the temporality is understood a text category in which by means of morphological, lexical, lexical-syntactic means and extra-linguistic factors is expressed the author's subjective and estimative attitude to the objective tense reflected in the text forming a grammatical text type in plan of its temporal structure. Temporary forms of a verb at the level of the publicistic text are multifunctional and multiple-valued, that is the same temporary form being capable to act at the level of the publicistic text in several qualities serving semantic and syntagmatic orderliness of the text.

The research task is to substantiate the analysis technique of text temporal organization of the newspaper reportage "Frankfurter Allgemeine Zeitung" - to show structural-semantic features of text, norm of tense usage in this genre of newspaper journalism and analyze comprehensively text-forming functions of tense category. The researched problem is actual from the position of text grammar as the newspaper doesn't represent a single text, but a set system of texts united by unity of time and the place of formation a single ideological content, and having own structural model. The research of structural and substantial organization of text among other problems has proposed on the agenda also a problem of the temporal organization of the text. In general form the position on text-forming function of category of tense has been already expressed in first works on linguistics of text and a sign of temporal integrity has been attributed both to the text in the narrow sense of the word – to super-phrase unity, and to the text – as the whole speech formation.

It should be noted that Harald Weinrich's works have special value concerning to a particular importance for studying of temporal structure of the text in general, and also features of temporary registration of separate functional and semantic types of speech in modern German. In his book "Tempus. Besprochene und erzählte Welt" H. Weinrich separates the use of tenses in German into two subsystems and connects them to his concept of the "world of reasoning" and "the world of narrative". According to H. Weinrich, the subject of linguistics is two categories of tense: paradigmatic - tense in a temporal system and syntagmatic - contextual tense together with other neighboring tenses. Tense in live speech, in sentence, and in text can occur in infinite combinations with other tenses, but one tense is given clear priority, especially in complex sentences and in those cases where the tense of the main clause determines the tense of the subordinate clause, and which has received the name of **consecutio temporum**. As tense forms of the "reasoning world" H. Heinrich considers Präsens, Perfekt, Futurum I and Futurum II (the so-called group I of tense forms) to be the tense forms of the "narrative world" respectively Präteritum, Plusquamperfekt, Konditionalis I and Konditionalis II (II group of tenses).

In the expressions **er singt** and **er sang** the data about the tense of singing process are absent. Präsens and Präteritum in these sentences give us the chance to understand whether singing process is discussed or narrated about it. The discussed singing demands usually instant expression of the viewpoint. But if the process of singing is narrated about, then information on it isn't urgent [2, S. 36-45]. More or less similar judgments of separate tenses have been stated also by some other researchers. As for Perfekt, Kaj B. Lindgren writes that this tense is subjective judgment, expression of thought. It is used in dialogue and is followed by the

adverbs: **schon** and **noch.** Kaj B. Lindgren notices in Perfekt shade of reference to speaking "I" [1, S. 97]. H. Weinrich adds to it that the function of Perfekt and is found in comparison with Präteritum. On the ground of Präteritum Perfekt appears in the text in strictly certain cases. The same text can be submitted at the same time both in the form of the narration and in the form of reasoning, and verbal forms of both temporary groups can be respectively used. The text reporting this or that fact can begin with Perfekt and continue in Präteritum. It means that Perfekt not only emphasizes an event of retrospectivity, but also gives a reasoning shade to this event. The given circumstance is an essential sign of this tense [2, S. 36-45].

H. Weinrich's thought on various temporal registrations of various types of the text and on dependence of the choice of a temporary form on a speech situation and our attempts to connect the use of these or those tense forms with a common problem of structural language signs of the main functional and semantic types of speech allocated by us – reasonings, narrations and descriptions in the text of the reportage of the newspaper "Frankfurter Allgemeine Zeitung" are close. The reportage is fairly considered in the theory of journalism as one of the most effective genres the functioning of which in the newspaper represents striking peculiar feature of a newspaper publicistic style. Distinctive feature of the reporting is the direct inclusiveness of the author in the described event - or as an observer, or as an active participant. The reporter is faced by a task to present this event as being happened in the face of the reader, to create by use of graphic and expression means its exact and figurative picture. Important means of achievement of this purpose is the effect of the author's presence on the place of an event. The originality of the reportage of the newspaper "Frankfurter Allgemeine Zeitung" is shown in its composition. As a rule, the facts are interpreted in the sequence in which they took place actually. It is clear: the requirement of documentary accuracy of the reporting belongs both to the right time when there were described events, and to sequence of illustration of the facts. Let's consider correlation in speech the reportage of the most characteristic to its composite elements – reasoning, narrations and descriptions. The description in the reportage is concluded in the image of a number of signs, phenomena, objects or events which are necessary to imagine everything at the same time. The narration, contrary to the description, is the image of the events or the phenomena which are not made not simultaneously, but following one after another or determining each other. The reasoning in the reporting aims to find out any thought and construct the logical scheme of conclusions. The narration in the reportage of the newspaper "Frankfurter Allgemeine Zeitung" generally happens in the form of Präteritum. Sometimes Präteritum is combined with Plusquamperfekt. The narration is often replaced by the description. The description is not given objectively but through the author's perception directly and openly revealing the narrator's "I". Subjective and emotional character of the description brings closer the reader to a situation of events, makes the description as a reporting element. Here "I" is neither a kind of stylization, nor artistic method, but it is the author's original "I". The description is made by Präsens and contacting to it Perfekt, as this speech type serves evident, consecutive display of the course of events and at the same time the reporter defines the position to what he writes about, drawing the corresponding conclusions.

All facts stated in reportings of this newspaper are proved and disproved by means of a reasoning which has to be presented in very convincing form. The basis of the reporting is made by the most important, the characteristic, carefully selected facts of which there is an event, and author's arguments, reasonings give to these facts emotional coloring, approve their reliability, and at the same time reproduce the whole figurative picture of an event. The reasoning takes place in the form of generalizing, sometimes punctual Präsens as this type of speech is sometimes presented also in a moment of statement. Being characteristic to the newspaper "Frankfurter Allgemeine Zeitung" reporting, sometimes sharp change of functional and semantic types of the speech – description, narration and reasoning creates dynamism of expression, a polyphonic picture of reality. If to use H. Weinrich's known concept on "the world under reasoning" and "the world under narration" [2, S. 36-45] as the publicistic genre of the newspaper "Frankfurter Allgemeine Zeitung", it can be stated that in this genre "the world under reasoning" prevails being characteristic to it verbal forms. However, it seems to us that the text of the reportage has two temporal dominants each forming one of its composite parts: the narrating part is formed by Präteritum (more often, in a combination with Plusquamperfekt), the description and reasoning is formed by means of Präsens (sometimes contacting to it Perfekt).

The data obtained as a result of researching temporal structure of the text in the reportage of the newspaper "Frankfurter Allgemeine Zeitung" are of interest from the viewpoint of revealing interconditionality between functional and semantic types of speech or system of the functional and semantic types of speech defining composition of this publicistic genre and temporal model of corresponding texts. As language of newspaper is not a unique genre of newspaper prose, it is acceptable to raise a question not only of temporal structure of the text - a representative of each newspaper genre, but also about temporal structure in general as sets of these genres. Of course, it is impossible to claim categorically that there is a rigid, unambiguous communication between certain functional and semantic types of speech, on the one hand, and the use of this or that temporary form, with another. However relative definiteness of temporal registration of various functional and semantic types of speech in relation to this genre of the text is undoubted.

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"LİTTLE MAN" İN RUSSİAN LİTERATURE

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Abstract

This article explores the literary motif of the "Little Man" in Russian literature, particularly through the works of Alexander Pushkin and Fyodor Dostoevsky. The "Little Man" represents individuals of lower social standing and limited ambitions, grappling with societal pressures and personal morality. Pushkin, one of the early adopters of this theme, portrays these characters with a romantic idealism, highlighting their dignity and resilience amidst life's challenges in works like "The Station Warden" and "Eugene Onegin." Conversely, Dostoevsky offers a darker, more introspective look into the psychological and moral complexities of such individuals in his novels "Crime and Punishment" and "The Brothers Karamazov." Both authors use the "Little Man" to address the social and moral issues of their times, providing profound insights into human nature and societal structures. Their narratives underscore the enduring relevance of this motif, reflecting the universal human struggle for justice and integrity.

Keywords: Literary Motif, Little Man, Pushkin, Dostoevsky.

The literary construct known as the "Little Man" boasts an extensive lineage, tracing its origins back to the lore of ancient civilizations and demonstrating substantial development across various cultural narratives throughout history. This scholarly article delves into the genesis, progression, and pervasive influence of this archetype, with a particular emphasis on its portrayal in the corpus of Russian literature, as exemplified by the seminal works of Alexander Pushkin and Fyodor Dostoevsky.

From its early representations in mythological contexts, where it often emerged as an archetype embodying the existential plight of humanity, the "Little Man" has evolved into a nuanced symbol in literary discourse. Typically depicted as an anti-hero or a quintessential everyman besieged by overwhelming societal forces, this character epitomizes the quintessential struggles of the average individual against oppressive structures of authority and power. The "Little Man" serves as a potent emblem of the ordinary person's struggle for autonomy and dignity in the face of daunting systemic obstacles. [2]

This figure not only encapsulates the common man's adversities but also symbolizes universal human anxieties, desires, and the inherent quest for justice and freedom. Throughout literary history, the "Little Man" has been strategically employed by writers to critique prevailing social injustices and to illuminate the resilience and enduring spirit of humanity. In this capacity, the character often challenges the status quo, prompting readers to reconsider the dynamics of power and the impact of societal constraints on individual lives. [1]

In the rich tapestry of Russian literature, the "Little Man" assumes a critical role, providing insight into the social and moral fabric of the times. The works of Pushkin and Dostoevsky, two titans of Russian letters, offer profound explorations of this motif. Through their narratives, these authors present a vivid tableau of the "Little Man's" encounters with existential dilemmas and societal challenges, thereby enriching our understanding of the human condition. [8]

Thus, the "Little Man" not only reflects the trials and tribulations of the everyday person but also serves as a mirror reflecting societal norms, injustices, and the ongoing human struggle for equity and recognition. Through the lens of Russian literary masters, this archetype is imbued with rich symbolism and deep philosophical inquiry, making it an indispensable element in the study of literature and its sociocultural implications. The enduring relevance of the "Little Man" in literature underscores its universal appeal and its ability to resonate across different epochs and societies, providing a robust framework for examining the interplay between individual aspirations and societal constraints. [4]

In the annals of Russian literary history, the archetype of the "Little Man" gained prominence in the early decades of the 19th century. This figure is typically characterized by a modest socio-economic status and constrained ambitions, reflective of a broader societal underclass. The literary critic Vissarion Belinsky is credited with first employing this term in a formal literary critique in the year 1840, marking a significant moment in the recognition and analysis of this motif within Russian literature. [1]

Alexander Pushkin, one of Russia's preeminent literary figures, was instrumental in introducing and developing the theme of the "Little Man" in Russian narrative arts. His short story "The Station Warden," part of the collection titled "Belkin's Tales," is pivotal in this regard. Through the character of Samson Vyrin, a minor official confronted with profound personal tragedy, Pushkin offers a deeply sympathetic portrayal of the vulnerabilities and existential challenges faced by individuals at the lower rungs of society. Vyrin's story poignantly underscores the impact of personal losses that resonate with the theme of social and emotional marginalization, thereby bringing to light the poignant

struggles associated with feelings of societal insignificance. [6]

Pushkin's exploration of the "Little Man" extends into other works, notably "Eugene Onegin" and "The Captain's Daughter." These narratives provide a canvas to explore the lives of ordinary individuals entangled in the complexities of romantic entanglements, societal norms, and the upheavals of significant historical events. In "Eugene Onegin," characters such as Lensky and Onegin navigate the intricate dance of social expectations and personal desires, reflecting the broader human condition within the framework of Russian social hierarchy. Similarly, in "The Captain's Daughter," Pushkin delves into the turbulent period of the Pugachev Rebellion, using his protagonists to explore themes of loyalty, bravery, and the human spirit in times of societal crisis. [6]

In these works, Pushkin's characters often exhibit a romanticized fortitude and dignity, which serve as a testament to the human capacity to endure and rise above daunting challenges. This portrayal not only emphasizes the resilience inherent in the human spirit but also highlights the nuanced interplay between individual agency and the overarching forces of history and society. Through the lens of the "Little Man," Pushkin not only critiques the social structures of his time but also celebrates the moral and emotional strength of ordinary people, thus providing a multidimensional view of the human experience in the face of adversity. [5]

Overall, the motif of the "Little Man" in Pushkin's oeuvre offers a rich exploration of the tensions and triumphs of the human condition, framed within the context of Russian society and its historical vicissitudes. This thematic exploration not only enriched Russian literature but also provided a foundation for subsequent generations of writers to build upon, ensuring the continued relevance and resonance of this literary theme. [1]

Fyodor Dostoevsky's interpretation of the "Little Man" archetype represents a profound departure into the realms of psychological depth and moral intricacy, particularly evident in seminal works such as "Crime and Punishment" and "The Brothers Karamazov." In these narratives, Dostoevsky's protagonists are often embroiled in intense ethical quandaries and internal turmoil. This deeper, more introspective approach offers a stark contrast to the more surface-level societal critiques often found in other literary treatments of the "Little Man." His characters, such as Rodion Raskolnikov and the Karamazov brothers, are meticulously crafted to explore the darker, more complex aspects of human psychology and morality. [3]

Dostoevsky's portrayal delves into how these individuals contend with the existential pressures and moral decisions that define and often torment their existence. This exploration extends beyond mere narrative function; it serves as a profound inquiry into the human soul, wrestling with questions of redemption, guilt, faith, and the inherent struggle between good and evil. The psychological landscape he paints is one of intense conflict and reflection, providing a vivid depiction of the human condition through the lens of the socially and economically marginalized. [4]

On the other hand, Alexander Pushkin's treatment of the "Little Man" in his literary works often embodies a more romanticized idealism. Pushkin's characters, while also navigating the trials posed by their environments and societal structures, typically display a resilience imbued with a sense of nobility and moral clarity. This is not to suggest a lack of complexity in Pushkin's characters but rather highlights a different stylistic and thematic focus. Pushkin's romanticized approach lends a certain poetic justice to the lives of his characters, often elevating their personal struggles to a level of heroic or tragic dignity.

Despite these differing approaches, both Dostoevsky and Pushkin leverage the "Little Man" to critique and examine the social and moral fabric of their respective times. Each author uses this figure not only to reflect on individual human virtues and vices but also as a mirror reflecting the broader philosophical and societal dilemmas facing the common person in Russia. Dostoevsky's characters often embody the existential angst and moral disquietude that characterize modernist literature, while Pushkin's figures frequently resonate with the themes of fate and personal valor typical of the Romantic era. [8]

Through their distinct literary lenses, both authors contribute richly to the dialogue about the role of the individual in society and the moral challenges they face. This ongoing literary conversation highlights the enduring relevance of the "Little Man" in exploring the depths of human nature and the societal pressures that shape our moral choices. Thus, Dostoevsky's psychologically rich and gritty narrative style, juxtaposed with Pushkin's more idealized and romantic portrayal, provides a comprehensive view of the human condition through the trials and tribulations of the "Little Man."

The literary archetype of the "Little Man" has maintained its prominence as a potent symbol within literature, resonating deeply with audiences and spurring a reflective examination of both personal and collective values. The sustained pertinence of this motif in literature can be attributed to its profound encapsulation of the essential elements of human existence—namely, the perennial struggles faced by individuals, the enduring quest for moral integrity, and the ongoing pursuit of justice. These universal themes are central to the human experience, offering readers not only a mirror reflecting their own lives but also a lens through which broader societal issues can be viewed and critically examined. [2]

The works of Alexander Pushkin and Fyodor Dostoevsky serve as pivotal explorations of this motif, significantly influencing Russian culture as well as the wider realm of global literature. Through the narrative arcs and character developments in their stories, these literary giants provide deep insights into the complexities of the human condition, framed through the experiences of the "Little Man." Their narratives weave a rich fabric of human emotions, interlaced with the varied textures of societal dynamics and conditions. By doing so, they elevate the "Little Man" to a symbol that transcends time and cultural boundaries, offering a timeless emblem that continues to engage and provoke thought across successive generations. [2]

The ongoing exploration of this theme in literary studies not only honors the legacies of Pushkin and Dostoevsky but also underscores the critical role of literary analysis in deepening our understanding of human nature and societal constructs. Through detailed examinations of these authors' works, scholars and readers alike gain insights into the nuanced interplay between individual actions and broader social forces. This scholarly engagement reaffirms the value of the humanities, illustrating how literature acts as a conduit for cultural expression and philosophical inquiry. [4]

In dissecting the portrayal of the "Little Man" by Pushkin and Dostoevsky, one appreciates the broader implications of their narratives in addressing fundamental questions about human aspiration, societal limitations, and the moral conflicts that arise therein. Their literary contributions thus continue to inspire academic discourse and creative explorations, highlighting the enduring relevance of their works in contemporary discussions about identity, morality, and social justice. [5]

In conclusion, the persistent resonance of the "Little Man" in literature is a testament to its profound impact as a vehicle for reflecting on human frailties and strengths, and the inexorable search for meaning and justice in an often indifferent world. Pushkin and Dostoevsky's artistic explorations into the lives of ordinary individuals facing extraordinary challenges illuminate the path to understanding more about ourselves and the society in which we live, bridging past and present, personal and universal. This exploration not only keeps their literary spirits alive but also continues to enrich our collective cultural heritage.

Conclusion

In conclusion, the exploration of the "Little Man" in the works of Alexander Pushkin and Fyodor Dostoevsky provides a rich tapestry through which the nuanced interplay between individual agency and overarching societal structures can be examined. Their narratives illuminate the profound struggles and moral questions that characterize the human condition, offering an enduring reflection on themes of justice, integrity, and personal resilience. While Pushkin presents these figures with a romantic idealism that highlights their dignity and struggle against fate, Dostoevsky offers a grittier, more introspective look into the psychological and ethical dilemmas faced by his characters.

Both authors contribute significantly to the discourse on social and moral issues of their time, using the motif of the "Little Man" to offer a critique of their respective societies that remains relevant today. This enduring relevance underscores the profound capacity of literature to transcend temporal and geographic boundaries, facilitating a deeper understanding of societal dynamics and individual psychology. The academic exploration of these themes not only honors the legacies of Pushkin and Dostoevsky but also enhances our comprehension of the literary mechanisms through which cultural and existential queries are articulated and examined.

Therefore, studying Pushkin and Dostoevsky's portrayal of the "Little Man" offers invaluable insights into the struggle for personal significance within larger societal contexts, providing a mirror in which the eternal conflicts of human existence are reflected. This ongoing relevance highlights the essential role of literary studies in fostering a deeper appreciation of both historical and contemporary human experiences, ultimately enriching our global cultural heritage and enhancing our collective empathy and intellectual breadth.

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PHYSICAL SCIENCES

A NEW APPROXIMATION TO DARK MATTER

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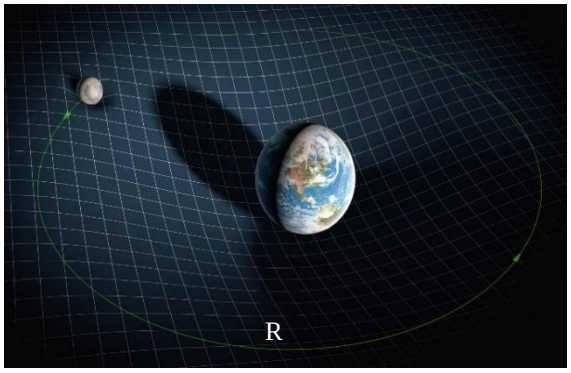
Abstract

In modern physics, the idea of creating general theory have faced to big problems.The main one is related to the properties of gravitational field.Giving unique theory of gravitational field with other interactions causes difficulties. Besides it, the exitence of dark matter which surrounds us and can't be observed is proved.According to the properties of this matter, the existence of it in multidimensional space and relation of it with gravitational field is given.The existence of this relation is determined according to lots of facts

Keywords: gravitational field, multidimensional space, dark energy,dark matter.

The attraction events in universe have always been interesting to us. Let's see Isaac Newton's idea about attraction: l discovered attraction force and calculated the value of it, but l don't know where it was created from and why celestial objects attract each other.Although there is such a big gap between celestial objects they attract each other.For such a problem, later A.Einstein said that, space isn't a gap. Time and location is a whole and looks like a cloth material.Each body having a mass wraps this material and a cavity is created around a wrapped material [1] The amount of wrapping depends on mass of the body, it means how bigger the mass, and the more is cavity.So less massed objects circulate around objects with large masses. By getting far away from this cavity circulation velocity decreases.According to Einstein ,this material is present in 4-dimensional space. This fact(physical field,interaction force) is complete among distance and conditions which balance chances of interaction and which differ events. Although things which exist in universe show different properties in different places they are complete.More exactly,although we observe them in a different way they are unique. This fact demands certain regularities for distribution of masses for concrete celestial bodies. Let's explain this regularity via Einstein's model. As we know, f=GM\R is potential of attraction field and M/R =f/G must be constant at given distance where G-gravitational constant,M-cirlce of celestial object,R-gravitational radius ofcelestial object ,f-potential of attraction field. Potential of attraction field is finite field having equipotential surfaces. For equilibrium of celestial bodies,from the point of energy,their potential energies mustn't differ. it means distance which have attraction radius must have a value that their potentials are same. Main reason of equilibrium of universe is conservation of this equilibrium. Change of this potential yields to different motions. Let's prove this fact mathematically

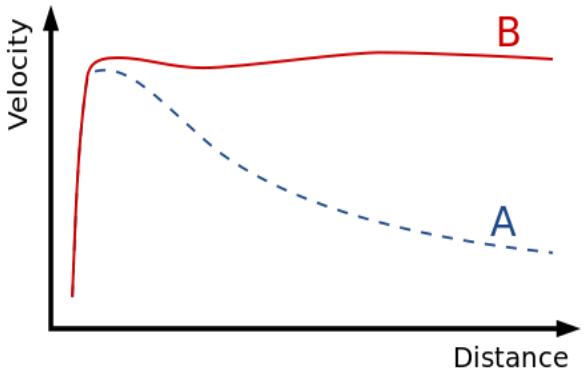


$$\frac{M_G}{R_G}=\frac{1988.8\times10^{27}}{1455\times10^{9}} \approx 1{,}015\times10^{18} kg/m; \frac{M_y}{R_y}=\frac{5.97237\times10^{24}}{384.4\times10^{6}} \approx 1{,}015\times10^{18}\ \text{kg/m}$$

We see from calculations that: $\frac{M_G}{R_G} \approx \frac{M_y}{R_y}$ so,M=χ**R** is conserved. here χ-is constant,and its value is $\chi \approx 1{,}015\times10^{18}\frac{kg}{m}$ Approximate value for constant χ is completely normal. Because we can't know gravitational radius and mass of the celestial body accurately. Also as there is the influence of other celestial bodies to this body, there is less accuracy here. Einstein's model can explain theese facts so he was right. Gravitational field is really a field which exists in 4-dimensional form and it is created by mass. Nowadays,the main reason for uncompleteness of "m theory" which

known as " theory of everything" is properties of gravitational field. As Einstein said we can suppose gravitational field as a field exist in 4-dimensional space.As a result of it, scientists face difficulty during including of gravitational field to any general theory.So gravitational field doesn't refer to 3-dimensional space completely, it can't be characterized by 3-dimensional space. Let's explain this oppinion a little. As we know 3-dimensional space where we live consists of combination of many 2-dimensional spaces. Similarly, 4-dimensional space also consists of combination of 3-dimensional spaces. We can never understand 4d space because we never see what it looks like. We can't imagine the thing that we have never seen.For this reason,we can't see and undrstand events, objects, beings occur at 4- dimensional space. In 3-dimensional space each object has mass form and etc. But we can't say same fact for 4 -dimensional space. As we say above 4-dimensional space consists of 3 dimensional spaces. So 3-dimensional space that we live in is located inside the 4-dimensional space.it means 4-dimensional space is larger compared to 3-dimensional. Let's see some facts that belongs 4-dimensional space.

In 1932, astronomer Jan Hendrix Oort investigated stars around our galaxy and calculated the amount of mass needed for stars in top and bottom to stay at certain altitude . But he faced to interesting fact. He calculated mass heavier 3 times than visual mass [2].Later in 1933, American astronomer Fritz Zwickyi from Switzerland analyzed that there is a collecting galaxy that consists 1000 galaxies and he was shocked a lot when he calculated gravitational force which contains galaxies together. Because calculations were leading to the fact that there must be existence of very big mass[3]. Actually,theese existing mass and galaxies must go far away from each other with high velocity. But his idea wasn't assumed seriously for 40 years. Let's note how he made calculations. As we know moon rotates around earth in a specific velocity. If Moon rotated in high velocity at that time it would go far away from Earth's attraction.if rotated with less velocity rahther than known velocity it would fall down to Earth. similarly, if mass of Earth was larger ,Moon would circle with high velocity around it . In a short, we can define mass of Earth using constant velocity of Moon and define mass of Sun by using constant velocity of Earth. If we apply this prinsip to orbits of stars around galaxy we can calculate how much gravitational force exist here and how much matter exists .If its existence isn't enough so there must be matter that we can't see and calculate but accept its existing.in 1970 the proof of existence of this matter was given by Vera Rubin and mates at Carnegie University in Washington. According to this collective they exepted that the velocity of bodies must decreses by going far away from center of galaxy. This fact is the same as Solar system. But inversely they observed that the speed of stars in galaxy are close to each other([4]).By getting far away from center the velocity of stars didn't decrease (B).



After this, they observed other galaxies but the result was the same.We can say that if observed matter is so much, then it was necessary to theese stars exceed from galaxy but it doesn't occur. There must be single expaination of this view. It must be an unvisual matter that can contain all bodies. As we can't observe such a matter it is called dark matter. Dark matter is one of the first parts of existence. Dark matter is a matter which is unvisual,without any relation with electromagnetic waves and which's existence determined by influence on other matters. Dark matter can help us in gravitational problems. We can't see dark matter and dark energy corresponds to it and they contain 95% in nature.We can't understand its form for now.But dark matter affects 3D space. Similarly, it is same as 4d space example as given above. At the same time, if we take into account the existence of gravitational field at 4D space, we can give general opinion that dark matter and energy is present in 4D space and they create gravitational field.Dark matter is a reason of existence of gravitational field. theese reasons create problems for us to learn them as we want.

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POLITICAL SCIENCES

THE PROBLEM OF RESETTLEMENT OF ARMENIANS TO THE NORTH CAUCASUS REPUBLICS OF THE RUSSIAN FEDERATION: ADYGEA, KABARDINO-BAKARIA AND KARACHAY-CHERKESSIA

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ПРОБЛЕМА ПЕРЕСЕЛЕНИЯ АРМЯН В СЕВЕРО-КАВКАЗСКИЕ РЕСПУБЛИКИ РОССИЙСКОЙ ФЕДЕРАЦИИ: АДЫГЕЮ, КАБАРДИНО-БАКАРИЮ И КАРАЧАЕВО-ЧЕРКЕСИЮ

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Abstract

The proposed scientific research examines the problem of Armenian resettlement in the republics of the Russian Federation - Adygea, Kabardino-Balkaria and Karachay-Cherkessia. The purpose of the work is determined by their integration and perception with the Adyghe people of the North Caucasus, because the Armenian factor has periodic spontaneity and is distinguished by mental characteristics manifested in the independent states of the South Caucasus - Azerbaijan and Georgia.

Аннотация

В предлагаемом научном исследовании рассмотрена проблема армянских переселений в республики Российской Федерации − Адыгею, Кабардино-Балкарию и Карачаево-Черкесию. Цель работы обусловлена их интеграцией и перцепцией с адыгским народом Северного Кавказа, ибо армянский фактор имеет периодическую стихийность и отличается особенностями ментального характера, проявленными в независимых государствах Южного Кавказа – в Азербайджане и Грузии.

Keywords: relocation, Adygea, Kabardino-Balkaria, Karachay-Cherkessia, Armenians, mentality.

Ключевые слова: переселение, Адыгея, Кабардино-Балкария, Карачаево-Черкесия, Армяне, менталитет.

Введение. Исторически переселение народов являлось естественным процессом, оно способствовало заселению людьми земного шар и достижению расового, национального и языкового разнообразия современного социума. Технологии и культуры, в какой-то мере, обязаны

мировому переселению. Однако у медали есть обратная сторона: переселение всегда являлось военно-политическим феноменом, потрясавшим до основания весь социально-политический порядок в обществе, несло в себе межэтнические конфликты, разрушения и даже геноцид. Необходимо разобраться, к чему ещё может привести переселение? Может ли оно угрожать цивилизационным обществам? В процессе исследования будем использовать наравне с термином «переселение» термин «внешняя миграция», официально появившимся в XIX веке, когда под действием глобальных процессов активизировались потоки переселенцев. Первопроходцем в данной области стал британский статистик немецкого происхождения Эрнст Равенштайн. Его исследования продолжил американский учёный-социолог Эверетт С. Ли, сформулировавший несущие позитивные и негативные факторы переселений. Комплексное изыскание Ли в данной области, привело к тому, что негативные факторы превалируют над позитивными. Согласимся с Ли, но, с учётом присутствия двух сторон: переселенцев и принимающей их стороны, поставим вопрос: что в итоге имеет каждая сторона? Оригинальность нашего исследования заключается в охвате комплексных факторов отдельно для переселенцев и принимающей стороны. Учитывая имеющийся опыт, предварительно ответим на поставленный вопрос: для эмигрантов больше будет позитивных факторов, а для принимающей их стороны больше

– негативных. К позитивным факторам для переселенцев относятся, приведённые Ли: безопасность, семейные связи, лучшее образование или жилищные условия, ощущение большей политической и религиозной свободы – в общем, все, что чаще всего заставляет людей покинуть привычное место жительства и отправиться на поиски лучшей жизни. Применяя данный метод, проверим, как отразилось переселение армян на Кавказ и что оно принесло и может ещё принести?

Данной проблемой после Равенштайна и Ли занимались многие учёные. Ими были предложены различные классификации причин внешней миграции. Однако армянская модель миграций отличается периодической стихийностью, а также спецификой менталитета, заключающегося в появлении и разрастании экспансии на основе придуманных историй, фальсификации фактов, уничтожения или присвоения культурных ценностей, принадлежащих коренным этносам. Примером является армянское посягательство на азербайджанскую культуру и почти 30-летнюю оккупацию азербайджанских территорий.

Исходя из опасности приведённых факторов, проблема «Переселения армян в Адыгейскую, Кабардино-Балкарскую и Карачаево-Черкесскую республики Российской Федерации» в аспекте полного разгрома Азербайджаном в 44-х дневной войне 2020 года хвалёной армянской армии, дипломатии и фашистской идеологии, является актуальной и насущной. Также, поставим цель выявления: чему научил армянских идеологов, полученный опыт фиаско. Ибо, армянские сепаратистские оппозиционные силы, продолжают выбрасывать ложную информацию в глобальную сеть интернета: искажают историю, действительность и приписывают, свойственный им вандализм и геноцид на Азербайджанский народ. Если и в дальнейшем армяне не откажутся от своих традиционных методов, под угрозу подпадают северокавказские народы.

Итак,

предметом предлагаемого исследования является проблема: «Переселение армян в Адыгейскую, Карачаево-Черкесскую и Кабардино-Балкарскую республики Российской Федерации».

Объектом исследования являются: армянские переселенцы и республики Адыгея, Кабардино-Балкария и Карачаево-Черкесия - субъекты Южного округа Российской Федерации, по сути, составляющие единый адыгский народ, разделённый искусственными границами.

Цель исследования:

- обозначить этапы переселения армян в означенные регионы;
- исследовать этническую политику СССР и её преемницы – России, искусственное смешение адыгов с армянами;
- представить анализ действительной интеграции между титульными адыгами и армянами;
- представить варианты прогноза взаимодействия адыгов и армян.

В соответствии с темой исследования, в целях выявления этапов переселения армян в северокавказские республики: Адыгею, Кабардино-Балкарию, Карачаево-Черкессию и идентификации их, по сути, с единым, но, разделённым советской властью адыгским/ черкесским народом, вначале исследуем кто такие адыги/черкесы.

Адыги или черкесы - самоназвание группы народов, являющихся коренным населением современных Адыгеи, Кабардино-Балкарии, Карачаево-Черкесии, Краснодарского и Ставропольского краёв, говорящих на адыгских диалектах абхазо-адыгской языковой группы [47] или общее название единого народа в России и за рубежом: Турции, Сирии, Иордании, Израиле, Косовской республике, в небольшом числе в некоторых европейских странах, в Канаде и в США, включающего в себя адыгейцев, кабардинцев**,** черкесов и шапсугов. Территория обитания их предков впервые была представлена Гомером в эпических поэмах «Иллиада» и «Одиссея» (IX-VIII вв. до н.э.). Силой поэтического воображения Гомер создал завораживающую, таинственную картину территории их проживания [49]. Описания Гомера определили интерес к данному региону у Ариана, Аристотеля, Гиппократа, Страбона, Плутарха, Геродота и у других. В своих текстах они предоставили сведения о племенах адыгов/черкесов. Так, благодаря Геродоту уже в V в. до н.э. появилось представление об этнической «пестроте» региона: «Много разных племён обитает на Кавказе» [14]. Геродот предпринял серьёзные усилия, направленные на описание географии их расселения, миграций и военных походов». Используя систему «привязок» к географическим ориентирам: Кавказские горы, Боспор Киммерийский, озеро Меотида, Геродот определил, что адыги/черкесы являются выходцами из кубанских и черноморских племен, населявших юго-запад Северного Кавказа и побережье Чёрного моря [39].

К Кубанскому племени относился меотский этнос по названию территории их проживания - Меотиды. Меотские племена составляли самостоятельную и большую группу, игравшую значительную роль в исторических судьбах Северо-Западного Кавказа. Впервые меоты упоминаются в источниках, относящихся к VI в. до н.э. Затем сведения о них мы находим у целого ряда древнегреческих и римских авторов. Наиболее подробные данные сообщает древнегреческий географ Страбон, использовавший сведения более ранних авторов. Он описывает не только территорию, занятую меотами, но и перечисляет меотские племена, приводит краткие сведения об их быте и занятиях. Наименование «меоты» представляет собой собирательный термин и объединяет целый ряд родственных племен. По Страбону, «к числу меотов принадлежат сами синды, затем дандарии, тореаты, агры и аррехи, а также тарпеты, обидиакены, ситтакены, досхи и многие другие». Названия меотских племен встречаются также и в надписях на каменных плитах, происходящих с территории Боспорского государства. В них упоминаются синды, дандарии, тореты, псессы, фатеи, досхи, которые были

подвластны боспорским правителям [31]. Большинство кавказоведов относят меотов к племенам кавказской языковой группы. Само слово «меоты» ряд авторов выводят из адыгейского языка. Так, П.У. Аутлев в статье «К вопросу о смысле слов «меоты» и «Меотида» (по материалам нартского эпоса)» считает, что слово «меоты» в его полной форме «Мэутхъох» означало «море, которое мутное» и этническое название «меоты» произошло от топонимического «Мэутхъох». [5, с. 250-257] В древних наименованиях некоторых рек Северо-Западного Кавказа - Псат, Псатий, местности Псехано и меотского племени псессы лежит адыгейская основа «псы», что означает вода или река. Ряд собственных имен в боспорских надписях выводится также из адыгейского языка, как, например: Багос, Блепс, Тхетлепс, Ханакес и др. Собственные имена, засвидетельствованные надписями, сохраняют древний фонетический облик и являются надежным лингвистическим источником. [30].

Черноморское племя объединяло зихов и керкетов. Экзоэтнонимы зихов - зиги, зики, зикхи, чиги, чики, джихи, джики, черкесы (в древнегреческом звучании «зухой», грузинском - «джикеби»; абхазо - адыгская группа народов. Впервые упоминал о зихах Страбон в I-м в. до н.э. [39]. Зихи являлись одним из основных компонентов в этногенезе современных адыгов и абхазов [27, с. 193-207] Следует отметить, что зихи локализовались в Приморских нагорных районах от современного Новороссийска до Гагры. Они занимались земледелием, скотоводством и морским разбоем; были основными поставщиками рабов для боспорских городов. На рубеже VIII-IX вв. «Зихия», возглавляемая вождями, была довольна значительной страной. Последнее упоминание о зихах относится к XV в. Зихи являлись одним из основных компонентов в этногенезе абхазов и адыгского этнического массива народов северо-западного Кавказа [19].

Керкеты были одним из древних племён Северо-Западного Кавказа (предки современных адыгов); их название, по-видимому, явилось основой возникшего позже названия народа - черкесы [22]. В античную эпоху керкеты жили на Черноморском побережье (южнее современного Новороссийска). Их название упоминаются античными писателями: Страбоном, Плинием, Птолемеем, Анонимом и др. В эллинистическую эпоху керкеты объединились с родственным племенем торетов.

В III-IV вв. н. э. они были вытеснены одним из племён готов в район верховьев реки Лаба. Племенное название керкетов, по-видимому, явилось основой возникшего позже названия народа - черкесы [23]. Исторически занимавшее промежуточное положение между западными адыгами и восточными (кабардинцами**)**. В настоящее время керкеты проживают в Карачаево-Черкессии, Адыгее и в Краснодарском крае**.** Керкеты широко представлены в адыгской диаспоре за рубежом. В V веке керкеты вошли в союз с зихами и возглавили адыгские племена. Таким образом, название «адыги» оказалось укоренённым не только для новообразованного союза, но и для соседствующих с ним народов.

Однако понятие «адыги» в разных культурно - языковых средах звучало по-разному. В европейских литературных источниках средних веков адыгов называли черкесами. В русских летописях X в. значились как касоги. В восточных источниках - на арабском и персидском языках, они записывались как кашаки или кешеки. Названия этого многочисленного этноса никак не отражались на их перемещениях, но отразились на смешении с другими народностями:

В XIII-XIV вв. часть адыгов двинулась на восток, в бассейн реки Терек, в бывшие места проживания аланов, большинство из которых были истреблены или изгнаны в горы монгольскими завоевателями. Со временем адыги смешались с оставшимися в живых аланами и образовали основное население Кабарды. Меоты, синды, черкесы, касоги, керкеты и другие являются титульным населением Адыгеи.

Что касается населения Карачаево-Черкесской Автономной области, то оно состоит частично из потомков западных адыгских племён - бесленеевцев и частично из кабардинцев, переселившихся на Кубань в 1820-1840 гг.

Бесленеевцы (самоназвание: адыгэ, беслъэней) - этнографическая группа (субэтнос**)** адыгов [24]. Они являются одним из старейших черкесских этносов, княжеские фамилии которого произошли от прародителя аристократии адыгов Инала [37].

Итак, в Адыгее, Карачаево-Черкесии и Кабардино-Балкарии, адыги являются титульным народом, искусственно разделённым советской властью для того, чтобы было легче ими управлять (действовали по принципу «Разделяй и властвуй»).

Несостоятельные теоретические установки об ускоренном слиянии наций и беспроблемных межнациональных отношениях в Советском союзе, не позволяли адыгам и карачаево - балкарцам афишировать историю своих народов.

Следует отметить, что адыгский язык претерпел ряд изменений. В современный период он имеет диалекты восточного и западного направления. К первому относятся кабардинский диалект и черкесский, а ко второму - адыгейский и шапсугский. Житель Черкеска может испытывать затруднение в понимании речи жителя Яблоновского, кабардинцу сложно понять разговор сочинских шапсугов. Однако материальная и религиозная культуры всех этих народностей сохраняют много общих элементов.

В силу географического расположения Кабарды на возвышенном плато, её население называет адыгейцев низовыми.

Стоит отметить, что синоним термина «адыг» – «черкес» в разное время распространялся также на соседей адыгов по Кавказу. Согласно турецкой версии, «черкесами» называли всех выходцев с Северного Кавказа. До советской власти, в Российской империи адыги/черкесы не имели собственных республик или автономий. Если бы их оставили в монолите, то такой географический субъект по размерам и политическому весу мог бы стать

равным каждой республике Южного Кавказа [50], поэтому в Кремле решили не рисковать.

Процесс образования Адыгеи, Кабардино-Балкарии, Карачаево-Черкессии и другие особенности исторических превратностей

Процесс образования Адыгеи, Кабардино-Балкарии и Карачаево-Черкесии происходил по-разному. Адыгея, территориально представляющая собой анклав, со всех сторон окружённый территорией Краснодарского края, является субъектом Российской Федерации в составе Южного федерального округа.

В экономическом делении она является частью Северо-Кавказского экономического округа. Она была образована 27 июля 1922 года как Черкесская (Адыгейская) автономная область на территории Майкопского и Екатеринодарского (Краснодарского) отделов Кубано-Черноморской области**.** 24 августа 1922 г. Черкесская (Адыгейская) автономная область была переименована в Адыгейскую (Черкесскую) автономную область, а в августе 1928 г. − в Адыгейскую автономную область**.** 3 июля 1991 г. она была преобразована в Советскую Социалистическую Республику Адыгея [16], [35]. Современное название было принято 23 марта 1992 года. [15] Современная Адыгея тесно взаимодействует с Россией, но в период Кавказской войны главными противниками российских войск выступали адыги Черноморского побережья и Прикубанья. Несмотря на то, что этот период советская власть «отправила» в забвение, для адыгов Кавказская война выступает важнейшим местом памяти, стержнем исторического самосознания. Адыгские общественные активисты и даже региональные власти, которые, в отличие от федерального центра, продолжают обращаться к памяти о Кавказской войне и выражают своё отношение к центральному событию народов Северного Кавказа, поэтому демаркирующая концептуализация является проблематичной, ведь тональность высказываний множества «акторов памяти» продолжает меняться на различных этапах осмысления истории и наследия Кавказской войны.

После Кавказской войны взаимоотношения адыгов с Россией складывались очень трудно: налаживанию контактов мешали прямо противоположные политические интересы сторон, различия в культуре и языке. Тем не менее, Черкесия − часть Российской Империи, что определяет её настоящую судьбу этой республики [45].

Столица Адыгеи – город Майкоп, что в переводе означает «Мыекъуапэ» - «долина яблонь» [7]. Но, есть и другая версия: город носит название одной из горных вершин «гора меотов», на меотском языке, являющимся одним из реликтовых индоарийских «m (ai)an-kap» [41, с. 255]. Возможно и тюркское происхождение названия Майкоп: от «май» - «нефть» и гидронимического термина «копа», что свидетельствует о нефтяном загрязнении местных водных объектов [32]. Город был образован в границах Майкопского республиканского городского округа.

В Кабардино-Балкарию из адыгов вошли кабардинцы. Для поддержания баланса их объединили с тюрками-балкарцами. Следом образовалась Адыгейская автономия, в которую вошли все оставшиеся суб-этнические группы бывшей Кубанской области. В 1936 г. к ним была присоединена горная часть республики вместе с городом Майкоп.

Шапсуги в Лазаревском районе города Сочи получили свою автономию в 1922 г. (в 1945 г. Советская власть ликвидировала автономию).

Последней автономию получила Карачаево-Черкесия в 1957 г. Её титульная народность адыги - бесленеевцы, близкие по диалекту к кабардинцам. В этом случае власти также поддержали этнический баланс между ними и населявшими республику абазинами и тюрками-карачаевцами (родственниками соседних балкарцев).

Шапсуг, бесленеевец, кабардинец являются суб-этносами адыгов, как уже было отмечено в предыдущем параграфе Шапсуги - древнейшее население Причерноморья, до Кавказской войны они составляли самое многочисленное адыгское племя. В Кавказской войне шапсуги принимали активное участие. Их национальный герой Тугужуко Кызбэч участвовал в кровопролитных боях, вёл партизанскую войну. Он является прообразом Казбича, описанного М.Ю. Лермонтовым в романе «Герой нашего времени» (глава «Бэла»).

Шапсуги отказывались принимать власть Российского государства. Во главе с адыгским предводителем Шамилем под исламскими флагами, они защищали свободу, но из-за неравности сил потерпели поражение. В 1864 г., выселив народ в Турцию, на Кубань, восстание удалось полностью подавить. Геноцид против шапсугов привёл к их массовой эмиграции: 150 тысяч человек оказались в Турции, крупные диаспоры имеются в Израиле, Сирии и Иордании, Ираке, в странах Евросоюза, в США и Австралии и т.д. В России после Кавказской войны осталось 5 тысяч шапсугов. Они проживают, как уже было отмечено в параграфе 1.1. в курортных зонах - на территории исторической Шапсугии - в Туапсинском районе и в Краснодарском крае, в основном, в Сочи, (Лазаревский район), а также в Адыгее. Во время переписей населения некоторые из них продолжают записываться черкесами или адыгейцами.

Многие шапсуги принудительно были переселены на Кубань, в результате чего в историческом регионе их проживания осталось меньше двух тысяч. В Адыгее, согласно проведённой переписи на 1 октября 2021 г. общая численность населения составила 496,9 тыс. чел. (средняя плотность населения 57,9 чел./км^2, что в 6,7 раза превышает соответствующий показатель по России). На первом месте русские – 64,43%, на втором – адыгейцы - 21,97%, на третьем месте – черкесы – 3,61%, на четвертом – армяне – 3,32%, за армянами другие не титульные этносы [31].

Шапсуги говорят на адыгском языке, но со своим диалектом. Раньше основой письменности у них служил арабский алфавит, в настоящее время

используется русская графика. Отличительная особенность языка – выделение большого числа звуков. Первые шапсуги устраивали молебны и жертвоприношения богам у священных деревьев, камней и дольменов; проводили обряд вызывания дождя; использовали воду священных источников [36]. Официально шапсуги являются мусульманами-суннитами. Ислам они сочетают с традиционными верованиями. Среди шапсугов много виноградарей, они пьют вино и едят свинину. Их древние верования основывались на обожествлении силы природы, почитаемый шапсугами бог - Тха (от адыгского дыгъэ, тыгъэ - «солнце»). Создатель сущего - Тха в адыгской мифологии - верховное божество, димиург жил на небе или на священной горе Ошхамахо [43]. Богу плодородия Созерешу шапсуги создали фитиш в виде деревянного обрубка с семью сучьями. Этот культовый предмет хранился в хлебном амбаре каждой семьи. После уборки урожая, в так называемую «ночь Созереша», фетиш переносили домой и совершали благодарственное моление. По более поздним представлениям, Созереш являлся также покровителем скота, подателем домашнего благополучия. Что интересно: народное сознание шапсугов определяло Созереша как одного из мусульманских пророков. А, бога молнии Шибле в молитве они упоминали одновременно с Аллахом [43].

Несмотря на полувековую историю адыгов (черкесов) внутри Российского государства, общество так и не избавилось от племенного (или по-научному – суб-этнического) давления.

До конца Кавказской войны в 1864 г. западные адыги (черкесы) жили на всей территории Краснодарского края и Адыгеи, к югу от реки Кубани до реки Шахе в Лазаревском районе Сочи. Восточные адыги (черкесы) проживали на юге Ставропольского края, в районе Пятигорья, в Кабардино-Балкарии и Карачаево-Черкесии, на равнинных частях Чечни и Ингушетии – между реками Терек и Сунжа.

В результате войны, в Турцию были изгнаны некоторые из субэтносов – такие как натухайцы и убыхи, большая часть шапсугов, хатухайцев, абадзехов. В настоящее время деление на племенные общества выражено не столь ярко, как раньше. Субэтнический термин «кабардинцы» оставили за адыгами (черкесами) Кабардино-Балкарии. Они были самым мощным, многочисленным и влиятельным адыгским субэтносом на всем Кавказе. Собственное феодальное государство, статус законодателей мод и контроль над путями в Закавказье помогали им долгое время удерживать сильнейшие позиции в политике региона.

В республике Адыгея, наоборот, самые крупные субэтносы – темиргоевцы, чей диалект является официальным языком республики, и бжедуги. В этой республике все наименования субэтносов заменили искусственным термином «адыгейцы». Строгих границ в аулах республик нет, все живут вперемежку, так что в Адыгее можно встретить кабардинцев, а в Кабарде – темиргоевцев.

Проще всего запомнить субэтносы можно в следующем порядке:

- восточные адыги (черкесы): кабардинцы в Кабардино-Балкарии; бесленеевцы в Карачаево-Черкесии;

- западные адыги (черкесы): шапсуги в Лазаревском районе города Сочи; темиргоевцы-хатухайцы-бжедуги-абадзехи, мамхеги, егерухаевцы, адамиевцы, махошевцы, жанеевцы в Республике Адыгея.

А как же абазины, которые живут во всех тех же аулах, но преимущественно в Республике Карачаево-Черкесия? Абазины – это смешанный народ, язык которого близок к абхазскому. Когда-то давно они переселились из Абхазии на равнины северных склонов Кавказа и смешались с черкесами. Их язык близок к абхазскому, который родственен адыгскому (черкесскому) языку. Абхазы (абазины) и адыги (черкесы) – дальние родственники, примерно, как русские и чехи [2].

Теперь в дискуссии с адыгейцем, черкесом или кабардинцем, если узнаем из какого он племени (субэтноса), то многое станет понятным из его частных предпочтений и поймём устройство удивительного адыгского (черкесского) общества. Ещё раз отметим, что субэтносы адыгов имеют общую структуру. В XIX - начале XX веках продолжали сохраняться многие нормы обычного права, такие как: обычаи кровной мести, аталычества, гостеприимства, куначества, патроната, искусственного родства (молочное усыновление, побратимство). Образ жизни привилегированных сословий резко отличался от жизни простого народа; социальные различия сказывались в одежде, ее цветовой гамме, покрое. В общественном и семейном быту, помимо обычного права (адат), действовали нормы мусульманского права (шариат). В настоящее временя адыги во многом сохраняют единую традиционную культуру, различия в которой (особенно в хозяйстве, поселении, пище) определяются, в основном, природно-климатическими условиями и вертикальной зональностью. Также, сохраняется общность духовной культуры адыгов: пантеон божеств, многие традиции общественного быта (например, творчество певцов-импровизаторов), традиционные представления [38]. Адыги четко осознают свое историческое единство.

Проблема этнонимических вариаций армян, идея и реализация встречных проектов по их переселению на Кавказ.

Агрессия, умение приспосабливаться, непоследовательность действий, мошенничество с историческими фактами и другие отрицательные свойства армян, активизировали исследования многих учёных разных стран мира в выявлении армянского фактора, как объективного, так и, имеющего свои политические интересы в продвижении армянской линии.

Однако, если в до информационный период происки жонглирования с географическими и историческими картами, подтасовкой событий и т.п., воспринимались мировым сообществом как драма

армянской нации, в эру цифровых технологий раскрылась истина об армянском феномене. Так, политолог С. Мамедов исследуя проблему появления армян выявил, что кипчако-тюркский топоним Армения (тюрк, Ər mən) к хаям не имеет никакого отношения [28]. То есть, не было такой нации, как армяне, были индоевропейские племена хаев, проживающие в индийских долинах, которые жили небольшими колониями. Это факт, которого не хотят признать проармянские ученые.

Далее, хайские племена были преобразованы в этногруппу под сильным влиянием арамейцев. Эти же арамейцы были семитами и называли своих предков − Арам-ом. То есть, тут возникает очередная проблематика уже в связи с происхождением этнонима «армянин» = Арам, который гласит, что оно происходит из арамейского народа. Почему мы это говорим? - Потому, что хитроумные хаи, приняв этноним «армяне» преследовали несколько целей:

1. Присвоение территорий коренных народов под вымышленным названием «армянин»;
2. Превращение истории данных народов в «историю хаев».
3. Получить легитимность в связи с административной реформой византийского императора Юстиниана в VI веке, а термин «Армения» (в то время область Византии) – прилепить к современным хаям-«армянам».

Однако приобретение хайскими племенами этнонима «армянин» связано не только с мошенническими действиями, но также с изменением религиозной (переход от христианства к исламу) позиции большинства членов армянской общины, проживающих в области Эрмания во время арабского властвования в данном регионе.

Локация т.н. «Хаясы».

Как видим, одноименная надпись «HAYASA» искусственным образом наложена на основу.

Известный российский и советский учёный историк-востоковед Игорь Дьяконов писал, что «хаи никогда не называли себя армянами» [3]. Об этом также говорит Фикрет Шабанов - канадский аналитик в своих интервью на официальных каналах интернета. Страну проживания армяне называют словом Хаястан (тюркское слово, означающее ориал - география) [19].

Идея и реализация встречных проектов по переселению армян на Кавказ.

В XVII-XVIII веках великие мусульманские тюркские империи начали слабеть и уступать на мировой арене место крепнущим европейским державам и России. В результате многочисленные христианские общины и малые народы, проживающие на территории Османской, Сефевидской (позже Каджарской) империй стали своего рода «пятой колонной» в руках европейских и российской монархий, стремившихся таким образом изнутри ослабить восточные мусульманские империи. Им под руку в григорианской церкви зародилась идея о поиске государства для хаев, которые начали убеждать европейцев и Запад в том, что мусульмане их угнетают. Их, связанных с Европой одной верой! [27] Ватикан, Америка и Россия, имеющие экспансивные интересы на Кавказе, взяли хаев под свой патронаж как проводников собственных проектов. Попав в волну покровителей, католикос Нерсес Аштаракеци взялся за подготовку плана о переселении хаев на Южный Кавказ. Появившиеся в это время в Европе, под эгидой Католической церкви монашеские центры мхитаристов под руководством Мхитаром Себастаци, начали заново переписывать древнюю историю мира, фальсифицировать и создавать несуществующие древние рукописи. Заметим, что данная организация продолжает своё существование и в настоящее время, лишь перебазировалась с острова Сан-Ладзаро (Св. Лазаря), расположенного около Венеции в Вену. Основной целью мхитаристов было переписывание древних книг, создание для хаев армянской истории и многочисленные компиляции, фальсификации, а также использование цитат из трудов античных авторов, без указания первоисточника, чтобы они выглядели как древнеармянские труды. Деятельность мхитаристов, в основном, служила укреплению влияния Ватикана и европейских держав на Востоке [14]. Все это делалось с целью удревнить и возвеличить некоторые христианские общины и народы, в том числе хаев-армян, приписать им часть истории других народов и империй, чтобы затем использовать армянскую политическую карту против мусульманских тюркских империй Востока. Это время можно назвать перерождением хаев в армян. Однако акцентируем внимание на том, что армянами издревле называли представителей любого этноса: кипчаков, албанов, айсоров, курдов и всех тех, кто

придерживался армяно-григорианского вероисповедания. К тому же армянская церковь делилась на множество независимых патриархий на просторах Европы и Азии, которые объединяли различные народы и подчинялись империям, в которых располагались. Одним из народов исповедовавших григорианство был этнос, самоназвание которого хай, представляющий собой нынешних армянский народ.

С российской политикой XIX века на Кавказе и Малой Азии связано становление Эчмиадзинской армянской церкви и усиление её статуса. Прежде существовал Араратский (Эчмиадзинский) католикоссат, переселен-ный в XV веке тюркскими правителями империи Кара-Коюнлу из Киликии (Турция) на Южный Кавказ в местечко Учкилиса (нынешняя Армения). Однако с приходом в регион России в XIX веке, статус Араратского (Эчмиадзинского) католикоса был повышен до «католикоса всех армян», хотя до сих пор ряд армянских католикосов Ближнего Востока с этим не считается.

Как известно после оккупации в 1826-1828 гг. Иревана (Ревана), армянский католикос 10 февраля 1828 г. Россия и Каджарский Иран подписали Туркменчайский договор, в который была внесена статья XV «О переселении армян». Россия в этом процессе играла самую активную роль. В её политические интересы входило искусственное усиление Араратского католикоса с целью использования армянского фактора в Турции и Иране. Параллельно началось массовое переселение армян из Турции, Ирана и Ближнего Востока на Кавказ. Вот тогда в награду за верную службу, самодержавие позволило Эчмиадзинской церкви стать пастырем всех переселенных армян, а также прибрать к рукам храмы, рукописи и христианские народы (албан, удин и других) на Южном Кавказе. Была упразднена Албанская Автокефальная Церковь, ее храмы и паства в Карабахе, Зангезуре, Гяндже, Шеки, Шемахе и в других областях исторического Азербайджана. Все культурные, религиозные, ценностные памятники приведённых Азербайджанских городов, были переданы в руки Эчмиадзина. Об этом свидетельствуют многочисленные документы, указы и переписка из русских архивов. В результате Эчмиадзинская церковь арменизировала многочисленные албанские (арранские) храмы и народы, создав на этой базе миф о древнеармянском (хайском) наследии Кавказа. Следует учитывать, что все «древнеармянские» рукописи созданы на основе сфальсифицированных древнегреческих, древнеримских источников и карт. Придуманные в средние века европейскими монахами, путешественниками и писцами исторические факты, личности и события ныне выдаются за историческую правду. При этом в европейских и российских архивах и фондах нет практически ни одного оригинала древнеармянских рукописей. Почти все они являются поздними копиями якобы некогда существовавших рукописей, которые никто не видел. Многие известные учёные мира констатировали, что нынешнее армянское (хайское) население Южного Кавказа является пришлым, что они в течение многих веков по разным причинам кочевали с Балкан в Малую Азию, а оттуда на Кавказ и далее. Об этом в своих научных работах писали такие признанные армянисты как: Адлер Б.О, Адонц Н, Бунак В.В., Величко В.Л., Дьяконов И.М, Пиотровский Б.Б,, Пигулевская Н.В., Орбели И.А., А.Сен-Мартен, Бурнутян Дж., Суни Р.Г., Гарсоян Н.Г. и множество других. Во II-м томе книги Фуада Ахундова «Разрушители фальсификаций» приводятся цитаты и высказывания огромного количества европейских, российских и, что самое важное, армянских ученых о том, что нынешний армянский народ является переселенным на Кавказ. Согласно этим ученым, после массового переселения армян в регион Южного Кавказа, были арменизированы некоторые коренные христианские народы, их церкви, религиозные книги и культурное наследие. О массовом переселении армян и присвоении духовного наследия местных христианских народов свидетельствуют документы из Актов Кавказской Археографической Комиссии (АКАК), многочисленные военно-исторические, этнографические и научные журналы о Кавказе, печатавшиеся в Российской империи в XIX веке. Также большой пласт материалов об этом имеется в европейских источниках того периода. По свидетельству русского ученого Н. Шаврова, непосредственно принимавшего участие в мерах по колонизации Кавказа, к началу XX века, «из 1 млн. 300 тыс. душ проживающих в Закавказье армян более 1 млн. не принадлежит к числу коренных жителей края и поселены нами». При этом Шавров особо делает акцент на том, что: «Широко использовав лжесвидетельство, армяне из безземельных пришельцев захватили огромные пространства казенных земель» [48, с. 59-61]. Шавров также отмечал, что «оседлое же туземное население, принадлежащее к татарскому Адзербейджанскому племени, располагалось с давних времен вдоль берегов Куры и Аракса и около Талышинских гор» [45].

Общеизвестно, что до конца средневековья Восток был передовой частью мировой культуры и цивилизации, а уж затем эта пальма первенства перешла к Европе, которая получила свое образование и мировоззрение благодаря великим школам, знаниям и традициям Востока. В Европе выдвинули политизированную «алтайскую» идею прародины тюрок, получившую позже распространение и в российской исторической науке, с целью принизить историческую и цивилизационную роль тюркских народов в мировой культуре. Другой целью было вытеснить тюрок с наиболее важных геополитических регионов Евразии, поскольку XVIII-XIX вв. стали периодом ослабления тюркских мусульманских империй Востока и многочисленных кровопролитных войн, учиненных европейскими колонизаторами и Российской империей за геополитическое преобладание в стратегических регионах континента. Завоевывая земли тюркских империй в Малой, Передней Азии, Ближнем Востоке, на Кавказе, Центральной Азии и Дальнем Востоке, европейская и российская империя выдвинули новую идеологическую концепцию, согласно которой все

тюркские народы являются пришлыми кочевниками, варварами и врагами цивилизации. Это была своеобразная месть Европы и России за то, что многие века они входили в состав тюркских империй и были их данниками. Согласно историческим источникам, в 1829-1830 гг. на Кавказ иммигрировали 40 000 армян из Ирана и 90 000 армян из Турции и расселились в основном в Нахчыване, Карабахе и Иреване. В 1905-1907 гг. армяне, воспользовавшись революционными процессами в России и ослаблением контроля центра над регионами, осуществили массовые убийства и грабежи азербайджанцев в Баку, Зангезуре, Иреване, Нахчыване, Ордубаде, Эчмиедзине, Джаваншир и Казахстан. В 1905-1906 гг. армяне разрушили 200 сел в Гянджинской и Казахской губерниях и 75 сел в Шушинской, Джебраильской и Зангезурской губерниях. Последствия переселения армян, в частности, на Южный Кавказ оказались очень трагичными. Армяне с особой жестокостью выполняли задачи предателей, предписанные им армянскими и российскими лидерами. Турция и Азербайджан всегда были объектами армянских махинаций [1]. Однако сокрушительная победа Азербайджана во Второй Карабахской войне в 2020 г. поставила препон дальнейшему развитию армянской агрессии на Южном Кавказе.

Переселение армян в адыгские общества и их демография в общем составе.

Массовое переселение армян на Кавказ началось с Указа Петра I (октябрь 1724 г.), о разрешении армянам селиться на захваченных Россией территориях. По разумению русской власти Указ был продиктован стратегической необходимостью создания христианского форпоста против мусульман. (В.А. Шнилерьман). Пётр Великий решил заселить армянами захваченные территории (этот политический курс продолжался 100 лет).

Перемещенным лицам были предоставлены важные льготы: они были освобождены от налогов и пошлин сроком на шесть лет. Им были предоставлены льготы из контрибуции, полученной от Ирана. Переселение было начато после проведения определенных подготовительных мероприятий. После того, как Россия победила в войнах с Персией и Османами, а также после подписаний мирных соглашений, армянские переселения ещё более активизировались.

Во время Карабахского конфликта, в котором армяне исполняли роль опосредованного адепта, они начали переселяться из Армении на Северный Кавказ, включая Адыгейскую, Кабардино-Балкарскую и Карачаево-Чркесскую республики Российской Федерации. Там проживают 1,5 миллиона армян [11].

Сейчас распространяется вымысел о том, что армяне пришли на Северный Кавказ в I веке до нашей эры.

Не имея своего государства, вместо того чтобы создавать свою государственность, а не возлагать его функции на апостольскую церковь, которая играет в их судьбе губительную роль, они продолжают слагать мифы о своём древнем происхождении уже в регионе Северного Кавказа.

Армяне в Адыгее.

Адыги являются мусульманами-суннитами. Ислам оказывает большое влияние на традиции и быт народа. Не меньшее значение для адыгов имеет древний свод правил «Адыгэ хабзэ» − неписаные нормы поведения на все случаи жизни, как всего общества, так и для каждого человека [25].

Благодаря толерантности адыгов, их общество по этническому составу отличается разнообразием, в его составе около 28 этносов.

В 2021 г. по численности на первом месте находились русские, затем сами адыги. После них шли черкесы, лакцы и курды. Первую пятёрку замыкали армяне.

Адыги проживают в столице Майкоп и в 45 аулах.

Армяне проживают в Майкопе, в Майкопском районе, охватывающим хутора: Пролетарский, Цветочный, Северо-Восточные сады, Шаумян, посёлок Тульский и станицу Кужорская.

Майкоп армяне впервые появились во второй половине XIX века. Это были выходцы из Новой Нахичевани, Крыма и областей Западной Армении, а также амшенские армяне из окрестностей города Трабзон, Орду, Самсун (древнегреческий Амисос) на южном побережье Черного моря и армяне из Османской империи. В 1897 г. армянская община Майкопа была малочисленной: здесь жил 381 армянин (265 мужчин и 116 женщин), в 1902−344 (168 и 176), в 1908 г. − 540 (256 и 284), в 1915−762 (392 и 370), в 1916−639 (355 и 284).

Для наглядности представим демографию этнических армян в Адыгейской республике по годам:

в % к общей численности

Армяне	1959	1979	1989	2002	2010	2021
	1,06	1,57	2,42	3,41	3,54	2,98

Как показывает таблица, с 1959 по 2010 гг. в Адыгее наблюдался стабильный рост численности армян. В другой таблице по национальному составу в 2010 г. армяне находились на третьем месте, после русских и адыгов, соответственно: 96119−71,28 %; 24526−18,19%; 4085−3,03.

Если цифра охвата армян представляется не такой высокой, как у русских и адыгов, то при сравнении её с численностью черкесов, которые, по сути, являются теми же адыгами, можно удивиться: 1812−1,34%.

В таблице выделяется подъёмом численности 1989 г. – год активных агрессивных армянских действий против азербайджанского населения, а также спадом в 2021 г., после сокрушительного поражения армян во Второй Карабахской войне и в период пандемии Covid-19. Остаётся предположить, что если первоначально география Адыгеи представлялась привлекательной своим климатом и расположением Майкопа на реке Белой (приток Кубани), то впоследствии экономический кризис в Российской Федерации погасил армянский интерес.

Однако в Адыгейской республике активно функционирует армянская община. В 2020 г. представители регионального отделения «Союза армян России» выступили с заявлением по делу Гагика Царукяна−одного из самых богатых людей Армении.

Из заявления армян Адыгеи: «Армянская община Адыгеи, являясь неотъемлемой частью мирового армянства, глубоко обеспокоена ситуацией, складывающейся в последние дни на исторической родине − в Республике Армения вокруг партии «Процветающая Армения» и ее лидера Гагика Царукяна. Мы представляем, насколько взрывоопасными могут быть подобные действия для общественно-политической обстановки в стране, как негативно они отразятся на уровне демократических свобод в Республике Армения, а также эффективности армяно-российского сотрудничества. Необходимо скорейшим образом предотвратить возникновение нового политического кризиса, которым могут воспользоваться внешние силы для эскалации ситуации в регионе». Дело в том, что Гагик Царукян не только лидер партии «Процветающая Армения», но и субъект, судя по обвинению, погрязший в коррупции. Ему вменялись: подкуп избирателей, незаконное предпринимательство и организация мошеннической схемы передачи земли. По словам генерального прокурора Армении, Царукян организовал подкуп избирателей в преддверии парламентских выборов 2017 года, заплатив 170 млн драм (360000 долларов США) более 17000 избирателей в провинции Гегаркуник. Прокуратура также обвинила его в незаконной предпринимательской деятельности и незаконном обогащении на сумму 62 млн долларов США от своих казино, а также организации мошеннической схемы передачи земли, из-за которой бюджет страны лишился на 800000 долларов США.

Генпрокуратура Армении запросила и голосами парламентариев правящего блока «Мой шаг» добилась лишения депутатской неприкосновенности Царукяна. Но, сторонники Царукяна и армянская община Адыгеи обращались ко всем сторонам, вовлеченным в данный конфликт, с призывом проявлять «сдержанность и благоразумие и не допустить ситуацию эскалацию» в регионе [33].

В результате суд общей юрисдикции отказал в аресте Царукяна. Благодаря стараниям обвиняемого и его сподвижникам, дело было свёрнуто, поскольку лицо, давшее показания против Царукяна, отказалось от своих показаний. Здесь возникает непонимание, если армян так беспокоит обстановка в регионе, почему они постоянно возмущают регион и делают всё для того, чтобы внести в него нестабильность. Так, в настоящее время общественность Адыгеи возмущает очередной армянский беспредел. В интернет-сети появилось видео как армянский бандит забирает землю у крестьян. Этнический армянин Ароян Артур Владимирович, проживающий в Армении, закупил в Адыгее, всё что мог, включая правосудие для того, чтобы финансировать антироссийскую истерию. В Адыгее в 2006 г. простыми аграриями под руководством пенсионером Азамат Гаибовым была начата с нуля постройка крестьянского хозяйства для односельчан. На деньги пайщиков был создан солидный агрокомплекс: складские помещения, мастерская, животноводческая и птица фермы, общежитие, пруд с рыбой и т.д. Данное крестьянское хозяйство стало объектом иностранной экспансии и уже совсем скоро вместо гаражей и техники здесь могут вырасти коттеджи и десятки людей при этом останутся без работы, а руководству, видимо, за заслуги перед экономикой Республики уготован отдых в местах не столь отдалённых. Формально хозяйство уже отжали, а конкурсный управляющий уже начинает его эксплуатацию, чтобы поднимать экономику. Вот только не российскую, а экономику совсем других стран и как не удивительно помогают ему в этом не иностранные агенты, а свои - отечественные органы. Таким образом, 25-летний безработный армянин, создал в Адыгейском обществе острую социальную напряжённость. Хотя вначале никто и предположить не мог, что это рейдерский захват [8].

Армяне в Кабардино-Балкарии. Кабардино-Балкарская Республика (КБР) расположена в предгорьях и на северных склонах центральной части Большого Кавказа, северная часть Республики располагается на Кабардинской равнине. Граничит на севере со Ставропольским краем, на востоке и юго-востоке – с Республикой Северная Осетия-Алания, на юге - с Грузией, на западе – с Карачаево-Черкесской Республикой. Протяженность территории с севера на юг – 123 км, с запада на восток – 167 км. Общая площадь – 12,5 тыс. кв.км.

Климат в Кабардино-Балкарии - континентальный. Средняя температура января в равнинной части -4° С (в горах до -12°С), июля +23°С на равнине (в горах до +4°С). Осадков выпадает: на равнине - до 500 мм в год, в горах – до 1000 мм. Продолжительность вегетационного периода на равнине – 190 дней. Рельеф на севере – равнинный, в остальной части - горный. На территории Республики расположена высочайшая гора Кавказа и высочайшая точка России – Эльбрус (5642 м.). Наиболее крупные реки – Терек, Малка, Баксан, Чегем, Нальчик, Черек, Урух. Площадь, занятая лесом, составляет 185 тыс. га.

По данным Управления Федеральной службы государственной статистики по Северо-Кавказскому федеральному округу, численность постоянного населения КБР на 1 января 2022 г. составила 870,48 тыс. человек. В Республике проживают представители более 100 национальностей. Основное население – кабардинцы, составляющие, по данным всероссийской переписи населения 2010 года, 57%. Вторыми по численности являются русские – 22,6%, на третьем месте балкарцы – 12,7%. Представители других национальностей (турки, осетины, армяне, украинцы, корейцы) – 7,7%. Язык кабардинцев относится к адыго-абхазской группе языков, балкарцев – к тюркской группе. Верующие кабардинцы и балкарцы – мусульмане-сунниты.

Кабардино-Балкарская Республика состоит из 10 административно-территориальных районов и 3 городских округов: Нальчика, Прохладного и Баксана. Столица Кабардино-Балкарии – город Нальчик (число жителей на 1 января 2022 года – 239,03 тыс. человек). Другие города: Прохладный, Баксан, Терек, Тырныауз, Чегем, Нарткала, Майский. Столицей Кабардино-Балкарской республики является город-курорт Нальчик, наиболее предпочитаемый армянами.

По численности самая большая армянская диаспора среди рассматриваемых нами республик, находится в Кабардино-Балкарии. Часть армянской диаспоры КБР проживает в Нальчике, её представители также живут в Прохладном, Майском и Нарткале. Градация общей численности населения за 2010 г. по этническому признаку представлена в нижеследующей таблице.

Численность населения республики по данным Росстата составляет 860 709 чел. (2015). Плотность населения — 69,02 чел./км² (2015). Городское население — 52,25 % (2015). [51]

Народ	**Численность в 2010 году, человек**	**Численность в 2002 году, человек**	**Численность в 1989 году, человек**
Кабардинцы (черкесы)	↘490 453 (57,2 %)	498 702 (55,3 %)	363 494 (48,2 %)
Русские	↘193 155 (22,5 %)	226 620 (25,1 %)	240 750 (31,9 %)
Балкарцы	↗108 577 (12,7 %)	104 951 (11,6 %)	70 793 (9,4 %)
Турки	↗13 965 (1,6 %)	8 770 (1 %)	4 162
Осетины	↘9 129 (1,1 %)	9 845 (1,1 %)	9 996 (1,3 %)
Армяне	↘5 002	5 342	3 512
Украинцы	↘4 800	7 592	12 826 (1,7 %)
Корейцы	↘4 034	4 722	4 983
Цыгане	↗2 874	2 357	2 442
Черкесы	↗2 475	725	614
Татары	↘2 375	2 851	3 005
Азербайджанцы	↘2 063	2 281	2 024
Чеченцы	↘1 965	4 241	736
Грузины	↘1 545	1 731	2 090
Лакцы	↘1 462	1 800	1 587
Немцы	↘1 462	2 525	8 569 (1,1 %)
Ингуши	↗1 271	1 236	664
Карачаевцы	↘1 028	1 273	1 202
Лица, не назвавшие национальность	↗2 269	15	0

Представленные в таблице армяне находятся на шестом месте по своей численности в Кабардино-Балкарии. К сожалению, проследить динамику их присутствия в данной республике не представляется возможной за неимением данных, что не является удивительным. Ибо этнические армяне занимают в Кабардино-Балкарии ответственные должности, многие из них являются депутатами парламента, сотрудниками правоохранительных органов, предпринимателями, многие заняты в информационном поле: на телевидении, в журналистике, в издательстве. Армянские кураторы, руководители и операторы российских СМИ формируют общественное мнение России, манипулируют фактами и осуществляют подмену понятий в интересах армянства, но в ущерб государственным интересам России.

Армяне способствуют дезориентации и деградации огромной российской аудитории. Они и их сатиллиты захватили российский эфир. Симоньян, Кеосаян, Бабаян, Багдасаров, Шахназаров, Соловьёв, Сатановский, Шейнин, Кургинян... список насчитывает десятки фамилий тех, кто дергает за информационные ниточки и тотально врет россиянам. Армянские агенты управляют российскими СМИ и пытаются забросить в информационное пространство РФ фальшивки. Спрашивается: почему интересами России в кино и на телевидении жонглируют Шахназаров и Кеосаян? Почему Соловьев и другие ведущие влиятельных Российские СМИ унижены до уровня обслуги армянского лобби РФ.

Тотальную арменизацию российских СМИ скрыть невозможно, россияне уже давно недовольны тем, что в их стране хозяйничают наглые, зарвавшиеся армяне. Как стало известно, представители многочисленных народностей России готовят свое обращение к руководству страны, чтобы была дана оценка деятельности и изучены кадры, работающие в российских СМИ, на предмет соответствия их работы интересам РФ [52].

Первым председателем общины армян КБР является Эдуард Восканян. Со слов руководителя армянского центра Артура Погосяна диаспора в Кабардино-Балкарии насчитывает около двенадцати

тысяч человек, из них в Нальчике проживают четыре с половиной тысячи. Союз армян России имеет свою символику: в центре витиеватой орнаментальной вязи голубая незабудка как символ выдуманного геноцида армянского народа на территории Турции. У диаспоры есть воскресная школа, где армянские дети продолжают изучать фальсифицированную историю [6].

Армяне в Карачаево-Черкесии. Карачаево-Черкесия была образована как автономная область 12 января 1922 г., в 1992 г. она получила статус республик [10], [44]. Её расположение – западная часть Предкавказья и северного макросклона Большого Кавказа. На западе она граничит с Краснодарским краем, на севере со Ставропольским краем, на востоке - Кабардино-Балкарской Республикой (высшая точка России), на юге, вдоль Главного Кавказского хребта −с Грузией (на части её международно признанных территорий − с частично признанной Республикой Абхазия).

На территории Карачаево-Черкесии проживают представители более 80 национальностей. Государственными языками являются: абазинский, карачаевский, ногайский, русский и черкесский. Русский язык, в соответствии с Конституцией республики, является языком межнационального общения и официального делопроизводства [24].

Численность населения республики в 2023 г. по данным Росстата составляла 468 444 чел. [35]. Среди них в 2010 г. армяне по численности находились на 7 месте – 2737 чел. (0,6 %). Для сравнения: в 2002 г. их численность составляла 3197 чел. Уменьшение численности армян объясняется общим миграционным оттоком (54 на 10 тыс. жителей, 2015), главным образом, в Ставропольский и Краснодарский края.

Период пребывания армян в Карачаево-Черкесию соотносится с концом XIX – начала XX вв. [23]. Они селились компактными группами, в основном, в столице – древнем городе Черкесске, являющимся ведущим промышленным центром. Население города имеет тенденцию численного роста, что свидетельствует об экономическом развитии. В 2010 г. численность населения Черкесска составляла 116, 5 тыс. человек, а в 2013 – 154 тыс. человек, в их числе, более трёх тысяч армян.

Для удобства прихожан Армянской Апостольской церкви, в центре Черкесска в 2005 году была построена часовня Сурб Геворг [12]. Лидеры армянской общины старательно работают над повышением национального самосознания местных армян. В Черкесской школе №2 был создан целевой сектор с изучением армянской истории и литературы [9] по учебникам мхитаристов. В соответствии с их писанием, армяне, не имеющие ничего общего с черкесами, оказались с ними (через черкесохаев) в одной этнической группе. Самоназвание черкесохаев - «ермелы», или «эрмелы», происходит от крымско-татарского термина «армянин». Согласно истории, проживая вместе с адыгами, ермелы перенимали у них язык, нравы, обычаи, особенности быта и весь уклад жизни, но, при этом продолжали сохранять свою монофизитскую армяно-григорианскую церковь (не признаваемую в православии). Идентифицируя себя с черкесами, с которыми у них нет ничего общего, хаи образовали своеобразный этнос черкесохаев [22].

Однако когда адыги начали принимать Ислам в мюридистской форме и искать союза с Османской империей, армяне обратились к начальнику Кубанской линии генерал−майору барону Г.Ф. фон Зассу с просьбой принять их под покровительство России и выделить им средства для поселения вблизи русских. Получив разрешение, они основались в Закубанской равнине, в Майкопе, Екатеринодаре, Армавире. Последний из аула превратился в город, который армяне теперь считают исконно своим.

Перцепция армян с титульным народом в республиках Адыгеи, Кабардино-Балкарии и Карачаево-Черкессии складывалась по разному, но, как показывает опыт, по единому сценарию: вначале они интегрируются в общество, приобщаются к местной культуре, а затем переходят к экспансии территории и культуры титульного народа.

До второй Карабахской войны 2020 г. Россия на всех уровнях проводила армянскую популяризацию, способствовала развитию конфликтных отношений среди народов Кавказа. Таким образом, через максиму «Разделяй и властвуй», она контролировала Кавказский регион. Центральное телевидение, интернет-сайты и «сарафанное» радио России развивали мифы об армянском геноциде. Западное армянское лобби подстрекает своих соплеменников на реваншизм, не принимая во внимание потери военнослужащих.

Резюме:

Полученный армянами трагический опыт с притязанием на Азербайджанские земли, не является точкой в идее создания «Великой Армении». Апостольская церковь, выполняющая функции государства, на генетическом уровне манипулирует сознанием армянского общества. Подстрекаемые своей Церковью и внешними заинтересованными силами, они продолжают разрушительные действия. В соответствии с этим, наше резюме следующее: во-первых, всемирная история не должна находиться на службе интересов сильных стран - Запада, США, Ватикана или России, во-вторых, каждое государство должно уважать территориальную целостность, историю и культуру других стран мира.

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PENTABASIS AND AGE-RELATED PENTAPSYCHOLOGY

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Abstract

The application of the structural-functional approach to the study of the human psyche is explored. To analyze personality, a five-component approach (pentapsychology) is used, and to analyze the human psyche as a whole, an eight-component approach (octanalysis) is used. The properties of five components (instances) of personality are analyzed: three instances of consciousness and two instances of the unconscious. The question of the personality instances hierarchy is considered. It is shown that human behavior and the effectiveness of his activities largely depend on the instances hierarchy of his personality chosen by a person. The application of the five-component approach to describe the psychological properties of both the personality and to describe the psychological properties of any association of the personalities (family, society, state, country, civilization) is analyzed. The Pentabasis is considered - a five-level worldview model proposed by the administration of the President of Russia as a value ideology of Russian society. Age-related pentapsychology, a section of pentapsychology, explains the essence of Pentabasis and offers a practice-tested methodology for selecting personnel to increase the effectiveness of large-scale application of Pentabasis in the life of the country.

Keywords: five-component theory of personality, octanalysis, personality psychology, Pentabasis, age-related pentapsychology

Introduction

In the field of science, structural-functional analysis is often used to obtain reliable knowledge.

Although the human psyche is invisible, such an analysis is quite applicable for studying the human psyche and studying the properties of his personality.

To describe the properties of the human psyche, the Austrian psychologist, psychoanalyst, psychiatrist and neurologist Sigmund Freud (1856-1939) was the first to use structural-functional analysis. He proposed a three-component structural model of the psyche. Of course, the three-component approach is not sufficient to describe the psyche.

The author's detailed study of personality traits shows that to obtain reliable knowledge about personality traits, it is necessary to use a five-component approach (pentapsychology), and to describe the human psyche as a whole, an eight-component approach (octanalysis) [1-23]. Pentapsychology and octanalysis were created on the basis of the article by Yatsenko V.I. "Five-component theory of personality" [1], registered by the Russian Society of Authors.

Pentapsychology notes that the five-component approach is applicable to describe the psychological properties of both an individual person and to describe the psychological properties of any association of individuals (family, society, state, country, civilization).

Currently, government structures in some countries set as their goal the use of a five-component approach of psychology to solve the problem of "Development and Improvement" in the following areas: personality, family, society, state, country, civilization.

For example, since 2022, Pentabasis [24] has been known - a five-level worldview model proposed by the administration of the President of Russia as a value ideology of Russian society.

A comparison of Pentabasis and pentapsychology shows that when developing Pentabasis, a five-component approach to personality analysis and a hierarchy of personality instances were used, which are considered in age-related pentapsychology, a section of pentapsychology.

Let's consider the possibilities of using age-related pentapsychology to explain the essence of Pentabasis and the effective use of Pentabasis in the life of the country.

Description of Pentabasis

The Pentabasis methodological model consists of five blocks: person, family, society, state, country. They are described in detail in the scientific article "Perception of basic values, factors and structures socio-historical development of Russia" (Journal of Political Research, Vol. 6 No. 3, 2022). Its authors include the head of the department for ensuring the activities of the State Council Alexander Dmitrievich Kharichev, the ideologist of the "DNA of Russia" Andrei Vladimirovich Polossin, the dean of the Faculty of Political Science of Moscow State University Andrei Yurievich Shutov and the head of the department of strategic research and forecasting of the Expert Institute of Social Research (EISR) Ekaterina Nikitichna Sokolova.

Pentabasis is a set of key value principles, including basic attitudes, norms and ideals that determine the behavior and interaction of members of society. These principles form the basis of the sociocultural system and determine its structure.

A system of five components, each of which has its own value dominant:

Person - Creation

Family - Traditions
Society - Consent
State – Trust in institutions
Country - Patriotism.

The Pentabasis components may differ and have variations depending on the specific time, historical and cultural context, but they are universal and human universal, as they reflect the basic needs and aspirations of society. [24].

Description of age-related pentapsychology

Pentapsychology studies the properties of five components (instances) of personality, which, when performing their functions, dominate the personality in turn. And here the question arises about the supported hierarchy of personality instances.

A person has freedom of choice and can establish in his personality any hierarchy of personality instances. A person's behavior and the effectiveness of his activities largely depend on the supported hierarchy of personality instances.

In pentapsychology, five instances of personality are designated: three instances of consciousness 5-Soul, 4-Heart, 1-Mind and two instances of the unconscious 3-Irratio, 2-Ratio. In this designation, the numbers 5, 4, 3, 2, 1 show the place of personality instance in natural, harmonious hierarchy of personality instances, from top to bottom, 54321-hierarchy.

Pentapsychology discovered a fundamental property of personality: a harmonious hierarchy of instances of individual consciousness - 541-hierarchy: 5-Soul - in first place, 4-Heart - in second, 1-Mind - in third place.

In 2010, using pentapsychology methods, the effect of innate dominance of personality instances was discovered [4].

Depending on the date of birth of a person, the five instances of his personality differ significantly from each other in the degree of innate dominance. The octanalytic personality formula and the octanalytic personality code show the degree of innate dominance of each of five personality instances.

The innate dominance of personality instances significantly influences a person's behavior and the effectiveness of his activities. The degree of innate dominance of personality instance persists throughout a person's life and makes it possible to predict the characteristics of a person's behavior in various life situations [13-18].

Age-related pentapsychology notes that five personality instances begin to show age-related activity at different periods of a person's life in the sequence: 3-Irratio, 2-Ratio, 1-Mind, 4-Heart, 5-Soul.

In the prenatal period, from conception to the birth of a child, only one instance of the unconscious 3-Irratio shows age-related activity in the child's personality.

During the period of innocent childhood, from birth to 1.5 – 2 years, two instances of the unconscious, 3-Irratio and 2-Ratio, show age-related activity in the baby's personality.

In the preschool period, from 1.5 – 2 years to 6 years, three instances of Stephen Karpman's dramatic triangle show age-related activity in the child's personality: two instances of the unconscious 3-Irratio (role Victim), 2-Ratio (role Rescuer) and one instance of consciousness 1-Mind (role Pursuer).

During the school period, from 6 years to 18 years, in personality of a child or teenager, already four instances show age-related activity: two instances of the unconscious 3-Irratio, 2-Ratio and two instances of consciousness 4-Heart, 1-Mind. During this period, a crisis of adolescence may manifest itself: the dual power of the instances of consciousness 4-Heart (friendliness) and 1-Mind (selfishness). As soon as the choice of consciousness instances hierarchy is made (41-hierarchy or 14-hierarchy), the crisis ends.

During the period of adult life, from the age of 18, all five personality instances show age-related activity in personality of an adult: two instances of the unconscious 3-Irratio, 2-Ratio and three instances of consciousness 5-Soul, 4-Heart, 1-Mind. During this period, a midlife crisis may manifest itself: the dual power of consciousness instances 4-Heart (friendliness) and 5-Soul (altruism). As soon as the choice of consciousness instances hierarchy is made (45-hierarchy or 54-hierarchy), the crisis ends.

Properties of emotionally unstable instances of the unconscious:

– instance-extrovert 3-Irratio – creativity, irrationality, spontaneity of actions, in Eric Berne's transactional analysis the state Child, according to Stephen Karpman the role of Victim, the temperament type choleric;

– instance-introvert 2-Ratio – rational, logical actions, following traditions, laws, agreements, practicality of actions, in Eric Berne's transactional analysis the state Parent, according to Stephen Karpman the role Rescuer, the temperament type melancholic.

Properties of emotionally stable instances of consciousness:

– instance-extrovert 1-Mind – intellectual abilities, building relationships according to the scheme "I am higher, you are lower", egoism, a sense of superiority, unprincipledness, deceit, aggressiveness, betrayal, according to Stephen Karpman the role Persecutor, the desire for entertainment, getting personal pleasure, enjoyment, conspicuous consumption, the tendency to give preference to short-term happiness over long-term satisfaction and personal growth, the temperament type sanguine, the implementation of independent conscious intellectual choice;

– instance-introvert 4-Heart – managerial abilities, building relationships according to the scheme "I and you are on the same level", friendliness, equality, brotherhood, heartfelt relationships, in Eric Berne's transactional analysis the state Adult, the temperament type phlegmatic, the implementation of independent conscious management choice;

– instance-extrovert 5-Soul – building relationships according to the scheme "You are higher, I am lower", altruism, submission, service, devotion, sacrifice, the temperament type sanguine, the implementation of independent conscious emotional choice.

Age-related pentapsychology notes that three instances of consciousness (5-Soul, 4-Heart, 1-Mind) begin to show age-related activity in the sequence: 1-Mind (from 1.5 - 2 years of age), 4-Heart (from 6 years

of age), 5-Soul (from 18 years of age). Such a sequence is directly opposite to the irreproachable 541-hierarchy of consciousness instances and is the reason for the emergence in a person of a false idea of reality.

In the absence of purposeful, systematic formation of the personality of a child or teenager, he may have the erroneous idea that the 145-hierarchy is a natural hierarchy of consciousness instances and this hierarchy must be observed.

Depending on the innate dominant properties of the individual, living conditions and upbringing, a teenager can be formed a 14-hierarchy or 41-hierarchy of consciousness instances, and an adult can be formed a 145-, 154-, 415-, 451-, 514- or 541-hierarchy of consciousness instances.

When forming a harmoniously developed personality in a child, teenager, or adult, the task of pedagogy is, first of all, the formation in their consciousness of a harmonious 541-hierarchy of instances.

Five value dominants of Pentabasis and five instances of personality

Let's compare the five value dominants of Pentabasis and the five instances of personality in pentapsychology:

– "PERSON (creation)" – instance 3-Irratio, creativity, irrational actions;

- "FAMILY (traditions)" – instance 2-Ratio, rational actions;

- "SOCIETY (consent)" – instance 1-Mind, analytical abilities, use of mind to achieve agreement;

- "STATE (trust in institutions)" – instance 4-Heart, managerial abilities, managerial actions based on friendliness, counteraction to the "fifth column";

- "COUNTRY (patriotism)" – instance 5-Soul, service, devotion, sacrifice, altruism for the sake of preserving the sovereignty of the country.

Selection of personnel for the use of Pentabasis

The comparison of Pentabasis and pentapsychology shows which instance of personality, when selecting personnel, should show innate dominance in order to increase the effectiveness of the implementation of the value dominants of Pentabasis:

– instance 5-Soul – "COUNTRY (patriotism)";

– instance 4-Heart – "STATE (trust in institutions)";

– instance 3-Irratio – "PERSON (creation)";

– instance 2-Ratio – "FAMILY (traditions)";

– instance 1-Mind – "SOCIETY (consent)".

Based on the octanalytic personality code, it is possible to select a candidate whose necessary instance of personality shows a high degree of innate dominance.

For example, to implement the value dominant of Pentabasis "COUNTRY (patriotism)", first of all, people with the innate dominance of the instance 5-Soul are needed. Pentapsychology notes that people born in a year ending in digit 2 or digit 3, for example, 201**2**, 201**3**, 202**2**, 202**3**, have such innate dominant personality traits.

Conclusions and offers

Age-related pentapsychology clearly explains the essence of Pentabasis. Pentapsychology also offers a practice-tested recruitment methodology to increase the effectiveness of the large-scale application of Pentabasis in the life of the country.

Compiling an octanalytic personality formula

Compiling an octanalytic personality formula makes it possible to reveal the congenital dominance of the personality instances. In the state of personality instance dominance, in the psyche, the properties of this personality instance are manifested first of all. The professional choice of a person, his behavior, character traits to a large extent depend on such a congenital tendency of personality instances to dominate.

Octanalysis studies the five instances of personality 5-Soul, 4-Heart, 3-Irratio, 2-Ratio, 1-Mind. Before the name of an instance, its serial number in the natural hierarchy of instances is indicated, from top to bottom: 5, 4, 3, 2, 1.

The study of personality with the help of octanalysis shows that in each person, depending on the date of birth, from two to five instances of personality have a congenital inclination to dominance.

In octanalysis, a method has been developed for compiling an octanalytic personality formula, which reveals the "First Dominant" and "Second Dominant" - congenitally dominant instances of personality associated with the date of birth of a person. The dominance of first dominant is more pronounced than the dominance of second dominant.

This congenital dominance of the personality instance manifests itself to the same extent throughout a person's life, regardless of the conditions of his life.

The term "octanalytic personality formula" used in octanalysis is substantiated by numerous tests in practice of the characteristics of such a formula when describing the properties of the psyche of specific people.

Dear reader! Below is a table with which you can independently create an octanalytic personality formula for any person by the date of his birth.

To describe the properties of the human psyche on the basis of the octanalytic personality formula, it is necessary to use not only the Table, but also to know in detail the properties of personality instances 5-Soul, 4-Heart, 3-Irratio, 2-Ratio, 1-Mind. Numerous properties of these instances are described in articles on octanalysis on the website "Eight instances of the psyche" www.8-in.com.

Key properties of five instances of personality:

• instance of consciousness 5-Soul - service, sacrifice, altruism;

• instance of consciousness 4-Heart - managerial abilities;

• instance of the unconscious 3-Irratio - creative abilities;

• instance of the unconscious 2-Ratio - rational abilities;

• instance of consciousness 1-Mind - analytical abilities, selfishness.

Table.

Compiling an octanalytic personality formula by date of birth

43-Ox	32-Tiger	23-Rabbit	13-Dragon	42-Snake	31-Horse
19.02.1901	08.02.1902	29.01.1903	16.02.1904	04.02.1905	25.01.1906
06.02.1913	26.01.1914	14.02.1915	03.02.1916	23.01.1917	11.02.1918
24.01.1925	13.02.1926	02.02.1927	23.01.1928	10.02.1929	30.01.1930
11.02.1937	31.01.1938	19.02.1939	08.02.1940	27.01.1941	15.02.1942
29.01.1949	17.02.1950	06.02.1951	27.01.1952	14.02.1953	03.02.1954
15.02.1961	05.02.1962	25.01.1963	13.02.1964	02.02.1965	21.01.1966
03.02.1973	23.01.1974	11.02.1975	31.01.1976	18.02.1977	07.02.1978
20.02.1985	09.02.1986	29.01.1987	17.02.1988	06.02.1989	27.01.1990
07.02.1997	27.01.1998	16.02.1999	05.02.2000	24.01.2001	12.02.2002
26.01.2009	10.02.2010	03.02.2011	23.01.2012	10.02.2013	31.01.2014
12.02.2021	01.02.2022	22.01.2023	10.02.2024	29.01.2025	17.02.2026
21-Goat	12-Monkey	41-Rooster	34-Dog	24-Pig	14-Rat
13.02.1907	02.02.1908	22.01.1909	10.02.1910	30.01.1911	18.02.1912
01.02.1919	20.02.1920	08.02.1921	28.01.1922	16.02.1923	05.02.1924
17.02.1931	06.02.1932	26.01.1933	14.02.1934	04.02.1935	24.01.1936
05.02.1943	25.01.1944	13.02.1945	02.02.1946	22.01.1947	10.02.1948
24.01.1955	12.02.1956	31.01.1957	18.02.1958	08.02.1959	28.01.1960
09.02.1967	30.01.1968	17.02.1969	06.02.1970	27.01.1971	15.02.1972
28.01.1979	16.02.1980	05.02.1981	25.01.1982	13.02.1983	02.02.1984
15.02.1991	04.02.1992	23.01.1993	10.02.1994	31.01.1995	19.02.1996
01.02.2003	22.01.2004	09.02.2005	29.01.2006	18.02.2007	07.02.2008
19.02.2015	09.02.2016	28.01.2017	16.02.2018	05.02.2019	25.01.2020
06.02.2027	26.01.2028	13.02.2029	03.02.2030	23.01.2031	11.02.2032

Numbers of the dominants - zodiac sign	Period of zodiac sign
43-Pisces	February 19 - March 20
32-Aries	March 21 - April 19
23-Taurus	April 20 - May 20
13-Gemini	May 21 - June 21
42-Cancer	June 22 - July 22
31-Leo	July 23 - August 22
21- Virgo	August 23 - September 22
12- Libra	September 23 - October 23
41- Scorpio	October 24 - November 22
34- Sagittarius	November 23 - December 21
24- Capricorn	December 22 - January 20
14- Aquarius	January 21 - February 18

In the Table, for each year of birth, the New Year is indicated according to the Eastern calendar. It falls on the second new moon after the winter solstice (after December 21st). In the Gregorian calendar, this usually corresponds to one of the days between January 20 and February 20.

The boundaries of the periods of zodiac signs indicated in the Table are not clearly established and depend on the year of birth. For example, in leap years the boundary shifts slightly. On the boundaries of the periods of zodiac signs, the dates are indicated, transitional from one zodiac sign to another zodiac sign.

The first dominant in the zodiac sign is highlighted in bold. It shows that when the zodiac signs change, the first dominant changes according to the 43214-cycle.

Now let's move on to compiling an octanalytic personality formula.

For example, we need to compile the octanalytic personality formula for the person born on July 2, 1954.

The table shows the start date of 1954 according to the Eastern calendar 02/03/1954. This means that, with a date of birth between 02/03/1954 and 01/23/1955, the entry "31-Horse" should be used. And with a date of birth from January 01 to February 02, 1954, you must use the entry "42-Snake".

The beginning of the year according to the Eastern calendar falls on the second new moon after the winter solstice and therefore moves between January 20 and February 20.

According to the Table, we find the combination: the zodiac sign of the western calendar 42-Cancer and the sign of the Animal, eastern calendar, 31-Horse. Here "42" means that the First congenital dominant is the instance 4-Heart, and the Second congenital dominant is the instance 2-Ratio. The designation "31" shows that the First Dominant is the instance 3-Irratio, the Second Dominant is the instance 1-Mind.

The designation 42-Cancer shows that with short-term planning of actions for a period of one month or less (short term), the properties of instances 4-Heart (First dominant) and 2-Ratio (Second dominant) are manifested in human behavior, first of all.

The designation 31-Horse shows that with long-term planning of actions for a period of one year or more (long-term perspective), the properties of instances 3-Irratio (First dominant) and 1-Mind (Second

dominant) are manifested in human behavior, first of all.

To describe the state of the psyche "42-Cancer" it is necessary to know in detail the properties of the personality instances 4-Heart and 2-Ratio. And to describe the state of the psyche "31-Horse" it is necessary to thoroughly study the properties of the personality instances 3-Irratio and 1-Mind.

In the given example of compiling an octanalytic personality formula, four instances of personality 4-Heart, 3-Irratio, 2-Ratio and 1-Mind show congenital dominance. But very often there are cases, according to the law of probability of uniform birth of people during the year, when only three or even two instances of personality show congenital dominance, for example, the combination: octanalytic personality formula 34-Sagittarius / 34-Dog, for people born in the period from November 23 to December 21 in 1934, 1946, 1958, 1970, 1982, 1994, 2006. In such cases, a person needs special pedagogical and psychological support during childhood.

The absence of congenital dominance of the personality instance can be partially compensated by the purposeful formation of the acquired dominance of the personality instance through education and training. Such a preventive measure is of great benefit to a person in the implementation of his social and personal adaptation in society. The octanalytic patronage service systematically carries out such preventive measures, and a person's life becomes more comfortable and happy. To register a person with an octanalytic patronage service, it is necessary to diagnose the congenital dominants of his personality. An octanalytic personality formula can be drawn up five minutes after the birth of a child, and this octanalytic formula of a person's personality will be valid throughout his life.

It should be noted that the acquired dominance of the personality instance always manifests itself much weaker than congenital dominance. When performing any work, a person with acquired dominance of personality instance cannot successfully compete with a person who has a congenital dominance of this personality instance.

For example, with the combination 34-Sagittarius / 34-Dog, a person does not have a congenital need for the dominance of instances 1-Mind and 2-Ratio. Such a person does not have a congenital tendency to constantly and deeply analyze the situation and formulate conclusions (properties of consciousness instance 1-Mind). In addition, a person does not have an inclination to constantly comply with any laws, agreements, rules, there is no inclination to perform rational actions, consistent, systematic learning (instance properties of the unconscious 2-Ratio). For such a person, the need for analysis of the situation and rational behavior must be formed through his upbringing and training. And for this, you first need to find out if a person has such a problem. For this purpose, you need to compile an octanalytic personality formula.

Extended octanalytic personality formula

The extended octanalytic personality formula is more accurate. When compiling it, it is necessary to take into account the properties of the so-called background dominant - one of the five instances of personality. The background dominant is determined by the year of a person's birth and manifests itself in a person's behavior as a congenital dominant. Personality instances (5-Soul, 4-Heart, 3-Irratio, 2-Ratio, 1-Mind), as background congenital dominants, uniquely correspond to the elements of "U-sin" (Water, Wood / Air, Fire, Earth, Metal) of Eastern philosophy and the elements (Ether, Water, Fire, Earth, Air) of ancient Greek philosophy.

Based on the data on the properties of elements "U-sin" of Eastern philosophy, every ten years all five instances of personality (5-Soul, 4-Heart, 3-Irratio, 2-Ratio, 1-Mind) dominate as a background dominant, in turn two years in a row.

Instance 1-Mind dominates as background dominant in years ending in 0 and 1. Instance 5-Soul dominates in years ending in 2 and 3. Instance 4-Heart dominates in years ending in 4 and 5. Instance 3-Irratio dominates in years ending in 6 and 7. Instance 2-Ratio dominates in years ending in 8 and 9.

For example, the instance 5-Soul dominates, as a background dominant, in the psyche of people who were born in 2022 and 2023, the instance 4-Heart - for those born in 2024 and 2025, etc. The sequence of changes in years of background dominance of personality instances corresponds to 543215-cycle "Way of the Heart".

The instance of personality, which dominates in the year of birth of a person as a background dominant, is an important congenital factor of the psyche, which it is advisable to take into account when compiling the octanalytic personality formula. In this case, the personality formula will have a different form.

For example, for a date of birth 07/2/1954, the usual personality formula is 42-Cancer / 31-Horse. The last digit of 1954 shows that for this year the background dominant is the personality instance 4-Heart. With this in mind, we write the extended personality formula as follows: 42-Cancer / 4-31-Horse. The entry "4-31-Horse" shows that instance 4-Heart is the congenital background dominant "4" for people born in 1954-1955, and in the combination of dominants "31" the instance 3-Irratio is the first dominant, and the instance 1-Mind is the second dominant. Thus, an additional entry in the personality formula shows that in connection with the background dominance of the instance 4-Heart, his congenital managerial abilities are more clearly manifested.

Refined octanalytic personality formula

The extended octanalytic personality formula discussed above changes in a 60-year cycle, which creates convenience in compiling the formula for people who lived several centuries ago.

In this formula, we took into account the influence of the congenital dominants of the solar zodiac sign, which shows the impact on the human psyche of the state of the Sun against the background of the constel-

lations on the day of his birth. This formula can be refined, taking into account also the influence of innate personality dominants, depending on the lunar zodiac sign, which shows the influence on the human psyche of the state of the Moon against the background of the constellations on the day of his birth.

The lunar zodiac sign has a 19-year cycle of signs (with an accuracy of + 2 hours 5 minutes). The phases of the moon go a day ahead relative to the calculated ones for 219 years.

Let us introduce the notation:

(0%) – the percentage of illumination of the moon in the new moon phase is 0%;

(28% +) – the percentage of illumination of the moon in the waxing moon phase is 28%;

(50% +) – the percentage of illumination of the moon in the "First Quarter" phase is 50%;

(100%) – the percentage of illumination of the moon in the "full moon" phase is 100%;

(50% -) – the percentage of illumination of the moon in the "Third Quarter" phase is 50%;

(23% -) – the percentage of illumination of the moon in the "waning moon" phase is 23%.

For the date of birth 07/2/1954 in the Internet search engine, for the query "moon phase July 2, 1954" we get:

"The current moon phase for July 2nd, 1954 is the Waxing Crescent phase. On this day, the moon is 2.06 days old and 4.59% illuminated with a tilt of -137.099°. The approximate distance from Earth to the moon is 380,083.28 km and the moon sign is Leo".

Then the refined octanalytic personality formula for the date of birth on July 2, 1954 will look like:

3 lunar day / 31-Leo / 4% + // 42-Cancer / 4-31-Horse.

In this formula, the data obtained from the lunar calendar,

"3 lunar day / 31-Leo / 4% +"

provide additional information about the congenital properties of the human psyche.

Octanalytic personality code

Based on the data of the octanalytic personality formula (Formula 1), we compile an octanalytic personality code (Formula 2), which shows the total degree of innate dominance of each of five instances of personality 5-Soul, 4-Heart, 3-Irratio, 2-Ratio, 1-Mind.

Let us assume that the degree of dominance of the First dominant is two points, that of the Second dominant is one point, and that of the background dominant is one point. Then in the octanalytic personality code (Formula 2) the total points is ten.

Octanalytic personality code (Formula 2) has the form

5-Soul/0 points – 4-Heart/3 points – 3-Irratio/4 points – 2-Ratio/1 point – 1-Mind/2 points

or, in shortened form, 5/0 – 4/3 – 3/4 – 2/1 – 1/2,

in a more abbreviated form, 034-12.

In the octananalytic personality code (Formula 2), the designation “4-1” shows the total degree of innate dominance for instances of the unconscious: 3-Irratio – 4 points, 2-Ratio – 1 point.

Other digits of the octanalytic personality code show the total degree of innate dominance for the consciousness instances: 5-Soul - 0 points, 4-Heart - 3 points, 1-Mind - 2 points.

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SOCIAL SCIENCES

THE ROLE OF ECOTOURISM IN GREEN TRANSFORMATION

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Abstract

The processes of globalization and the sharpening of competition taking place in the world at the moment make it necessary to adopt the principles of sustainable development aimed at the future and to apply more progressive economic management models. A creative approach to the issues of green transformation is interesting from the point of view of solving the crisis faced by the society in order to ensure sustainable economic development in a time when resources are depleted and environmental problems are becoming more acute. This article discusses the importance of implementing the concept of sustainable tourism in solving green transformation issues.

Keywords: sustainable tourism; green transformation; environmental education; consumer culture

In the modern world, the level of development of the green economy is one of the factors that determine the competitiveness of the national economy. In this sense, the attention paid to the ecological situation and consumer culture (3) is one of the most urgent issues in the activities of individuals and communities. But unfortunately, when the issues of creating a global coalition with a specific goal for the green future of the planet are on the agenda, international cooperation and, or healthy competition for the sake of building a low-carbon, resource-efficient and socially inclusive economy, instead of being solved and reduced day by day, on the contrary, it becomes more acute. Especially in developed countries, in a time when people waste many times more material goods than the consumption norm, CO_2 emissions released into the atmosphere by weapons used during senseless global and regional conflicts are not taken into serious account at this time, various interpretations are being given to the concept of "green economy". For the green transformation, it is relevant to give priority to alternatives in energy consumption from traditional ones, to create smart residential areas, and to apply machines and equipment based on modern technology in household and production.

A number of researchers point out in their approach that the "green economy" improves people's well-being and ensures social justice. In other words, it is the fairest decision here that those who create more carbon dioxide (CO_2) by achieving a "green economy" and thereby gain more material benefits, have the same rights as others who have not done so, but who suffer from waste like everyone else (6). In another approach, while studying the green economy within the framework of principles, goals and activities, special attention is paid to the following features:

- ensuring sustainable development and stimulating economic growth;
- promotion of green business and green technologies;
- transformation of natural resources into real resources for socio-economic development;
- increasing the role of green infrastructure.

It should be noted that it is useful to add conditions such as consumer culture and the responsibility of individuals and economic subjects for the transition to green transformation. During the implementation of the green transformation for the development of the green economy, the types of activities that change people's consumption habits and inculcate a more "green behavior" model in the society by covering areas such as alternative energy, ecologically clean transport and waste management gain relevance at this time. In this sense, it is also possible to recognize the green economy as an economy that provides a higher quality of life using green technologies within the ecological limits of the planet.

Based on all this, the green transformation:

• the unreality of the infinite expansion of the economic sphere in a limited living space;

• it can be noted that it is due to the fact that it is unrealistic to meet the ever-increasing needs in the conditions of limited resources.

The green economy, in general, the "green society" in which the green transformation is supposed to be applied, is a high-knowledge, high-tech sector (7). In this sense, the application of green technologies in society brings to the fore the formation and development of the tourism industry oriented to nature conservation. Thus, ecotourism and other types of "green tourism' allow people to be involved in tourism activities as friends of nature, and to educate everyone as a lifestyle element. From this point of view, it is possible to consider ecotourism not only as a special type of

tourism, but also as an organizational form of "green tourism industry".

For the sustainable development of tourism, it should first be aimed at satisfying human needs and ensuring a healthy life (1). Thus, modern industrial production with waste requires high physical and mental endurance of people against the physical and psychological stress caused by the increase in labor intensity in various fields. Only healthy and rested people can cope with these requirements. For this purpose, active rest and free time organized in the recreation complex should be considered as a demand of all sections of the population, the difference in the level of per capita income, population mobility, the values or consumption habits preferred by different demographic groups should be considered.

The development of sustainable tourism is clearly visible in its integration with the ecological situation and the general economy. These three areas always complement each other, it is impossible to imagine them separately from each other. Even the weakening of one of these areas affects the condition of the other area as well. Thus, when natural tourism resources are used in a rational way, there is not only a threat of disruption of the ecosystem here, on the contrary, the tourism income obtained by their involvement in the economic cycle creates favorable opportunities for the protection of not only the ecological situation here, but also the natural, historical and cultural tourism resources (10).

The ecological importance of sustainable tourism activity is directly related to the active use of the environment and tourism resources. The development of sustainable tourism and the protection of natural resources are directly related to the management of human consumption. Therefore, it is necessary to evaluate the impact of tourism on the ecological situation in both negative and positive directions. With the development of tourism in the area, the people of the region more accurately assess the value of their resources and understand the need to protect them. That is why the resources that were not used until the arrival of tourists to the area and were destroyed spontaneously gained a new value with the development of tourism and are protected.

Another important function of ecotourism in the green transformation, in particular, is the formation of consumer culture in relation to nature, leading to rational behavior towards limited natural resources. This is directly explained by the essence of ecotourism. Recreation and restoration of human resources in the natural environment allows to connect it with tourism types such as recreation-health, ecological, cultural-educational, scientific expedition, education, sports, adventure, village, agriculture (9). The essence of the matter here is the comparison of the pleasure a person gets from being in contact with nature and the pleasure he gets from getting to know its charm, and the use of natural resources for other purposes. In other words, if a person has the habits of acquiring more than he needs in his consumption actions for the sake of paying for material well-being, he is face to face with nature and enjoys its beauties during active tourism trips (for example, hiking in the mountains, spending the night in a camp, fishing, mushroom picking). , collecting herbs, spending the night in a village house with minimal facilities, etc.), he learns that he can earn recreation by being satisfied with the minimum he needs. Therefore, at a time when the importance of green transformation is increasing, one can think about how relevant such trips are for those who have not been on active recreational ecotourism trips at least once in their life. It is precisely in this that the role of ecotourism can be seen in eliminating the difference in consumer culture between the representatives of the middle and young generation, who approach the nature of environmental problems on the planet in different ways, and are not ambivalent about global climate change and environmental disasters.

Findings

Green transformation comes from the need for global protection of the resources of our planet in the era of modern economic and cultural development. Living better with less damage to nature, transitioning to more green energy causing less carbon emissions and being more careful with our daily consumption, in this regard, has become a demand that manifests itself in the concept of sustainable tourism. In this sense, the role of tourism, which has mass influence in terms of understanding the nature of green transformation, its application in social groups, age groups and government management structures, is important in this sense.

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WHY THE LAW AGAINST FOOD WASTE IS A MAJOR INNOVATION TO TACKLE CLIMATE CHANGE

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Abstract

Based on FAO data, it is estimated that approximately 30% of global annual food production is wasted. This alarming statistic highlights the significant scale of food insecurity and the detrimental effects of food waste. Arash Derambarsh demonstrates that these losses are a result of various factors, including inefficiencies in the supply chain and consumption practices. Despite the ongoing calls for increased food production to meet the ever-growing demand, the wastage of food resources is impeding progress towards the FAO's ambitious target of a 70% increase by 2050. There have been notable initiatives, such as those implemented in Courbevoie City (France), that serve as effective solutions by establishing a legal framework requiring supermarkets to redistribute unsold food to charitable organizations. However, there are still several challenges that need to be addressed in order to significantly reduce food waste and ensure sustainable access to food for all. From the commitment of individual citizens to the mobilization of the international community, it is imperative to establish a globally coordinated approach. The Food and Agriculture Organization of the United Nations (FAO) has reported that approximately 30% of the world's food is wasted annually, equating to the loss of one in three food supplies worldwide. However, despite these significant levels of waste, it is disheartening to note that 783 million people suffered from hunger in 2022, and 3.1 billion people lacked access to nutritious food in 2021, as reported by the same UN institution. In light of these statistics, it is evident that urgent action is required to address the issue of food waste and ensure equitable and sustainable access to food for all individuals across the globe.

Keywords: Food waste, food insecurity, food production, 2050 target, sustainable access to food, food loss, FAO, sustainable development, food chain, agri-food system.

Overview:

According to the organization's statistics, globally, « 13% of food is lost in the distribution chain, from post-harvest to pre-retail and that an additional 17% of food is wasted at the household, food service and retail levels » [6]

In recent years, the demand for food products has grown steadily, due to demographic trends and changing eating habits. The restrictions that agriculture faces—such as yield limits, technological integration, natural disasters, climate change, urbanization-related loss of agricultural lands, and scarcity of water resources—are placing growing pressure on agricultural productivity. To fulfill the food supply, reducing losses and waste might be a key lever in addition to raising agricultural productivity. It is impossible to distinguish clearly between the two concepts of « losses » and « waste » due to the wide variety of circumstances under which they arise across nations.

According to FAO sources, 30% of the world's is wasted[7]. Not only does it represent a significant loss of food resources, this staggering quantity is also at the root of many other problems, such as environmental degradation, food insecurity and real economic difficulties. Addressing food waste is therefore a necessary and essential part of promoting sustainability, reducing hunger and building more resilient and efficient food systems.

Every year, from the farmer to the final consumer, 1.3 billion tons of food are lost or wasted. The high proportion of food loss and waste is more than worrying. Every year, an estimated 1.3 billion tons of food - equivalent to almost half the world's grain supply - are unfortunately wasted or lost, from agricultural production to the final consumer. To alleviate this problem, concerted efforts are needed from everyone along the food supply chain.

The phenomenon of food waste affects developing and developed countries alike. A major problem, 630 million and 670 million tons of agricultural food respectively are lost throughout the production chain, right up to the final consumer[8].

By 2050, the current world population will have increased by 2.3 billion, according to FAO estimates.

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[5] « Nobel Prize for sustainable development : lawyer Arash Derambarsh rewarded » : https://clever-energies.com/en/nobel-prize-for-sustainable-development-lawyer-arash-derambarsh-rewarded/

[6] United Nations. (s. d.). Food Loss and Waste Reduction | United Nations. https://www.un.org/en/observances/end-food-waste-day#:~:text=Did%20you%20know%3F%201%20Globally%2C%20around%2013%20percent,total%20energy%20usage%20in%20the%20global%20food%20system.

[7] Seeking end to loss and waste of food along production chain. (s. d.). Food And Agriculture Organization Of The United Nations. https://www.fao.org/in-action/seeking-end-to-loss-and-waste-of-food-along-production-chain/en/

[8] Robinson, D. (2024, 4 mars). 25 Shocking Facts about food waste. Earth.Org. https://earth.org/facts-about-food-waste/

According to the same UN statistics, the world's population will reach 11 billion by 2100, and 9 billion by 2050[9]. To meet current food needs, food production will have to increase considerably. It will therefore be essential to increase, if not intensify, food production in order to meet all the food needs of this population.

It is for this reason that the FAO envisages a 70% increase in current production to meet the population's food needs by 2050[10].

However, with so much food being wasted every year, it won't be enough to simply increase production. By keeping a close eye on consumer habits and demands, we'll need to implement bold strategies at every link in the food system. The chances of successful corrective action are possible at these levels. It is more than obvious that to both "feed more" and "feed better", a synergy of actions between the various stakeholders is more than essential[11]. Food waste and food insecurity are intrinsically linked and interdependent. With both environmental and social consequences, food waste is a major issue facing the world's population. It results in the loss of precious resources, and has a negative impact on people with intermediate resources, who can find themselves in a situation of food insecurity.

This is the fundamental reason why the concept of food insecurity is most often reduced to the question of accessibility to food, not only in sufficient quantity but also in quality. However, to take into account the socio-cultural and political aspects associated with food, a broader approach is required. Taken through the prism of social and political issues, food insecurity must lead us to re-examine the legal questions that arise from it, as the history of the right to food testifies.

As highlighted by Nicolas Bricas, Damien Conaré and Marie Walser[12], the political and relational dimension of food transcends many domains and exerts a profound influence on the world. Instead of considering it as an isolated domain, an ecological approach to food proposes using it as a lever to rethink our society in crisis. That said, the consumer-citizen, as a specific player, must be convinced of the importance of combating food waste and take ownership of this approach, hence the importance of lifelong education, training and communication. From this perspective, the causes of food insecurity are multiple and complex. They may be linked to economic, social, political or individual factors.

In other words, food insecurity stems from various causes, including food waste, illustrated by the fact that 30% of foodproducts sold in supermarkets are thrown away, hence the emergence of « waste-eaters », a phenomenon that is gaining momentum, by ideology for some (fights against the consumer society), by necessity for the majority.[13] Similarly, an irresponsible diet, characterized by excessive meat consumption, has harmful consequences for health and the environment. That being said, according to a survey conducted by the Brussels Observatory of Sustainable Consumption, in 2001 « food waste amounted to 7.6% by weight of household waste, of which 3.1% of expired products and 4.5% of opened products ».

The 2004 campaigns show a decrease in weight of the fraction « freshly wasted » (from 30.4 kg per household per year to 23.1 kg per household per year) and an increase in percentage by weight of the fraction of opened products (from 4.5% to 5.6%) in household waste[14]. The opened products are mainly (more than 80% of the flow) : cooked dishes (33%), bread (28%), fruits and vegetables (22%).

The main expired foods are fresh fruits and vegetables (more than 60% on average).

Also, some 265 million tons of meat are produced annually for only 0.1% of privileged eaters who consume annually the trifle of 100 kg of meat per person. And if such consumption is well beyond what our body requires and even proves to

be harmful to health, it also comeswith other deleterious effects.

Because this livestock consumes 60% of the world's cereal production, or the trifle of 670 million tons, which thereforeescape human consumption, occupies 78% of the world's agricultural land, or so many hectares that cannot therefore be devoted to the production of foodstuffs[15].

And what about when we learn that it takes 25,000 liters of water to produce 100 g of beef, while many populations do not have drinking water, which is essential for their survival? Or even that it takes 17 cal of vegetable food to produce 1 cal of beef?

Then, food waste and food insecurity are two phenomena thatmust be fought in a concerted manner. In fact, food waste, with its multiple ramifications, generates deleterious impacts on the environment, the economy and society, while posing an ethical challenge in the face of the persistence of hunger in the world. Simply put, food waste also has an impact in the long term.

This compromises food security and climate stability on the planet. Indeed, food waste accounts for 8% of global greenhouse gas emissions, more than the emissions of civil aviation[16]. It also contributes to soil

[9] United Nations. (s. d.-c). World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100 | United Nations. https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100

[10] World Food and Agriculture – Statistical Yearbook 2022. (2022). Dans FAO eBooks. https://doi.org/10.4060/cc2211en

[11] Farming leaders give insights into scaling up sustainable agriculture. (2024, 16 janvier). World Economic Forum. https://www.weforum.org/agenda/2024/01/farming-leaders-scale-up-adoption-sustainable-agriculture/

[12] "An ecology of Food" - Quæ Editions - 2021 (Vauban university library) : https://bibliotheque.univ-catholille.fr/Default/doc/SYRACUSE/442130/une-ecologie-de-l-alimentation-sous-la-direction-de-nicolas-bricas-damien-conare-marie-walser?_lg=fr-FR

[13] V. ROCHER C., The dumpster divers hunt waste by recovering what is consumable, Midi Libre, 6th April 2009

[14] The fight against food waste is a solution to the fight against. (s. d.). Resource.co. https://resource.co/article/fight-against-food-waste-solution-fight-against-global-warming

[15] Crop, livestock and food. (s. d.). Food And Agriculture Organization Of The United Nations. https://www.fao.org/food-agriculture-statistics/statistical-domains/crop-livestock-and-food/en/

[16] Idem

degradation, overexploitation of water resources and loss of biodiversity.

It finally represents an enormous economic cost, estimated at 1,000 billion dollars per year. Therefore, the fight against food insecurity becomes a complex challenge that requires a global approach. It must involve all actors of society, from public authorities to charitable associations, through businesses and citizens. A rights-based approach will therefore be essential to fight against food insecurity. It will consist of recognizing the right of everyone to adequate and quality food.

This will ensure that people in food insecurity have access to the food they need.

In the face of food waste, forms of citizen organization have emerged to fight hunger, by recovering, redistributing or transforming food destined to be thrown away.

These initiatives have taken various forms, depending on the actors involved, the modalities of operation, the objectives pursued, and the beneficiaries targeted. For example, food banks, created in the 1960s in the United States, collect the surplus from producers, distributors and consumers, and distribute them to charitable associations.

Disco-soups, which appeared in the 2010s in Germany, organize festive events where participants cook and eattogether fruits and vegetables that are unsold or damaged. Finally, anti-waste applications, developed in the 2010s, connect merchants and consumers, to offer them products at a reduced price before their expiration date. This paper aims to bring a contribution to the the historical roots and legal debates surrounding food waste, from antiquity to the present day, highlighting the various citizen initiatives to counter this scourge.

Thus, in pharaonic Egypt, food was considered sacred and waste as a sin, according to the book « *Aux origines du gaspillage alimentaire* ». In ancient Rome, on the contrary, waste was a sign of wealth and power, and sumptuous banquets were frequent, as reported by the article « *Food waste : what consequences for the planet* ». In the Middle Ages, the Church condemned waste as a vice, and advocated charity towards the poor, according to the book « *History of food, from prehistory to the present day* ». In modern times, waste was denounced as a waste of resources, and laws were enacted to limit it, especially duringperiods of war or famine.

In contemporary times, waste was recognized as a major problem, and initiatives were taken to reduce it, both at the national and international level, as highlighted by the *2021 UNEP Report on the Food Waste Index*. This has led us to underline the need for an integrated and participatory approach involving the whole of society, from producers to consumers, through public authorities, businesses and associations. In addition, there is a need to broaden the concept of food insecurity by integrating social and political dimensions, thus revealing the legal issues in a new light.

In this respect, the importance of education from an early age is emphasized, as well as the involvement of the citizen-consumer in the fight against food waste. Thus, beyond the concrete efforts presented, it is important to call for a paradigm shift in the fight against food insecurity, recognizing the identity, social and cultural dimensions of this issue, and redefining the contours of adequate legal protection for all.

This leads to rethinking the food system as a whole, by promoting a more environmentally friendly production, a more equitable distribution and a more responsible consumption[17]. It is also essential to strengthen cooperation between the different actors, from the local to the global level, and to raise public awareness of the importance of reducing food waste.

Finally, it is possible to draw inspiration from existing good practices, which show that it is possible to valorize unsold or damaged food, by transforming it into useful products or energy. In the end, it is essential to distinguish between simplyguaranteeing access to food and guaranteeing dignified and sustainable access for all. Overall, this distinction reveals the complex issues related to the « gastronomy of hunger » and underlines the need for adequate legal protection to fight against inequalities and social exclusions around food.

Indeed, all the scientists, data and international reports confirm that there is a climate emergency to react and take concrete action for change. Reducing food waste is one of the three main solutions to combat global warming. We have a powerful lever to preserve Humanity. This was implemented in the City of Courbevoie (France).

So, Since 11th February 2016[18], the date of adoption of the law requiring supermarkets of more than 400m2 to donate their unsold consumables to charitable associations, its beneficial effects are undeniable.

This law quickly proved its beneficial effects : more than 10 million meals are distributed each year in France[19]. This represents a 22% increase in food donations for charities.[20]

If the law against food waste was seen as innovative and revolutionary, a French city like Courbevoie City served as a pioneer in its application.

The City of Courbevoie received agents from the Food and Agriculture Organization of the United Nations (FAO) on 2nd Friday February 2024[21]. They came from Rome to see for themselves the officialization of

[17] Byaruhanga, R., & Isgren, E. (2023). Rethinking the Alternatives : Food Sovereignty as a Prerequisite for Sustainable Food Security. Food Ethics, 8(2). https://doi.org/10.1007/s41055-023-00126-6

[18] Law No. 2016-138 of 11th February 2016 relating to the fight against food waste

[19] "In Courbevoie, the UN supports the recent law against food waste" (Le Figaro) : https://www.lefigaro.fr/actualite-france/2018/01/26/01016-20180126ARTFIG00177--courbevoie-l-onu-soutient-la-recente-loi-contre-le-gaspillage-alimentaire.php

[20] Food Bank : https://www.ba-81.org/actualites/blog-des-b%C3%A9n%C3%A9voles/323-la-france-pionni%C3%A8re-de-la-lutte-contre-le-gaspillage-alimentaire.html

[21] "How the city of Courbevoie became a world leader in the fight against food waste" : https://www.revuepolitique.fr/comment-la-ville-de-courbevoie-est-devenue-un-

a figure record : 400,000 meals were saved and redistributed for charitable associations so that the poor can eat their fill.[22]

Even in a city that appears to be a rich city, the poor has multiple faces : middle class, single mother or father raising their children, civil servant, retired, student or unemployed person. Poverty is increasing.

Thus, Secours Catholique estimates that nearly 10% of French people used food aid in 2020.[23] Indeed, « between 5 and 7 million people » used food aid in 2020 alerts Secours Catholique in its annual report on the state of poverty in France published Thursday, based on data from the General Directorate of Social Cohesion (DGCS).[24] The City of Courbevoie has shown to be inventive and resourceful in its efforts to combat food waste.[25]

Since 2020 and for six years, the city of Courbevoie has provided concrete responses to this economic crisis by extending the French law against food waste.[26]

Because in fact, since 11th February 2016, the rule prohibiting food waste has been limited to stores of more than 400 square meters. Since the law is responsible for the distribution of more than 10 million meals per year, its positive effects were immediately felt.

Widespread implementation of this legislation has resulted in tangible improvements in food accessibility, nutritional standards and social well-being. By ensuring efficient and equitable distribution of meals, particularly to vulnerable populations, the law quickly reduced hunger and food insecurity in communities across the country. Additionally, its proactive measures to reduce food waste and promote sustainable consumption practices have produced environmental benefits, further amplifying its positive effects.

Additionally, the law's emphasis on nutritional quality and value underscores its commitment to promoting public health and welfare, fostering a culture of healthier eating habits and better food choices. As a result, the transformative impact of this legislation has reverberated throughout society, creating ripple effects that extend beyond the simple provision of food to encompass broader societal benefits and positive outcomes.

A 22% increase in food donations intended for associations[27].

And everyone applauded this law. But at the local level, we had to go much further. In fact, two thirds of the thirty-one supermarkets located in Courbevoie are exempt from the legal obligation since their sales area is less than 400 m².

It was therefore decided that with the help of several start-ups and social and economic actors, a charter against food waste would be voted on each year in all spheres of activity in the city:

• 2020 with all supermarkets located in the city without zone delimitation

• 2021 with hospital catering

• 2022 with school catering

• 2023 with food businesses (restaurants, bakeries, markets)

• 2024 with retirement homes

These commitment charters, a first in France, have multiple objectives:

• Create synergies so that everyone can take part in this fight and adapt their practices

• Participate in raising awareness among the general public about the fight against food waste

• Contribute to reducing the economic impact of this waste

• Establish food donation partnerships in favor of associations in accordance with the law

• Promote partnerships with municipal associations

• Organize “anti-waste” promotions, particularly for products close to the DLC

• Offer wholesale or unit sales in order to adapt the quantities purchased, and reduce packaging

• Promote the development of fresh products, and develop awareness-raising marketing operations (for example: “Ugly Fruits and Vegetables” operation, etc.)

• Lead a discussion with suppliers in order to define a control strategy against food waste (product quality charters, etc.)

• Act to recover waste.

Furthermore, on 24th October 2022, the city of Courbevoie organized a working meeting at the National Assembly with the aim of proposing an amendment to French legislation against food waste. Deputies Karl Olive and Philippe Juvin were present at the meeting. [28]

The proposal was straightforward: amend the statute that was enacted on 3rd February 2016, and issued on 11th February 2016.[29] The city of Courbevoie specifically suggested the following fixes :

• Reduce the current 400m2 barrier for applying the legislation to food businesses to at least 100m2 to include over 5,000 additional outlets.

• Increase penalties for businesses that reject food from 10,000 euros to 20,000 euros, replacing the current 5th class fine of 10,000 euros.

leader-mondial-dans-la-lutte-contre-le-gaspillage-alimentaire/

[22] Courbevoie fights against food waste (BFM) : https://www.bfmtv.com/paris/replay-emissions/bonjour-paris/hauts-de-seine-courbevoie-lutte-contre-le-gaspillage-alimentaire_VN-202402050155.html

[23] Poverty in France : 10% of the population needed food aid in 2020 (Paris Saclay University) : http://www.ritm.universite-paris-saclay.fr/poverty-in-france-10-of-the-population-needed-food-aid-in-2020/

[25] City of Courbevoie (fight against food waste) : https://www.ville-courbevoie.fr/2195/lutte-contre-le-gaspillage-alimentaire.htm

[26] The law on Food Waste - From Courbevoie to Assembly : https://resource.co/article/law-food-waste-courbevoie-assembly-10198

[27] The State of Food Security and Nutrition in the World 2022. (2022). Dans FAO eBooks. https://doi.org/10.4060/cc0639en

[28] « Anti Food Waste : a proposed law to go further » (La Voix du Nord) : https://www.lavoixdunord.fr/1252076/article/2022-11-10/antigaspillage-alimentaire-une-proposition-de-loi-pour-aller-plus-loin

[29] Proposed law aimed at combating food waste in France (17th January 2023) https://acrobat.adobe.com/id/urn:aaid:sc:EU:727392be-c20e-4f68-b86d-dcc46fca7193

• If anyone believes that their unsold products are unfit for consumption, they will be fined twice as much.

The example of Courbevoie City is a response to the Draw Down project (2020) and IPCC (April 2022) reports which affirm that reducing food waste is one of the three main solutions to combat global warming.

Which proves that the vote on the law against food waste is a major innovation in the fight against global warming, as we will demonstrate.

INTRODUCTION

Food waste and food insecurity are two significant issues that affect the global food system. According to the Food and Agriculture Organization (FAO), approximately one-third of all food produced for human consumption is lost or wasted globally. This food waste not only represents a significant economic loss but also has severe environmental and social impacts. Among impacts we can underline the increased greenhouse gas emissions, water scarcity, and malnutrition. Meanwhile, food insecurity remains a pressing issue.

Millions of people worldwide lacking access to sufficient, safe, and nutritious food. Qu Dongyu, Director-General of Food and Agriculture Organization (FAO) claims : "*Food waste is a global issue that affects the environment, the economy, and food security. We need to take action to reduce food waste and promote sustainable food systems. By working together, we can create a more resilient and sustainable food system that provides sufficient, safe, and nutritious food for all.*"[30] Despite the efforts to increase food production, reducing food waste and ensuring sustainable access to food for all is crucial to achieving the FAO's 2050 target of a 70% increase in food production.

This paper aims to explore the factors contributing to food waste, highlight effective solutions, and propose a globally coordinated approach to tackle food waste and food insecurity. Food waste and food insecurity are two pressing issues that significantly impact the global food system. According to the Food and Agriculture Organization (FAO), approximately one-third of all food produced for human consumption is lost or wasted globally, amounting to about 1.3 billion tons per year (FAO, 2019). This food waste not only represents a significant economic loss but also has severe environmental and social impacts. For instance, food waste contributes to increased greenhouse gas emissions, water scarcity, and malnutrition, among other challenges (FAO, 2019). On the other hand, food insecurity remains a pressing issue. Millions of people worldwide lacking access to sufficient, safe, and nutritious food (FAO, 2021). According to the Director-General of the Food and Agriculture Organization (FAO), Qu Dongyu, food waste is a global issue that affects the environment, the economy, and food security. He argues that reducing food waste and promoting sustainable food systems is critical to achieving the FAO's 2050 target of a 70% increase in food production (FAO, 2021).

Ensuring sustainable access to food for all is crucial to achieving this target. Food waste occurs at various stages of the food supply chain. For instance, food waste can occur during harvesting, processing, transportation, and storage. As well as in retail and consumer settings (FAO, 2019). In developed countries, food waste is often due to consumer behavior, such as buying too much food, not using leftovers, and discarding food that is close to its expiration date (FAO, 2019). In contrast, in developing countries, food waste is more likely to occur due to inadequate infrastructure, such as inadequate storage facilities, poor transportation, and limited access to markets (FAO, 2019). The environmental impacts of food waste are significant. For instance, food waste contributes to increased greenhouse gas emissions, accounting for about 8% of global greenhouse gas emissions (FAO, 2019). Food waste also contributes to water scarcity, as it requires significant amounts of water to produce food that is ultimately wasted (FAO, 2019). In addition, food waste can have negative impacts on biodiversity, as it can lead to the overuse of land and other natural resources (FAO, 2019).

The social impacts of food waste are also significant. For instance, food waste can contribute to malnutrition, particularly in developing countries, where food waste can exacerbate existing food insecurity (FAO, 2019). In addition, food waste can have negative impacts on food systems, particularly in small-scale farming communities, where food waste can undermine the economic viability of food production (FAO, 2019).

To address food waste and food insecurity, there are several effective solutions that can be implemented. For instance, reducing food waste can be achieved through better inventory management, improving transportation and storage infrastructure, and promoting consumer education and awareness (FAO, 2019). Additionally, food waste can be reduced through the use of innovative technologies, such as precision agriculture, which can help to reduce food waste in the production process (FAO, 2019). To tackle food waste and food insecurity, a globally coordinated approach is necessary.

This can involve the implementation of policies and regulations that support sustainable food systems. It includes: food waste reduction targets, incentives for food waste reduction, and the promotion of sustainable agricultural practices (FAO, 2019). Additionally, international cooperation and coordination can help to promote knowledge sharing and best practices. As well as to support the development of sustainable food systems in developing countries (FAO, 2019). In fact, food waste and food insecurity are two pressing issues that significantly impact the global food system. By reducing food waste and promoting sustainable food systems, it is possible to achieve the FAO's 2050 target of a 70% increase in food production while also addressing environmental and social challenges. A globally coordinated approach is necessary to tackle food waste and food insecurity.

[30] Opening statement at the 41st Session of the Committee on World Food Security Food and Agriculture Organization of the United Nations, 2019.

This involves the implementation of policies and regulations that support sustainable food systems. As well as the promotion of knowledge sharing and best practices. By working together, we can create a more resilient and sustainable food system that provides sufficient, safe, and nutritious food for all.

MAIN PART

I- Factors contributing to food waste

Food waste is a complex issue with various contributing factors. These factors include: inefficiencies in the supply chain and consumption practices. According to the FAO, food loss and waste occur throughout the food supply chain, from production to consumption (FAO, 2019). The supply chain inefficiencies, such as poor storage, transportation, and infrastructure, are significant contributors to food waste (FAO, 2019). For instance, in developing countries, inadequate storage facilities and poor transportation infrastructure lead to significant food losses, while in developed countries, the wastage occurs at the retail and consumer levels (FAO, 2019).

Consumption practices also contribute to food waste. Overconsumption, food waste in households, and food expiration dates are significant factors. According to a study by the Natural Resources Defense Council (NRDC), American consumers waste approximately 40% of their food purchases (NRDC, 2012). Additionally, the COVID-19 pandemic has significantly impacted food supply chains, leading to increased food waste due to disruptions in the supply chain, such as labor shortages and reduced demand (FAO, 2020).

II- Effective solutions to reduce food waste

Various initiatives have been implemented to reduce food waste, such as the redistribution of unsold food from supermarkets to charitable organizations. According to a report by the Ellen MacArthur Foundation, redistributing surplus food can reduce food waste by 50% (Ellen MacArthur Foundation, 2019). Innovative technologies, such as food waste tracking apps, can also help reduce food waste by providing real-time information on food waste levels, enabling businesses to make informed decisions (O'Brien, 2019). Education and awareness campaigns can also promote sustainable consumption practices. According to a study by the World Resources Institute, educating consumers about food waste and its impacts can reduce food waste by 15% (WRI, 2019).

Smart refrigeration systems can also help reduce food waste by monitoring food freshness and alerting consumers when food is close to expiration (Liu, 2020).

III-The role of the international community in addressing food waste and food insecurity:

International organizations, such as the FAO and the United Nations, can provide leadership and coordination in addressing food waste and food insecurity. Governments can implement policies and regulations to reduce food waste and promote sustainable food systems. According to a report by the United Nations Environment Program (UNEP), governments can implement policies such as food waste reduction targets, food waste measurement and reporting, and food waste reduction education (UNEP, 2019). The private sector can also invest in sustainable food systems and support innovative solutions to reduce food waste. According to a report by the World Economic Forum, the private sector can invest in sustainable food systems by reducing food waste in their supply chains, investing in innovative technologies, and supporting sustainable agriculture practices (World Economic Forum, 2019) supply chains, investing in innovative technologies, and supporting sustainable agriculture practices (World Economic Forum, 2019).

Furthermore, international cooperation can help create a more sustainable food system by sharing best practices, research, and technology. For instance, the European Union's Farm to Fork strategy aims to reduce food waste by 50% by 2030, promote sustainable food production, and ensure access to healthy food for all (European Commission, 2021). Collaboration between countries and international organizations can help create a more resilient and sustainable food system.

IV- Why the French law against food waste is a major innovation in the fight against global warming

Despite all these initiatives and these citizen and political coalitions necessary to fight against waste, it is undeniable that the law against food waste is a major legislative innovation in the agri-food field.

The very first reason is that the food chain is in an unbalanced situation.

Thus, this chain brings together production, processing, distribution and consumption.

Since large-scale distribution is in a monopoly situation and therefore in a position of economic power vis-à-vis small producers and consumers, it never occurred to anyone to prohibit this powerful lobby from throwing consumable food in the trash.

It was the law of 3rd February 2016 that prohibited this. Better still, the law now imposes a fine of 10,000 euros on supermarkets for tampering with consumable food.

Supermarkets were therefore obliged to change their behavior.

On the other hand, France has been the most courageous country in this matter because no country in the European Union or even in the world has imposed such a coercive legislative system. The reasons are multiple, such as pressure from lobbies in certain States, the desire to form partnerships in others or even the disinterest of the State sometimes.

The French law against food waste is therefore a major innovation in the fight against global warming for several others reasons.

The French law against food waste represents a significant stride in environmental conservation and social responsibility. The law's innovative approach to reducing food waste aligns with global efforts to combat climate change, as the decomposition of wasted food in landfills contributes significantly to greenhouse gas emissions.

Several awareness-raising and lobbying campaigns have played a crucial role in bringing this issue to the fore. By advocating for supermarkets to donate

unsold food to charities, the initiator not only addressed the immediate problem of hunger but also promoted a circular economy where resources are used more efficiently and sustainably.

The law has had several positive outcomes :

- Reduction in Greenhouse Gases: By diverting food from landfills, the law helps to decrease methane emissions, a potent greenhouse gas.
- Resource Optimization: It encourages better inventory management among food retailers, leading to more efficient use of resources.
- Social Solidarity: The law fosters a sense of community as supermarkets partner with charities, benefiting those in need.
- Awareness and Education: It raises public awareness about the value of food and the importance of reducing waste, influencing consumer behavior.

The initiator's success illustrates the power of individual initiative to effectuate legislative change. And ultimately, the broader impact such changes can have on society and the environment. His efforts have inspired similar actions worldwide. Which is a matter of fact proving that a dedicated activism can lead to meaningful and lasting transformations.

The law, which came into force in 2016, has since inspired similar legislation in other countries, emphasizing the importance of responsible consumption and sustainable practices. Even if, as we explained above, no legislation has gone this far in coercion. which proves that France had the will to protect its unsold food, protect its producers and help the most deprived. The effects of the law have been beneficial like nowhere else.

Beyond the effectiveness of donating to charities, supermarkets, previously reluctant to this idea, have also understood that food donation procedures can be beneficial, by improving their image with the public and reducing the costs of elimination.

Finally, the global success of this law demonstrates the power of civic engagement and the impact that determined individuals can have on society. It serves as a reminder that change is possible when people come together for a common cause, and it sets a precedent for future initiatives aimed at creating a fairer and more sustainable world.

CONCLUSION

The French law against food waste of 3rd February 2016 is therefore a key to use to respond to certain concerns due to global warming.

Food waste and food insecurity are two significant challenges. These challenges require a globally coordinated approach. By addressing the factors contributing to food waste. By factors we mean inefficiencies in the supply chain and consumption practices. By doing so, we can reduce food waste. And promote sustainable food systems. According to the Food and Agriculture Organization (FAO), food waste in the supply chain can be reduced by implementing better storage and transportation infrastructure. In the meantime, reducing food waste in households can be achieved through education and awareness campaigns. Effective solutions, such as food waste tracking apps and redistribution of unsold food, can also help reduce food waste.

The World Resources Institute (WRI) reports that educating consumers about food waste and its impacts can reduce food waste by 15%. Smart refrigeration systems can also help reduce food waste. It enables monitoring food freshness. It's helping in m alerting consumers when food is close to expiration. International organizations, governments, and the private sector have a critical role in creating a more sustainable food system. By sharing best practices, research, and technology, we can create a more resilient and sustainable food system. In this situation can ensure to provide sufficient, safe, and nutritious food for all. For instance, the European Union's Farm to Fork strategy aims to reduce food waste by 50% by 2030. Their strategy aims is to promote sustainable food production. And ensure access to healthy food for all.

NGOs, such as the Natural Resources Defense Council (NRDC), also emphasize the importance of reducing food waste and promoting sustainable food systems. According to the NRDC, reducing food waste can help reduce greenhouse gas emissions, conserve natural resources, and alleviate food insecurity. By working together, we can create a more sustainable food system that benefits everyone.

In conclusion, reducing food waste and promoting sustainable food systems is crucial to achieving food security and creating a more resilient and sustainable food system. By addressing the factors contributing to food waste, implementing effective solutions, and promoting sustainable food systems, we can create a better future for all.

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MODIFICATION OF CONCRETE DESIGNED FOR STRENGTHENING UNDERGROUND STRUCTURES OF MINES

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Abstract
The conducted studies of the influence of the Sika Plast-520 hyperplasticizer and blast furnace slowly cooled slag on the speed of formation of the strength of fine-grained concrete based on slag Portland cement established the factors that affect the value of the compressive strength of this concrete. It is proven that they consist of the used amount of slowly cooled blast furnace slag and hyperplasticizer. Sika Plast-520.

Keywords: fine-grained concrete, Portland cement, hydration, concrete modifier, strength, surfactants

INTRODUCTION

Concrete is one of the most popular materials in the construction of houses, residential and non-residential structures. It has a sufficiently high strength, is easy to work with and has a relatively low cost. The disadvantage of all concrete mixtures based on Portland cement is the occurrence of shrinkage after pouring into the formwork, the risk of cracks and delamination. Thanks to concrete that has minimal shrinkage, or does not have it at all, it is possible to reduce the time of manufacturing building structures and reduce the probability of defects. Such concretes are used for road restoration, restoration of load-bearing surfaces, staircases and floors, sealing of joints between reinforced concrete structures.

Unlike traditional types of concrete, non-shrink concrete has a minimal risk of cracks and increased strength. This property is currently ensured by adding a large amount of superplasticizers to the composition of concrete. They increase the strength of cement during compression, demonstrate a quick reaction with water at the beginning of solidification.

Additives with pozzolanic properties show the ability to hydraulic hardening when mixed with lime, gypsum or cement. These additives include granulated blast furnace slag, fuel slag, natural pozzolans, glazes, low-calcium fly ash, etc..

It is believed that filler additives, in particular carbonates, also participate in the chemical processes that occur during the hydration and hardening of cements, but their interaction with cement hydration products occurs very slowly [1], so their influence on the properties of cements is limited [2]. Such additives include natural silicates of calcium and magnesium, as well as carbonates of calcium, magnesium and iron, chalk.

Of all types of cement, slag portland cement has the lowest consumption of natural materials with the lowest energy consumption, which contains up to 50% slag, is usually used under the same conditions as ordinary portland cement. Slag portland cements, containing the maximum amount (up to 80%) of slag, are low-temperature and are used in massive hydraulic structures, for the manufacture of structures exposed to the action of aggressive waters.

But in slag portland cement, the strength gain at the moment of the start of solidification of materials, this process is significantly slower than in portland cement. Slag portland cement acquires a strength close to that of cement after 6–12 months, depending on the temperature and humidity conditions of solidification. After some time, slag portland cement shows significantly greater strength than portland cement.

Taking into account the multifunctional effect of surface-active substances used in ultra-low concentrations [3], research aimed at further improvement and development of concrete technology based on slag portland cements [4], which contain carbonates, with a high operational resource, should be considered relevant, is a directed regulation of phase processes - and structuring of cement stone by using effective surface-active substances in extremely small doses.

ANALYSIS OF RECENT PUBLICATIONS ON THE ISSUE.

As is known, the amount of water added to cement during the preparation of concrete is much greater than that required for its chemical binding in products of hardening of the binder. Excess water evaporates, leaving pores, which increases the porosity of the cement stone and increases its permeability to aggressive environments, thus reducing stability and durability. Therefore, by increasing the density of cement stone, a method of reducing the amount of water that evaporates in cement stone and concrete can be recognized.

One of the ways to reduce the amount of water that evaporates from concrete is the use of so-called new generation concretes, in particular on binders of low

water consumption [5], or with the use of nano additives [6,7]. The indicated concretes have high strength at an early age, but the hydration of Portland cement does not occur to the full extent, which will obviously affect their durability.

It is obvious that the more water during cement hardening will be bound into stable, strong minerals, the less will be the shrinkage of the cement stone and the higher will be its density and, therefore, its strength. This is consistent with the conclusion made in [8] that it is better to use those binders for concrete whose hardening is accompanied by a strong stable binding of the maximum amount of water with moderate contraction and, therefore, a significant increase in the volume of solid of the phase formed in comparison with the volume of the initial solid phase. This position is confirmed by the data given in [9], that when aluminates are converted into more complex forms, for example, sulfoaluminates, a significant decrease in the concentration of defects in the structure of cement stone is observed due to the effect of microreinforcement of the structure of cement stone.

One of the most well-known minerals formed during the hardening of Portland cement compositions, which contain a significant amount of chemically bound water, are calcium hydrosulfoaluminates, of which two calcium hydrosulfoaluminates are best known [8]. Therefore, ensuring the presence of a significant amount of calcium hydrosulfoaluminate-type minerals in the hydration products of the dispersed system that hardens will ensure an increase in its density and, as a result, strength and corrosion resistance, as well as a decrease in its deformability. However, the amount of these minerals in known dispersion systems based on Portland cement is limited. In addition, the highly sulfated form of calcium hydrosulfoaluminate is thermodynamically unstable.

Under certain conditions (introduction of calcium carbonates or calcium chlorides into the hardening system of Portland cement compositions), in the process of hydration of calcium aluminates, according to [8], calcium carbo- and chloroaluminates such as calcium monocarboaluminates and calcium monochloroaluminates can occur. to be formed However, these minerals are not very stable and decompose at temperatures above 70°C. According to [8], calcium sulfate in monohydrosulfoaluminate can be replaced by metal silicates. These minerals gradually, in the process of hardening of the composition, turn into a high-silicate form.

The nature of the influence of the aggregate on the process of hydration and hardening of cement depends on its nature and mineralogical composition. A large number of studies are devoted to the effect of aggregates on the process of cement hydration and structuring of cement stone in concrete. Chemical interaction can take place between aggregate and binder in concrete compositions [9]. The authors [10] showed that the use of limestone aggregate significantly increases the degree of hydration of cement.

But not only aggregates consisting only of carbonates have an effect on the properties of concrete. Thus, the iron ore rocks of the Kryvyi Rih deposit contain iron carbonate, which leads to an increase in the strength of concrete when these rocks are used as a fine aggregate [8, 11-14].

Studies of the system "portland cement cement - mineral additive - water - surface-active substance" established [15] that the rate of formation of certain neoplasms is determined by the mineralogical composition of cement and additives, as well as the ratio of components in the system.

The availability of these studies makes it possible to adjust the content of the complex modifier "carbonate mineral additive - surface-active substance" of the system to ensure the physical and mechanical characteristics of concrete. Despite the practical significance of such results, the kinetic regularities of the processes of forming the strength of concrete with the simultaneous use of carbonate mineral admixture, fine aggregate and surface-active substance applied in ultrasmall doses have not been sufficiently considered.

The feasibility of using complex modifiers containing calcium and iron carbonates is confirmed by the improvement of the physical and mechanical properties of concrete and a significant increase in its mechanical strength [15-17]. According to the authors [15], this is due to the formation of a significant number of nanostructures during the hydration of Portland cements in concrete. However, no relevant physical and mechanical studies are given to confirm this hypothesis. Therefore, there are reasons to believe that the insufficient determination of the effect of complex carbonate modifiers "carbonate mineral additive - surface-active substance" on the speed of formation of the strength of fine-grained concrete formed with their participation during the hydration of portland cements determines the need to conduct research in this direction.

EXPERIMENTAL PART

The purpose of the conducted research was to determine the rate of formation of the strength of fine-grained concrete with an individual and complex modifier based on iron carbonates. To achieve the goal, the following tasks were solved:

– to determine the effect of superplasticizer and iron-based carbonate modifier on the change in the speed of formation of the strength of fine-grained concrete at different values of the water-cement ratio;

- to determine the effect of iron-based carbonate filler on the change in the speed of formation of the strength of fine-grained concrete.

Materials and research methods

The research was carried out using cement SEM II/B-S 400 PrJSC "Kryviy Rig Cement", which contains 75% blast furnace granulated slag, and modifiers - hyperplasticizer of organic origin Sika Plast-520 and iron ore beneficiation waste with a content of iron carbonates of 26-39%. Dnipro polyfraction river sand was used as fine aggregate.

The components of the concrete mixture were moistened to the humidity determined by the experiment plan and the mass was mixed for 4 min. Additives were introduced with an aqueous solution at the rate of Sika Plast-520 - per mass of cement. Experimental samples with side dimensions of 40x40x160 mm were made by the method of vibration molding, part of

which, after hardening in air for 3 days, continued to harden in air, and the other part - in water.

Determination of the effect of modifiers on the hardening of cement stone in the early stages was carried out on cement samples with W/C of 0.5, 0.55 and 0.60. The main indicators of the properties of concrete samples determined in the experiment were: compressive and bending strength limits. The determination of the specified indicators was carried out according to the methodology of the relevant State Standards of Ukraine. For simplification and clarity of processing results, strength indicators were converted into relative units (%).

The results of our own research and their discussion

The results of determining the mechanical strength of cement concrete samples in the early stages of hardening with W/C= 0.5-0.6 are presented in Fig. 1.

It should be noted that the carbonate modifier has different application efficiency depending on the water content (W/C) in the system. The greatest effectiveness of the carbonate modifier is manifested at average (relative to the experimental plan) values of water consumption.

According to the experimental data shown in fig. 2, the effectiveness of the carbonate modifier changes over time. It practically does not depend on the water content and is a 110-120% increase in the strength of concrete with a carbonate modifier content of 10-20% of the system mass.

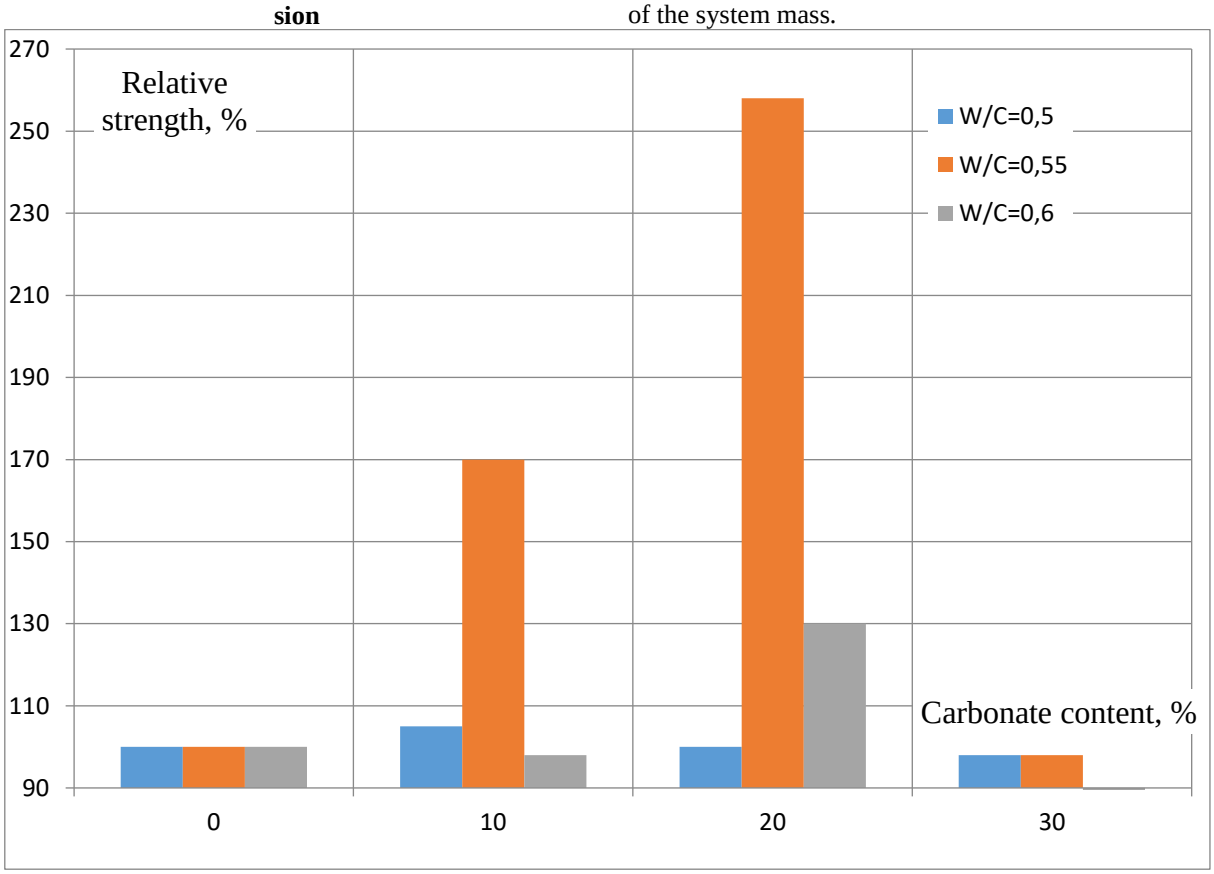

Figure 1. *The influence of carbonate cement on the relative strength of concrete at the age of 7 days*

At the same time, the simultaneous use of carbonate modifier and hyperplasticizer in extremely small doses leads to an increase in the effect of increasing the strength of concrete (Fig. 3).

In this case, the efficiency of using the complex "carbonate modifier - hyperplasticizer" provides an increase in the strength of concrete by at least 150% and reaches 400%.

As can be seen from fig. 4 and fig. 5, when using the "carbonate modifier - hyperplasticizer" complex, its effectiveness at the age of 28 days of concrete does not exceed ensuring an increase of concrete strength by more than 40%.

Thus, the optimal content of the complex "carbonate modifier - hyperplasticizer" in fine-grained concrete is:

Carbonate modifier based on iron - 20% of the mass of the mixture of carbonate modifier and Portland cement;

Hyperplasticizer - 0.0002...0.0004% of the mass of the mixture of carbonate modifier and slag Portland cement.

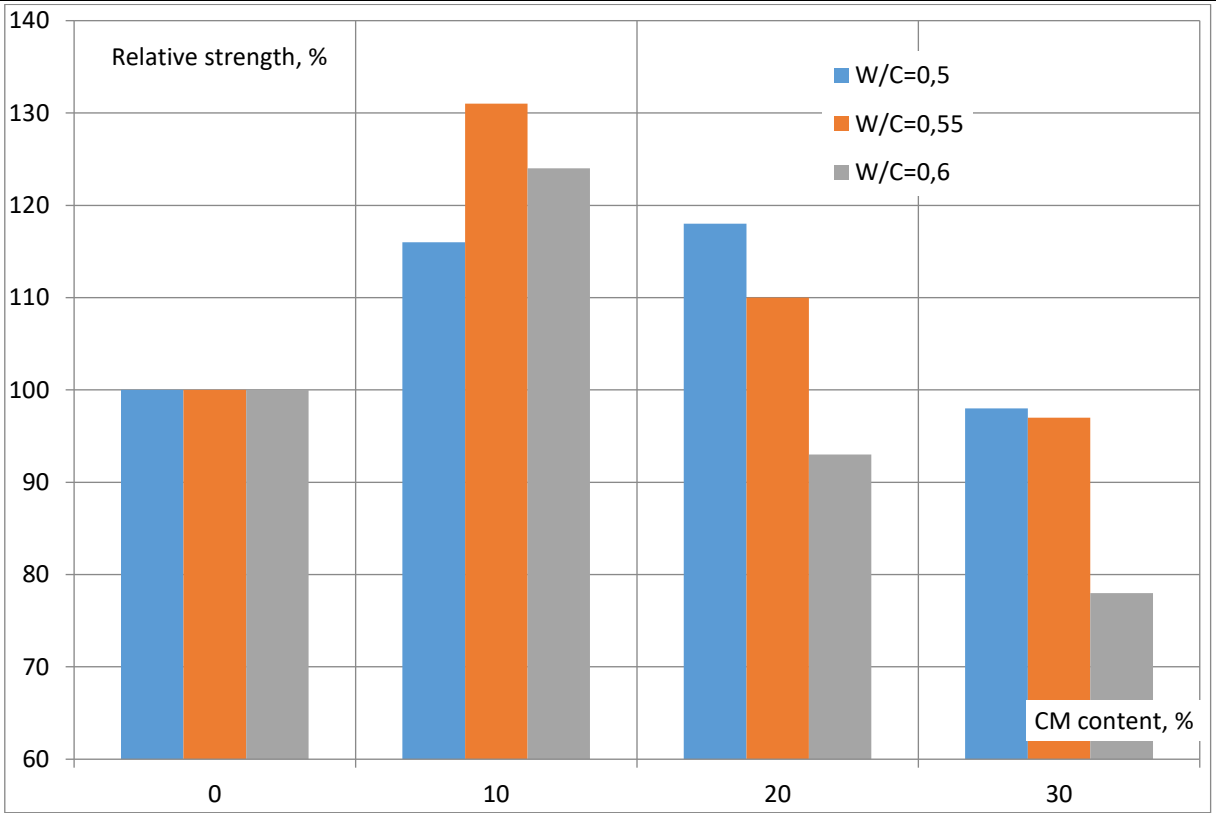

***Figure** 2.*
The influence of the carbonate modifier (CM) of cement on the relative strength of concrete at the age of 28 days

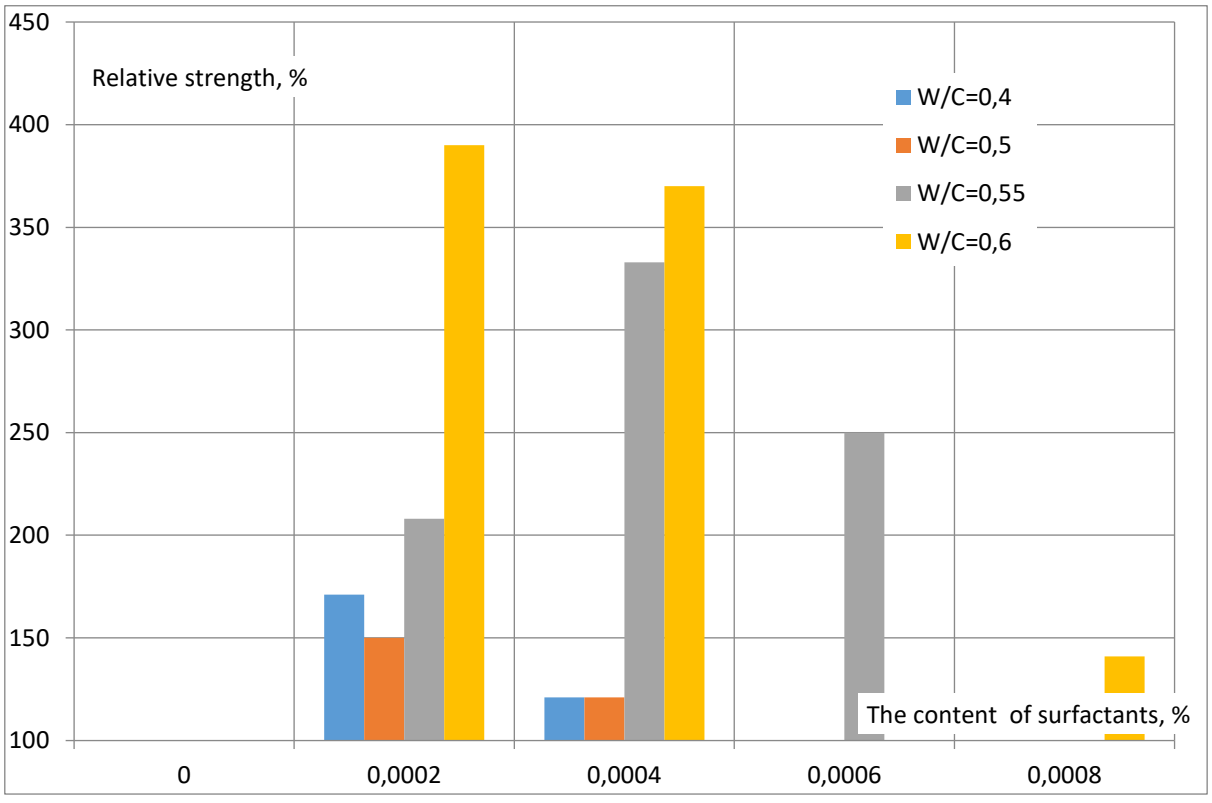

***Figure** 3. The effect of hyperplasticizer on the relative strength of concrete at the age of 7 days (carbonate modifier 20% by weight of cement)*

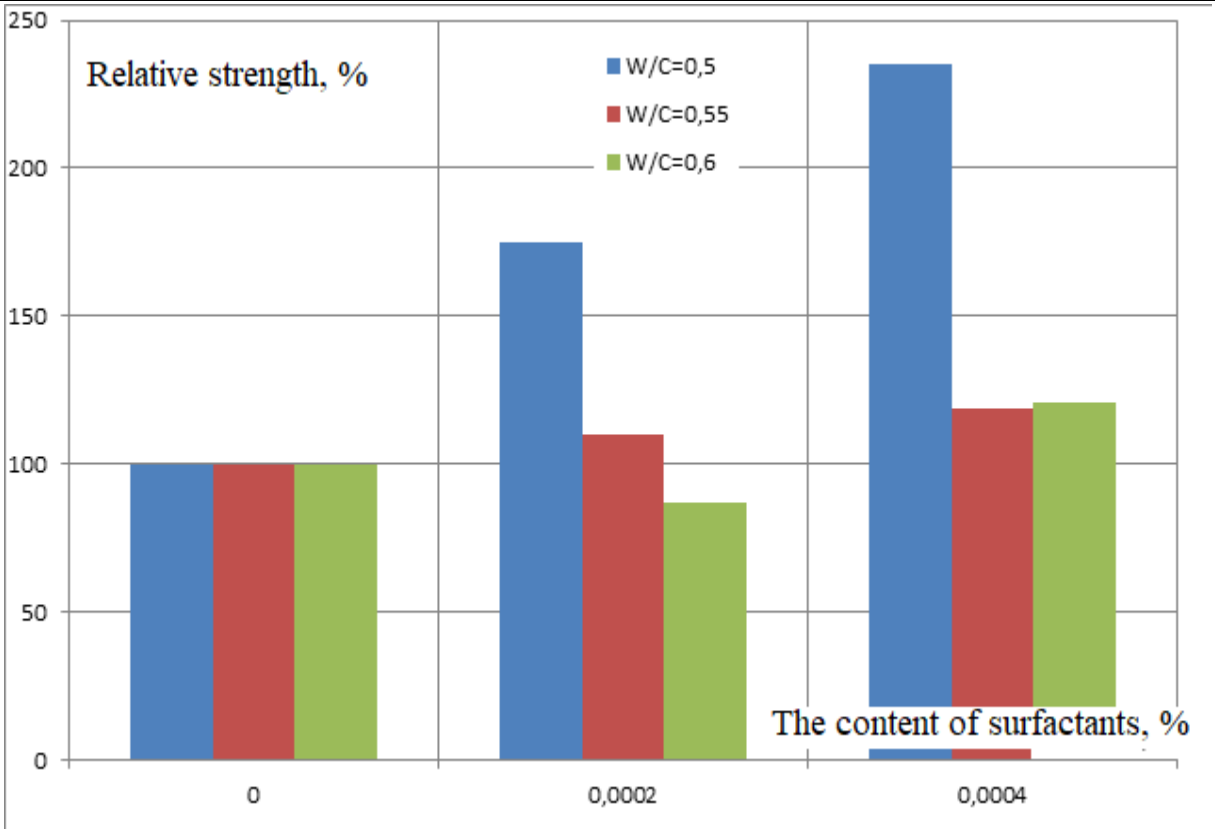

***Figure** 4. The influence of the complex "carbonate modifier - hyperplasticizer" on the relative strength of concrete at the age of 28 days*
(carbonate modifier 10% by weight of cement)

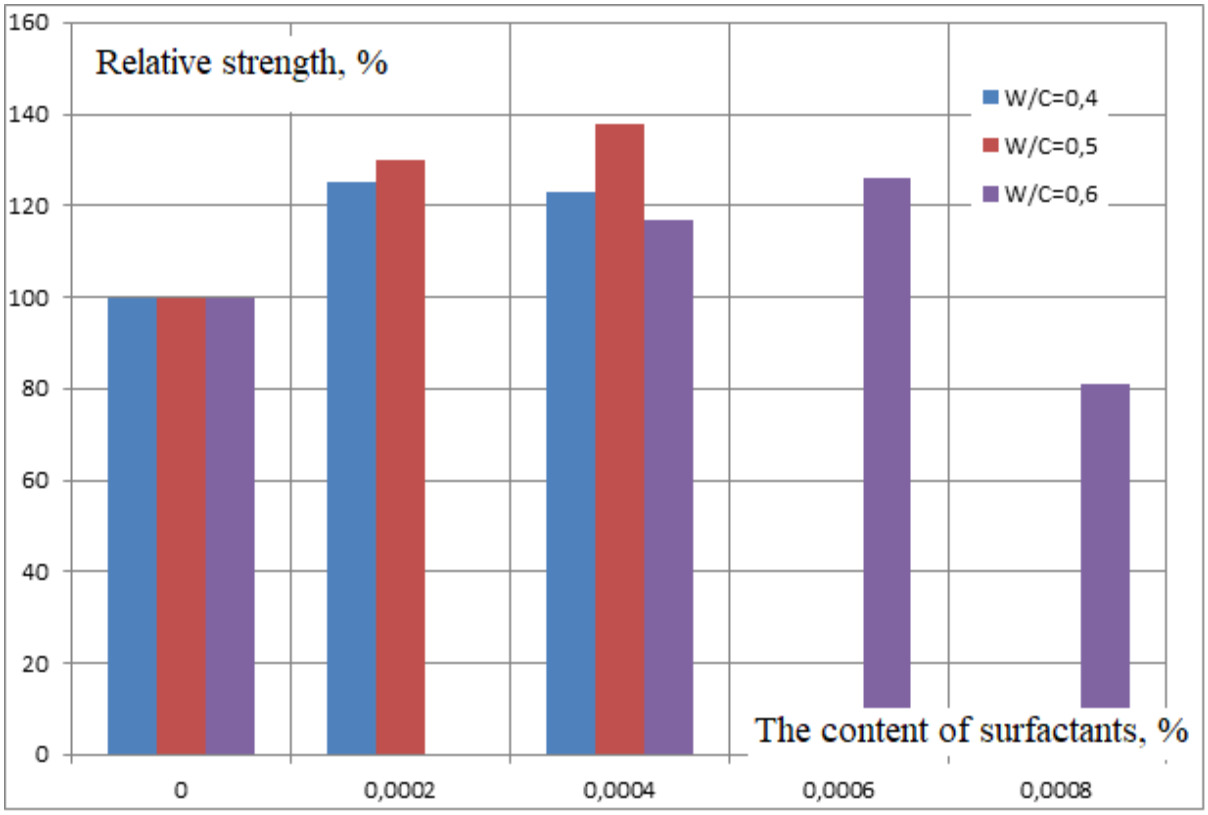

***Figure** 5. The influence of the complex "carbonate modifier - hyperplasticizer" on the relative strength of concrete at the age of 28 days*
(carbonate modifier 20% by weight of cement)

When determining the effectiveness of the complex modifier on the hardening process of slag Portland cement, as follows from the obtained results (Fig. 1), it is natural to increase the speed of formation of strength by cement stone. This is obviously due to the dispersing action of the hyperplasticizer (surfactant) of organic origin Sika Plast-520 and the formation of adsorption layers on the surface of clinker minerals, which slow down the diffusion of hydroxyl ions and the formation of crystal hydrates. It should be noted that the presence of surfactant additives leads to an increase in the effect of accelerating the formation of strength by fine-grained concrete. Obviously, such a mechanism of surfactant influence is the process regulation factor, thanks to which the complex modifier helps to increase the strength of concrete in the late stages of hardening. The effect of accelerating the speed of structure formation, and therefore the strength of concrete over a certain time, depends on the water content in concrete. An increase in the water-cement ratio leads to an increase in the effect of increasing the strength of concrete. This can be explained as a tangential effect, which confirms the formation of polyhydric minerals. In this sense, the interpretation of the results shown in fig. 2,3,5.

A comparison of the hardening terms and the duration of the hardening periods of modified cement with different W/C indicates the acceleration of the hardening processes of the cement dough. This does not differ from the practical data, well known from the works, the authors of which, by the way, also associate the change in the duration of the process with the formation of less stable compounds in the composition of concrete precisely in the third time interval of hardening. But, in contrast to published research results, the data obtained on the effect of Sika Plast-520 and a complex modifier containing iron carbonate on the hardening process of Portland cement allow us to state the following: - the main regulator of the process is not so much the formation of a significant number of nanostructures, but the deflocculating effect of modifiers and dilution of cement dough; – the correct arrangement of additives in the Sika Plast-520 → complex modifier series has a significant impact on the process. Such conclusions are expedient from a practical point of view, because they allow a reasoned approach to determining the required amount of modifier and hyperplasticizer. From a theoretical point of view, they are able to assert the determination of a certain mechanism of the hydration processes of Portland slag cement in the presence of the complex "modifier containing iron carbonates - hyperplasticizer", namely the formation of an increased amount of minerals that contain a significant amount of chemically bound water, which are certain advantages of this study.

Conclusions:

1. The conducted research established that the hyperplasticizer and the modifier containing iron carbonates have a significant effect on changing the nature of hardening processes, phase and structure formation of fine-grained concrete based on Portland slag cement in the early stages of hardening.

2. Features of the formation of the structure of fine-grained concrete, containing a hyperplasticizer in ultra-small doses and a carbonate modifier containing iron carbonates, are to further increase the strength of concrete. Due to this, the mechanical strength of concrete increases and is 300% of the strength of concrete without additives. This indicates the possibility of directed regulation of the processes of forming a strong structure of fine-grained concrete by using the complex "carbonate-containing modifier based on iron carbonates - hyperplasticizer" as a complex modifier.

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INNOVATIVE TECHNOLOGIES HEALTHY ICE CREAM

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ІННОВАЦІЙНІ ТЕХНОЛОГІЇ ОЗДОРОВЧОГО МОРОЗИВА

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Abstract

This article analyzes the technology, the components of modern types of frosts, presents the technology according to the new type of frosts in the role of roles. The analysis of the glycemic index of the components of roll ice-cream mixtures allows us to state that the selection of recipe components, the use of computer calculations allows us to obtain products that meet the demands of health nutrition. This type of ice cream does not contain preservatives, thickeners, has a reduced calorie content, and a minimum content of sugars and fats. The use of fresh berries, citrus fruits, and nuts allows you to lower the glycemic index from 62 to 40, increase the content of vitamins, vegetable proteins, and useful fatty acids, make the product natural, nutritious, and health-oriented for any age and wishes.

Анотація

В даній статті проаналізована технологія, складові сучасних видів морозива, представлена технологія порівняно нового виду морозива у вигляді ролів. Аналіз глікемічного індексу складових roll ice-cream сумішей дозволяє стверджувати, що підбір рецептурних компонентів, застосування комп'ютерних розрахунків дозволить отримувати продукти, що відповідають запитам оздоровчого харчування. Даний тип морозива не містить консервантів, згущувачів, має знижену калорійність, мінімальний вміст цукрів, жирів. Застосування свіжих фруктів ягід, цитрусових, горіхів дозволить зменшити глікемічний індекс з 62 до 40, підвищити вміст вітамінів, рослинних білків, корисних жирних кислот, зробити продукт натуральним, поживним, оздоровчого спрямування для будь-якого віку і побажань.

Keywords: glycemic index, roll-ice cream, technology.
Ключові слова: глікемічний індекс, рол-морозиво, технологія.

Вступ. Морозиво – одне з популярних продуктів літнього періоду. Це - заморожений солодкий десертний продукт. Традиційно морозиво виготовляють з молока, вершків, масла, цукру з добавленням смакових та ароматичних речовин. Разом з тим все більшою популярністю користується крім морозива на молочній основи ще і плодово-ягідне, ароматизоване. Сучасне морозиво характеризується великою кількістю технологічних добавок штучного походження для одержання сталої якості готового продукту незалежно від якості основної сировини.

Актуальність теми. Все більше уваги населення України приділяє правильному здоровому харчуванню, що пов'язано з життєво важливими

функціями організму. Головним завдання харчової галузі є розробка нових та поліпшення традиційних продуктів харчування на основі розширення сировинної бази за рахунок натуральної сировини, запозичення та розробки інноваційних для нашого ринку технологій та адаптування їх до смаків та уподобань українців.

Матеріали і методи. Використано методи аналізу й синтезу, порівняння, системного підходу. Проаналізовано перспективи запровадження в ресторанному господарстві інноваційного для українського ринку морозива із замороженої суміші у вигляді ролів.

Результати та обговорення. Морозиво у класичному вигляді за зовнішнім виглядом являє собою збиту, насичену повітрям заморожену суміш з різних харчових компонентів рівномірно розподілених за всією масою [1, 2]. Колір, запах, смак морозива залежать від якості молока та молочних продуктів, їх попередньої обробки, застосованих харчових наповнювачів, технологічних добавок. Практичні досліди з визначення вмісту повітря в готовому морозиві, однорідності, піностійкості свідчать про особливу увагу виробників до цих показників споживчої якості. Для отримання однорідності структури, підвищення в'язкості додаються стабілізатори на основі з гуарової камеді, камеді ріжкового дерева, ксантанової камеді, карбоксиметилцелюллози, каррагінанів. Морозиво також може містити добавки: антиокиснювачі, антизлежувальні компоненти, гелеутворювачі, згущювачі, барвники, консерванти, ароматизатори, піноутворювачі, регулятори кислотності, стабілізатори піни, емульгатори, підсолоджувачі.

Особливим напрямом в виготовленні морозива є заміна тваринних жирів на рослинні як з метою зменшення калорійності морозива, так і з метою зменшення собівартості. Разом з тим стоїть питання щодо корисності пальмової, кокосової олій, саломаси, моно- і дигліцеридів жирних кислот, що є складовими сучасного морозива як загартованого, так і м'якого.

Ці та подібні компоненти сучасного морозива негативно впливають на організм людини дорослої, ще більш негативний вплив вони мають на дитячий. Погано або й зовсім не засвоюються організмом, можуть навіть порушувати роботу шлунково-кишкового тракту. Морозиво, що виготовляють з тваринних жирів, містить в своєму складі велику кількість холестерину, надлишок якого може бути досить шкідливими і навіть призвести до ряду захворювань, таких як каменів в жовчному міхурі, серцевих нападів, інсульту.

Майже всі види морозива містять в своєму складі велику кількість цукру або цукрозамінників. В свою чергу цукор підвищує калорійність: в 100 г готового продукту може міститись до 500 ккал, глікемічний індекс цукру білого бурякового складає 65 одиниць. Глікемічний індекс морозива на молочній основі - 62 одиниці [3].

Головна задача дослідження: розглянути можливості розширення асортименту, зниження глікемічного індексу морозива шляхом підбору сировини зі зниженим глікемічним індексом, застосуванням нових технологій отримання тонких пластів морозива без збивання з натуральних продуктів, у тому числі фруктово-ягідної сировини, подрібнених і заморожених у вигляді шару, сформованих ролами та вплив такого морозива на здоров'я споживачів.

Батьківщиною цього виду морозива є Таїланд. Тайці називають своє морозиво roll ice-cream, що означає морозиво. Назва «рол-морозиво» сподобалась споживачам. Починаючи з 2015 року такий вид десерту став з'являтись спочатку в США, а потім так зване «смажене морозиво» набрало популярності в Великобританії, в Європі. В останні роки започаткували його виготовлення в Києві, Харкові, Одесі, Львові [4,5].

Технологія рол-морозива передбачає застосування натуральних високоякісних компонентів на молочній основі у вигляді вершків, йогуртів, молока згущеного. Важливою складовою цього виду морозива є фрукти, ягоди, цитрусові. Існує безліч смачних поєднань, наприклад: полуниця, ківі, банан, персик, малина, смородина, ожина тощо. Слід зазначити, що глікемічний індекс банана найбільший – 62 одиниці, разом з тим ягоди, фрукти, цитрусові мають від 53 (ожина, лохина) до 10 (малина). [3]. Їх додавання в суміші морозива має можливість суттєво зменшити глікемічний індекс ягідних ролів.

Також застосовують добре відомі ласощі у вигляді печива, цукерок, горіхових паст, шоколаду: орео, кіндер, снікерс, мілківей, нутеллу, арахісову при приготуванні ролів.

Цікавим, незвичайним є приготування морозива безпосередньо перед споживачами у вигляді шоу з вибором складовихв на очах замовника, одночасним подрібненням, заморожуванням компонентів на пласкій поверхні фризера з прикрашенням горіхами, топінгами, шоколадною крихтою, печивом тощо.

Підбір складових споживачем, візуалізація технологічного процесу робить це морозиво індивідуально корисним, цікавим, смачним.

Особливістю технології є незначна, впродовж 3-6 хвилин тривалість виготовлення методом заморожування в тонкому шарі молочно-фруктової суміші посіченої безпосередньо на охолодженій поверхні фризера ручним способом з подальшим розміщенням та притисненням до поверхні пласкої пластини фризера з температурою від мінус 20 до мінус 35 °С. Після формуванням пласта, заморожування, виконується зрізуванням замороженого пласта і згортання шару суміші у вигляді ролу безпосередньо перед споживачем продукту. Отримане морозиво має кінцеву температуру на виході від -15 до -22 °С .

Важливим є якість морозива, що забезпечується однаковістю температури по всій пластині фризера та однаковою товщиною шару нанесення суміші на поверхню фризера.

Площа морозива має відповідати порції, причому площа заморожування має бути розділена від 3 до 5 ролів.

Глікемічний індекс молока тваринного походження коров'ячого складає від 27 до 32 одиниць. Для отримання морозива зі зниженим вмістом лактози, у якості сировини використовують молочні йогурти (глікемічний індекс від 12 до 19) [3].

За потреби отримання морозива нетваринного походження, молочну сировину заміняють на соєве, мигдальне, кокосове молоко. Глікемічний індекс рослинних напоїв, що називають молоком, складає від 30 (мигдалеве, соєве) до 40 (кокосове) [3].

Крім молочних сумішей для отримання фруктових видів морозива можна застосувати дво- або багатокомпонентні соки, пасти, пюре з додаванням фруктів у вигляді подрібнених шматочків, подрібнення яких відбувається під час заморожування.

Подача такого виду морозива відбувається безпосередньо після виготовлення в креманці з ложечкою у вигляді 3-6 ролів прикрашених печивом, шматочками або крихтою шоколаду (глікемічний індекс від 23 до 43) [3], горіхів, більшість яких має глікемічний індекс 15, 25 - тільки мигдаль [6].

Для даної технології необхідно оригінальне устаткування з фризерною поверхнею пласкої форми у вигляді кола або прямокутника з мінімальним розміром 45-55 см. Температура поверхні обумовлена температурою зовнішнього середовища, в нашому кліматі рекомендують від мінус 18 до мінус 20 °С, в жаркий літній період температура поверхности до -35 °С, для гарантування роботи в жару до -40 °.

Інновацією в технології рол морозива є ретельний комп'ютерний підбір складових у відповідності до за бажань споживача за заданою калорійністю, вітамінним складом, на основі безлактозної, безаллергенної сировини рослинного або тваринного походження.

ТМ "Ласунка"[7], добре відомий виробник морозива в Україні, пропонує свої рецепти рол-морозива з готового морозива пломбіру. Для цього пломбір заводського виконання попередньо частково розморожують, вносять банани, ягоди, подрібнюють, розрівнюють на пласкому листі рівним шаром з подальшим заморожуванням в морозильній камері будь якого холодильника або морозильника. Тривалість заморожування складає до 30 хвилин, після цього пласт морозива розрізають, скручують в роли. Весь процес спрощений, не вимагає додаткового устаткування, може відбуватись як з закладі ресторанного господарства, так і в домашніх умовах.

Висновок. В результаті теоретико-аналітичних досліджень проаналізована технологія, складові сучасних видів морозива, представлена технологія порівняно нового виду морозива у вигляді рол. Аналіз складових roll ice-cream сумішей дозволяє стверджувати, що підбір рецептурних компонентів, застосування комп'ютерних розрахунків дозволить отримувати продукти, що відповідають запитам оздоровчого харчування, продукт, що не містить консервантів, згущувачів, має мінімальний вміст цукрів, жирів, має знижену калорійність. Присутність замовника дозволяє йому обрати гіпоалеергенні компоненти. Застосування свіжих фруктів ягід, цитрусових, горіхів, кисломолочних продуктів, замінників тваринного молока дозволить зменшити глікемічний індекс з 62 (на молочній основі) до 40, підвищити вміст вітамінів, рослинних білків, корисних жирних кислот, зробити продукт натуральним, поживним, оздоровчого спрямування.

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MACHINE LEARNING IN DRONE CONTROL

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Abstract

Machine learning has emerged as a critical component in drone control, offering a pathway to enhanced automation, efficiency, and adaptability. This study explores the integration of machine learning into drone control systems, analyzing its impact on navigation, obstacle avoidance, and decision-making processes. Through a combination of theoretical frameworks and real-world case studies, this research assesses the performance improvements brought by machine learning, while also examining the challenges and considerations in its implementation. The findings offer a comprehensive understanding of how machine learning is reshaping the capabilities of drones, setting the stage for further advancements in autonomous systems.

Keywords: Machine Learning, Drone Control, Obstacle Avoidance, Autonomous Navigation, UAV

Introduction. Drones, also known as unmanned aerial vehicles (UAVs), have gained significant traction in various industries, from agriculture and logistics to surveillance and entertainment. As these systems become more complex and their applications more diverse, the need for intelligent control mechanisms has become apparent. Machine learning (ML) has proven to be a key technology in addressing this need, enabling drones to make real-time decisions, adapt to changing environments, and improve their overall performance [3].

Machine learning in drone control allows for enhanced automation and flexibility. By leveraging ML algorithms, drones can perform tasks that were previously considered challenging or impossible. For example, machine learning enables drones to navigate autonomously through complex environments, avoid obstacles, and make informed decisions based on sensor data. This advancement has opened up new possibilities for drone applications and has the potential to revolutionize the field of unmanned systems [7].

This article explores the integration of machine learning into drone control, focusing on its impact on key aspects such as navigation, obstacle avoidance, and autonomous decision-making. Additionally, it discusses the challenges associated with implementing ML in drone systems and proposes solutions to overcome these hurdles.

Background. Drones have traditionally relied on predefined flight paths and manual control to navigate and perform tasks. While effective in certain scenarios, this approach has limitations, especially when drones are required to operate in dynamic or uncertain environments. The emergence of machine learning has provided a way to overcome these limitations, offering drones the ability to learn from data and improve their performance over time.

Machine learning in drone control encompasses various techniques, including supervised learning, unsupervised learning, and reinforcement learning. Supervised learning involves training a model using labeled data, allowing drones to recognize patterns and make predictions. Unsupervised learning, on the other hand, does not require labeled data, enabling drones to identify underlying structures and relationships within the data. Reinforcement learning focuses on training drones through trial and error, allowing them to learn from their actions and optimize their behavior [8].

These techniques have been applied to different aspects of drone control, such as obstacle avoidance, autonomous navigation, and decision-making. By utilizing machine learning, drones can process data from sensors, cameras, and other sources to make informed decisions in real-time. This capability is particularly valuable in scenarios where manual control is impractical or unsafe, such as search and rescue missions, industrial inspections, and aerial mapping.

Challenges and consdirations. Integrating machine learning into drone control presents several challenges and considerations. One of the primary challenges is the need for large datasets to train ML models. High-quality training data is essential for accurate predictions and reliable performance. Obtaining such data can be time-consuming and resource-intensive, especially for complex drone operations.

Another challenge is the computational power required to run ML algorithms on drones. Unlike traditional computer systems, drones have limited processing capabilities and battery life. This constraint necessitates the development of efficient algorithms and lightweight models that can operate in real-time without draining the drone's resources.

Safety and reliability are also critical considerations. Drones operating in public spaces or near people must adhere to strict safety regulations. Machine learning models used in drone control must be thoroughly tested and validated to ensure they perform safely under various conditions. Additionally, the use of machine learning introduces the risk of overfitting, where models become too specialized in their training data, leading to poor generalization in new environments [1].

Methodology. To evaluate the effectiveness of machine learning in drone control, a structured methodology was employed, focusing on key aspects such as obstacle avoidance and autonomous navigation. This methodology involved training ML models on a combination of synthetic and real-world datasets, followed by extensive testing in controlled environments and field scenarios.

The training process began with supervised learning, where models were trained using labeled data to recognize objects and obstacles. This approach enabled drones to detect and avoid obstacles during flight. Next, reinforcement learning was applied to train drones to navigate through complex environments, allowing them to learn from trial and error.

The testing phase involved both simulated and real-world environments to assess the models' performance and robustness. Simulated tests allowed for controlled experimentation, while real-world tests provided insights into the models' behavior in actual operating conditions. Key metrics used to evaluate performance included accuracy in obstacle detection, success rate in autonomous navigation, and response time in decision-making [5].

4. Performance Analysis. The performance analysis focused on measuring the impact of machine learning on drone control. The results demonstrated significant improvements in key areas such as obstacle avoidance, autonomous navigation, and decision-making speed. In the obstacle avoidance tests, machine learning-enabled drones achieved a high level of accuracy in detecting and avoiding obstacles. The use of deep learning models for image recognition played a crucial role in this success, allowing drones to identify and respond to obstacles with minimal error. For autonomous navigation, the reinforcement learning approach showed promising results [6].

Drones trained with reinforcement learning successfully navigated complex environments, learning optimal flight paths and adapting to unexpected changes in the surroundings. This adaptability is a significant advantage for applications like search and rescue, where drones must operate in unpredictable environments.

The performance analysis also highlighted areas for improvement. While machine learning brought notable advancements, some limitations were identified. For example, models trained with limited datasets exhibited reduced accuracy in new scenarios, indicating the need for broader and more diverse training data. Additionally, the computational requirements for running complex ML models on drones posed a challenge, underscoring the importance of optimizing algorithms for lightweight execution.

Statement of the problem and a solution method. The increasing complexity of drone applications has highlighted a critical problem: traditional control methods often lack the adaptability and efficiency required for modern drone operations. Drones are increasingly being deployed in diverse environments, from urban areas to remote landscapes, where they encounter unexpected obstacles and dynamic conditions. This unpredictability poses significant challenges, as predefined flight paths and manual controls can be inadequate for safe and efficient operation. Moreover, drones used in critical applications, such as search and rescue or disaster response, require fast and accurate decision-making, something traditional systems struggle to achieve.

To address these issues, a more intelligent control system is needed—one that can adapt to changing conditions, learn from experience, and make real-time decisions. Machine learning (ML) offers a solution by enabling drones to learn from data and improve their performance over time. ML can be used to develop models that allow drones to autonomously navigate complex environments, detect and avoid obstacles, and optimize their operations based on historical and real-time data [2].

Proposed Solution Method. The integration of machine learning into drone control involves several key steps:

1. Data Collection and Preparation: To train ML models, high-quality data is essential. This step involves collecting diverse datasets that reflect the variety of conditions and obstacles drones might encounter. Data sources include drone sensors, cameras, LiDAR, GPS, and external environmental data. This data must be cleaned, labeled, and preprocessed for ML training.
2. Model Selection and Training: Depending on the specific application, different ML techniques may be used. For obstacle avoidance, deep learning models can be trained to recognize objects and obstacles. For autonomous navigation, reinforcement learning allows drones to learn optimal flight paths through
3. trial and error. Models are trained using a combination of synthetic and real-world data to ensure robustness and generalizability.
4. Integration with Drone Systems: Once trained, the ML models are integrated into the drone's control system. This integration allows for seamless communication between the ML models and the drone's hardware, ensuring that the drone can make decisions in real-time. Interfacing with existing drone control systems and flight controllers is a critical part of this process [10].
5. Testing and Validation: To ensure safety and reliability, the integrated system undergoes rigorous testing in both simulated and real-world environments. This step involves evaluating the drone's performance in various scenarios, measuring its ability to avoid obstacles, navigate autonomously, and respond to changing conditions. Safety protocols and redundancy systems are implemented to mitigate risks. Deployment and Iterative Improvement: After successful testing, the drone control system with machine learning is deployed in real-world applications. Continuous monitoring and iterative improvement are essential to ensure ongoing performance and safety. Feedback from operational use is used to update and refine the ML models, ensuring they remain effective over time.

Conclusion. Machine learning has transformed the field of drone control, enabling drones to operate with greater autonomy, efficiency, and adaptability. Through the integration of various ML techniques, drones can navigate complex environments, avoid obstacles, and make real-time decisions, opening new possibilities for applications across multiple industries.

However, the successful implementation of machine learning in drone control requires careful consid-

eration of the associated challenges, such as data requirements, computational constraints, and safety regulations. Addressing these challenges will be crucial in harnessing the full potential of machine learning in drone control [9].

This article provides a comprehensive analysis of how machine learning has impacted drone control and underscores the need for ongoing research and development to further enhance drone capabilities. By understanding the strengths and limitations of machine learning, developers and researchers can create more robust and reliable drone systems that push the boundaries of autonomous flight.

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OPTIMIZING MOBILE APP PERFORMANCE: TIPS AND TECHNIQUES

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Abstract

In the fast-paced world of mobile app development, optimizing performance is paramount to ensuring user satisfaction and retention. This article explores a variety of strategies, tips, and techniques aimed at enhancing the performance of mobile applications across different platforms. Beginning with an overview of the importance of performance optimization, we delve into the key factors that influence mobile app performance, including network connectivity, device resources, and software architecture. We then proceed to discuss specific optimization techniques such as code optimization, image and asset management, asynchronous programming, and memory management.

Keywords: data handling, efficiency, speed, optimization, mobile app performance, image optimization, code optimization, monitoring

Mobile app performance optimization is paramount in today's digital landscape, where users demand seamless experiences and lightning-fast interactions. In an era characterized by instant gratification and relentless competition, the performance of a mobile app can make or break its success.

At the core of the user experience lies performance – the speed at which an app loads, responds to user inputs, and navigates between screens. Users have grown accustomed to instantaneous responses, and any delays or lags can quickly lead to frustration and abandonment. In fact, studies have shown that even a one-second delay in page load times can result in a significant drop in user engagement. Beyond user satisfaction, the performance of a mobile app directly impacts business outcomes. Here are some factors that affect mobile app performance:

Network latency - refers to the delay experienced when data packets travel between the user's device and the server hosting the application. Several factors contribute to network latency, including:

- Connection Type: The type of network connection, such as Wi-Fi, cellular data (3G, 4G, 5G), or a wired connection, impacts latency. Cellular networks tend to have higher latency compared to Wi-Fi or wired connections.
- Distance: Physical distance between the user's device and the server can increase latency, especially in the case of global applications where data may travel across continents.
- Bandwidth: Network congestion and limited bandwidth can lead to increased latency, particularly during peak usage times or in areas with poor network coverage.
- Protocol Overhead: The protocols used for data transmission, such as HTTP or HTTPS, introduce overhead that can affect latency. For example, HTTPS encryption adds extra processing time for secure communication.

Device resources - the performance of a mobile app is heavily dependent on the resources available on the user's device, including:

- Processing Power (CPU): The device's CPU determines its ability to execute instructions and process data. High CPU usage can lead to sluggish performance and reduced responsiveness.
- Memory (RAM): Insufficient memory can result in app crashes, slowdowns, or excessive background app termination by the operating system (OS).
- Storage: Limited storage space can impact the app's ability to cache data, store temporary files, and download additional resources.
- Battery Life: Power consumption plays a critical role in app performance, as energy-intensive operations can drain the device's battery quickly.

Software Architecture - the design and architecture of a mobile app significantly influence its performance. Key aspects of software architecture that impact performance include:

- UI Rendering: Inefficient UI rendering can lead to stuttering animations and slow responsiveness. Optimizing layout hierarchies, reducing overdraw, and minimizing view redraws can improve UI performance.
- Data Fetching and Processing: Inefficient data retrieval and processing can cause delays in loading content and interacting with the app. Asynchronous programming, lazy loading, and caching strategies can optimize data fetching and processing.
- Concurrency and Threading: Utilizing multiple threads and asynchronous operations can improve responsiveness and prevent UI freezes. However, improper thread management can lead to race conditions, deadlocks, and other concurrency issues.
- Architecture Patterns: Choosing appropriate architecture patterns, such as Model-View-Controller (MVC), Model-View-ViewModel (MVVM), or Clean Architecture, can facilitate modularization, maintainability, and scalability while optimizing app performance.

Talking about the factors that affect mobile app performance, there are various ways of optimizing mobile app performance by using network performance optimization techniques, code optimization, design principles for performance, etc.

Code optimization techniques - optimizing code is a crucial aspect of mobile app development, contributing significantly to app performance and efficiency. By reducing redundancy and eliminating duplicated logic, developers can streamline codebases and promote reusability, leading to cleaner and more maintainable code. Efficient data structures and algorithms play a vital role in minimizing time and space complexity, enhancing overall app performance. Additionally, minimizing memory usage through careful object management and resource recycling prevents memory leaks and ensures optimal resource utilization. Optimizing loops and iterations, along with judicious error handling and exception management, further contribute to code efficiency and responsiveness.

Network performance optimization - network performance optimization in mobile apps is a crucial aspect of ensuring a seamless user experience. Developers employ various strategies to enhance performance, such as minimizing HTTP requests by combining resources, leveraging caching mechanisms to reduce data transfer, and implementing content delivery networks (CDNs) to distribute content efficiently. Additionally, optimizing image and video sizes, using compression techniques, and prioritizing critical content loading contribute to faster load times.

Architectural patterns for performance optimization - Architectural patterns play a pivotal role in optimizing the performance of mobile apps, ensuring efficiency, scalability, and maintainability. One widely used pattern is the Model-View-Controller (MVC), which separates the app's logic into three interconnected components: the Model (data and business logic), the View (user interface), and the Controller (handles user input and updates the model and view accordingly). This separation allows for easier management of code, enhancing performance by enabling modular development and easier debugging.

Another prevalent pattern is the Model-View-ViewModel (MVVM), which is particularly popular in mobile app development, especially with frameworks like Android Jetpack and SwiftUI. MVVM separates the UI logic from the business logic by introducing a ViewModel, which acts as an intermediary between the View and the Model.

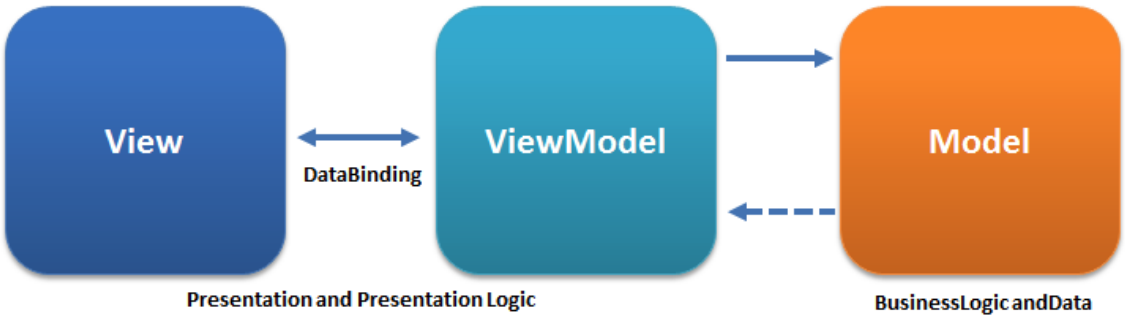

Figure 1. A photo representing MVVM software architecture

Design principles for performance - Design principles play a crucial role in optimizing the performance of mobile apps, ensuring they are responsive, efficient, and user-friendly. One fundamental principle is prioritizing simplicity and clarity in the user interface (UI) and user experience (UX) design. Keeping the UI clean and uncluttered reduces cognitive load for users and enhances navigation speed, contributing to a smoother overall experience. Furthermore, optimizing for performance requires a deep understanding of the target audience and their usage patterns.

Conclusion

In summary, optimizing mobile app performance is a multifaceted endeavor critical to delivering a seamless user experience and ensuring the success of applications in today's competitive market. By addressing factors such as network latency, device resources, and software architecture, developers can significantly enhance app responsiveness and efficiency. Key optimization techniques, including code optimization strategies, network performance optimization, and architectural considerations, empower developers to create high-performing apps that resonate with users. Moreover, continuous monitoring, profiling, and refinement are essential for identifying and addressing performance bottlenecks. As technology evolves and user expectations continue to rise, prioritizing performance optimization remains paramount for developers and businesses alike. Investing in performance optimization not only enhances user satisfaction and retention but also strengthens brand reputation and competitive advantage in the dynamic landscape of mobile app development.

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INFLUENCE OF THE NUMBER OF KNIVES ON THE QUALITY OF GRINDING IN A SMALL ROTARY KNIFE GRINDING DEVICE

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ВЛИЯНИЯ КОЛИЧЕСТВА НОЖЕЙ НА КАЧЕСТВО ИЗМЕЛЬЧЕНИЯ В МАЛОГАБАРИТНОМ РОТОРНО-НОЖЕВОМ ИЗМЕЛЬЧИТЕЛЬНОМ УСТРОЙСТВЕ

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Abstract

In the developed small-sized rotary grinding device, working with a new method - free-impact cutting, a pattern of changes in one of the parameters characterizing the quality and efficiency of grain grinding has been established - the number of dust-like fractions, fractions less than 1 mm in size, depending on the number of grinder knives. It has been established that at a constant speed of rotation of the knives, with an increase in the number of knives, the number of dust fractions smaller than 1 mm increases proportionally.

Аннотация

В разработанном малогабаритном роторном измельчающем устройстве, работающий новым методом – резание с свободным ударом установлена закономерность изменения одного из параметров, характеризующих качество и эффективности измельчения зерна – количество пыловидных фракций, фракции размером менее 1 мм в зависимости от количества ножей-измельчителей. Установлено, что при постоянной скорости вращения ножей с увеличением числа ножей пропорционально увеличивается количество пылящих фракций мельче-1 мм.

Keywords: cutting, knife, free kick, cutting, devices, small-sized, chopper, grain.

Ключевые слова: резание, нож, свободный удар, резания, устройства, малогабаритный, измельчитель, зерна.

Введение В зерновом сырье зерновых культур собраны концентрированные питательные вещества с высокой биоэнергетикой. Они составляют основу пищевых потребностей человека. Однако благодаря своим высоким энергетическим и питательным качествам эти материалы полезны как молочным, так и мясным животным и птицам. Кормление животных этим видом кормов создает основу для их здорового роста, а также налаживания интенсивных технологий в области животноводства. По потребности количество обогащенных кормов в суточном рационе кормов крупного рогатого скота и птиц составляет 15-25%. Согласно зоотехническим требованиям кормовые материалы животным и птицам следует давать в измельченном виде и в тот же день. Тот факт, что когда животные получают зерно в измельченном виде, еще больше повышается отдача, увеличивается и эффективность[1,с.8-33]. Благодаря этому зерновое сырье, считающееся сильным кормом, легко переваривается и хорошо усваивается животными если измельчать.

В настоящее время существуют различные типы машин, измельчающих фуражное зерно. Наиболее распространенными из них являются КДМ-2, КДУ-2, ДМ-440У и др. зернодробилки молоткового типа. Производительность различной марки этих машин- 2-9 т/ч, масса 240-2500 кг, требуемая энергия 7-100 кВт. [2,С.67-68; 3,С.85-68;.7,С.80-81]. Машины указанного типа в основном предназначены для крупных комбикормовых заводов и фабрик, а также для комплексов по приготовлению комбикормов. В настоящее время их использование в мелких фермерских и крестьянских хозяйствах неэффективно. Кроме того, эти машины имеют ряд других конструктивно-технологических недостатков, затрудняющих их использование в фермерских и мелких крестьянских хозяйствах. Итак, данные приемы измельчают зерно преимущественно ударно-трющим методом. Измельчение этим методом требует много энергии на единицу работы, а при влажности зерна выше 15% его становится затруднительно измельчать. При превышении влажности зерна этого предела при его дроблении существующими машинами затраты энергии на дробление резко возрастают в 2-3 раза и более [7,С.80-81;8,С.380-394;9,С.96-99]. При измельчении в этих машинах влажного зерна,

которое в процессе работы сильно трется между пакетом молотков и сеткой или декой, нагревается и перегревает, качество получаемого измельченного зерна существенно ухудшается. Поэтому выше указанного предела 15 % влажности зерна сушат до 14-15% -ов. Это вызывает дополнительные энерго- и трудозатраты, снижает эффективность работы и увеличивает стоимость продукта. При работе с такими машинами, кроме указанных, при дробление образуются образуется много пылящие фракции размером менее 1 мм, не соответствующие агрозоотехническим требованиям, и их количество в таких машинах составляет 15-25% .и вше, от общего объема обрабатываемой продукции. По этой причине в конструкции таких машин применяется дополнительная конструкция, улавливающая порошкообразные фракции. Это усложняет конструкцию и снижает эффективность работы. В последние годы в различных развитых стран применяется технология измельчения кормового зерна разной влажности методом компрессионного дробления[4,С.95-97;5,С.413-415;6,С.28-30]. При этом методе зерно прессуют. Поверхность ее в определенной степени увеличивается, верхняя корка растрескивается, зерна деформируется и сплющивается. Приготовленное таким образом зерно хоть и полезно для крупного рогатого скота, но их не охотно едят другие животных и птиц. Кроме того, такой подготовленный зерновой материал сложно использовать при приготовлении комбикормов. По этой причине этот метод не получил широкого распространения.

Следует отметить, что после распада СССР, что произошел в 90-тые годы прошлого века, в нашей республике Азербайджан были ликвидированы колхозы и совхозы по указу Президента Республики –Великий Лидер Гейдар Алиев передал землю крестьянам в сельском хозяйстве, в последствии в республике день ото дня наблюдался быстрый прогресс в области выращивания зерна, как в республике и во всех поля. В настоящее время в республике Азербайджан ежегодно производится не менее 2,5-3 млн тонн зерна. Это означает рост в 5-6 раз по сравнению с 1980-ми годами. Более 90% этого объёма зерна добывается за счет крестьян-фермеров и дворов, число которых по республике превышает 400 тысяч. В настоящее время крестьяне поставляют выращенное зерно на крупные заводы и фабрики и потом закупают там переработанную зерновую продукцию в виде круп, муки и комбикормов. Здесь затраты на погрузку-разгрузку и транспортировку, которые непосредственно проявляются как дополнительные затраты, увеличивают стоимость продукции. В этом процессе возникают как количественные, так и качественные проблемы. Анализ показывает, что при небольшом количестве животных в каждом мелком хозяйстве наиболее удобно и более эффективно фермерам и крестьянам лучше чтобы им измельчать собственного зерна в соответствии с его ежедневными потребностями, и кормить своих собственных животных в виде свежеизмельченными кормоматериалами, при их же существующей влажности, который, обычно в нашей республике эта сезонная влажность составляет от 15-ти до 35% и выше[1, С. 28-33].

Однако отсутствие малогабаритного измельчителя и невозможность измельчения в указанным пределе влажности существующих устройствах затрудняют решение этой задачи. По этому, надо чтобы ново созданный малогабаритный измельчитель позволил без их сушки измельчать зерно в пределах до 35% и выше является важным и актуальным вопросом.

Нами в Азербайджанском Государственным Аграрном Университете совместно с Азербайджанским Технологическим Университетом был создан удовлетворяющее указанные требования, устройство, для измельчение фуражного зерна, которое прошло Государственные испытания в Азербайджанской Государственной Испытательной Станции и рекомендован для использования в малых фермерских и дворных хозяйствах.

Установлено , что на новом устройстве можно измельчат зерна как пшеницы, ячмень, кукурузы, так и зерна других культур с влажности до 35%и больше. С применением экспериментального нового устройства можно измельчать зерно в широком пределе влажности для животных и птиц в фермерских и дворных хозяйствах и использовать измельченное зерновое сырье при приготовлении комбинированного смеси. При этом энергозатраты на единицу работы снижаются в $2{,}5 \div 5{,}5$ раза, металлоемкость снижается в $1{,}5 \div 4{,}5$ раза, а годовой экономический эффект, получаемый от применения экспериментального устройства, составляет 7843 маната[10,с.18-19].

Актуальность. Одним из основных показателей предложенный нами измельчительном устройстве, также и других таких устройствах, является возможности уменьшение величины пылевидных фракций размером менее 1 мм, находившейся в измельченном материале, после выхода его из измельчителя. Так, если фракций размером менее 1 мм больше допустимого, то отделяют их от измельченной основной массы. Эта важно. В противном случае, поедания пылящие фракции, животные, могут вызвать тяжелые осложнения в их желудочно-кишечной системе. Засорение происходит в желудке и кишечнике и это нарушает желудка-кишечнике проходимости.

Поэтому при создание нового измельчителя зерна для измельчения корма животных следует учитывать допустимый предел мелких фракций, который по зоотехтребованям должен быть не более - 10% от веса в каждой измельченной массе, определение и обоснование, которого является важным и актуальным.Данная статья направлена на решение этого актуального вопроса в новом устройстве.

Методика. Для решение указанный задачи в статье рассматривается и учитывается конструктивной особенности устройства и вывяливаются факторы влияющей на получение пылевидной фракции в ее работе.

В новом предложенном устройстве пыловидные фракции в основном зависит от скоростного

режима устройства и количества быстроврашающих ножей в измельчающим утройстве. Зерно в предлагаемой зернодробилке, следует изучать количество пыловидные фракции в единице веса так чтобы менее 1 мм и определить количество ножей режима, способного производить фракции менее 1 мм. и ниже допустимого, согласно зоотехническим требованиям.

Из них обосновании рациональной величины скорости определяется из соображений, что скорость ножа должен больше технологически необходимой скорости ножа, обеспечивающий среза и или деформировать зерно и достаточной силой сбрасывать к окружающей части ситообразной сетки. По расчету и по экспериментальным исследованиям установлено что такая скорость составляет 3000мин $^{-1}$ для ножа устройства [8,С.380-384]. Поэтому как с технологической так и по эксплуатационной точки зрение надо принять скорость ножа *n*=3000 оборот/в минут= const. А искать возможности снижение пыловидности только в зависимости от выборам количества ножей в устройстве. Для этого в первой очередь надо рассмотреть конструктивную схему устройства.

Принципиальная схема технологического процесса работы новоразработанного устройства показана на рис 1.

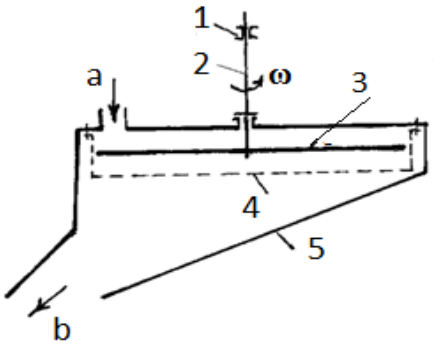

Рис. 1. Схема нового ротационного зерноизмельчительного устройства, работающего по принципу режуще-ударным способом: а- входное окно зерна из бункера в камеру измельчение; б - выходное окно измельченных зерн; 1 – приводной шкив; 2- вертикальная ось; 3- нож; 4- ситообразная железная решета; 5 – скатной поддонник.

На рисунке 1. а - окно подачи зерна из бункера; б - окно выхода измельченного зерна из устройства. 1-шкив передачи движения; 2- вертикальная ось; 3-нож; 4- ситовидная решета; 5- скатной поддонник .

Процесс работы устройства заключается в следующем. Из бункера собственным потоком зерна через горловины а пересыпается на кончика быстро вращающегося ножа 3.

Когда зерно попадает на быстро вращающийся (n=3000 об/мин) нож в камере измельчение он ударяется ножом или разрезается, или раскалывается и сбрасывается в сторону к круговой части ситовидной сетки и здесь заново измельчается и под действием центробежной силы через отверстия сита выходит из камеры измельчения и направляется выходноми окно б. В новом устройстве можно использовать в зависимости от потребности несколько взаимозаменяемые ситовидное сетки с различными диаметрами отверстий на поверхности сита. С целью измельчения зерновых материалов с разных размерами - в каждом сменном сите имеются свои по величине отверстия. Это позволяет получать корм различного диаметра для различных видов животных.

По указанному принципу работы нового устройства имеется возможность методом выбора такого количество ситовой сетки что позволяет измельчать зерновой материал в зависимости, от диаметры отверстий поверхности ситовой сетки, разной величине частице что необходимо получать при:

–1мм для - муки; 2мм – для кормление цыплят и кур; 3-мм-для мелких животных и телят; 4мм – для крупно рогатый животных и 4 и 5мм –для получения крупы со средним размером 4мм или размером 5мм, что полностью удовлетворяет потребность мелких фермерских и домашних хозяйств в селе в одном устройстве.

Исследование и обсуждение. Как было указано процессе измельчения большое значение имеет количество ножей. Так как при большом количестве ножей можно добиться более высокой степени измельчения зерна за счет в единицы времени оказания большего количества воздействия на зерно при минимальной технологической скорости дробления. Для этого мы провели исследование с использованием различного количества ножей, расположенных симметрично на диске устройства в скоростном режиме ножей n = 3000 об/мин = const и сравнили результаты между вариантами по качеству измельчения. В результате установлено, что во всех вариантах зерно, поступающее в камеру дробления, подвергается 100% дроблению и покидает железную ситовую решетку полностью измельченным. Установлено, что с увеличением количества ножей в одном и том же скоростном режиме повышается качество измельчения, одновременно увеличивается и количество порошкообразных фракций менее 1 мм (рис. 2).

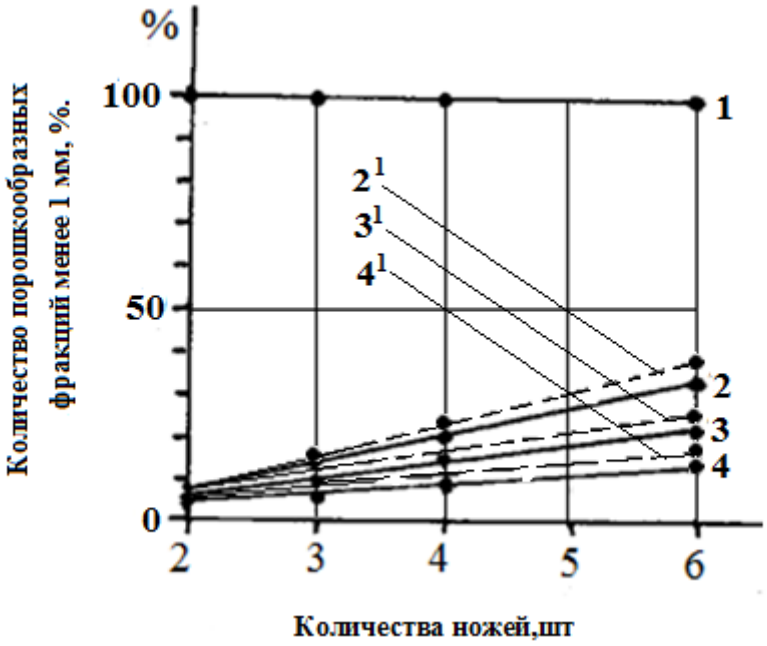

Рис.1.Влияние количества ножей на качество измельчения зерна и количество пылевидной фракций менее 1 мм, при влажности зерна 15%. Общий процент дробления 1; количество фракций енее 1 мм при измельчении; 2- зерен пшеницы; 3- кукурузы; 4- ячмень, 2^1,3^1 , 4^1- измельчение зерна при установления по 3 ножа на диске верхи по 3 ножа на диске низ; n=3000 циклов/мин=const.

Установлено, что для измельчения зерна в новом устройстве с одинаковой постоянной технологический скоростью вращения(скорость срезающий и рассекающий зерна свободным ударам ровным-3000 мин$^{-1}$) можно использовать 2, 3, 4, 6 режущих ножей с одинаковым углом установки между ними. В тоже времени определено что по мере увеличения количества ножей при одинаковой скорости вращения пропорционально увеличивается количество получаемых фракций размером менее 1 мм. и минимальная количества фракция, менее 10% (5÷8)% получается при числе ножей, равном 2. Поэтому в предлагаемом устройстве для измельчения зерна приняты режим скорости n=3000мин$^{-1}$ и количество ножей-2.

Определено, что при наличии двух ножей количество таких фракций при влажности зерна 15% составляет менее 10%, т.е. 5-8% и меньше, а в тех же условиях при 6 ножей - 32% (рис.2). Поэтому в малогабаритном устройстве целесообразнее использовать меньшее количество ножа, дающие более меньшее количество мелких фракции измельчение. Установлено, что при указанном режиме с увеличением влажности уменьшается выход пылевидных фракций с размером меньше 1мм.. При применении экспериментального устройства использовались два ножа, заточенные на 21°. Увеличение пылевидной фракций с увеличением числа ножей объясняется тем, что при большом количестве ножей одновременно на каждом обороте появляется больше режуще-ударные деформации, воздействующие, на зерно в камере измельчение и эта вызывают, большего образование мелких фракций - 2^1,3^1 , 4^1-(рис. 2).

Выводы:

1.Установлено, что для измельчения зерна в новом устройстве с одинаковой постоянной скоростью вращения можно использовать 2, 3, 4, 6 режущих ножей с одинаковым расстоянием между ними.

2.По мере увеличения количества ножей при одинаковой скорости вращения пропорционально увеличивается количество получаемых фракций размером менее 1 мм.

3.Установлено что: фракция менее 10% (5÷8)% получается при влажности зерна 15% и при числе ножей, равном 2. Поэтому в предлагаемом устройстве для измельчения зерна приняты режим скорости n=3000мин$^{-1}$ и количество ножей-2;

4. Определено что -с увеличением влажности уменьшается мелкие фракций продукта.

5. При применение нового устройства позволяет измельчение зерна до влажности 35% и больше. При этом отпадает необходимость в сушке зерна и затрата на эти операции.

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POSSIBILITIES OF IMPROVING QUALITY MANAGEMENT SYSTEMS IN THE DIGITAL AGE

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Abstract

It was noted that in the digital era, the classical approach to the definition of the concept and the emphasis on quality assurance are fundamentally changing. It is shown that focusing on the current and future needs of consumers requires prompt monitoring and regulation of product quality parameters on a real-time scale. Based on the forecast of the development of quality management systems, the structure of a digital system for ensuring the level of product quality required by the consumer is proposed in the article. Proposals for determining the minimum survey frequency for each of the measured (evaluated) quality parameters have been also developed. A mathematical model for establishing the number of numerical ratios about the value of single indicators of product quality is proposed too.

Keywords: quality consumers require, quality parameters mathematical model, digital quality management system, evaluation frequency measuring quality parameters

Introduction

The quality management systems (QMS) design is regulated by the fundamental standard ISO 9001, which has been revised several times since its inception. The purpose of revision of the standard is constant adaptation to changes in the production sphere in accordance with the development of the scientific and technical revolution. From TQM and lean production, quality management systems have gradually moved to systems that must comply with Industry 4.0, built on smart devices and cyber-physical systems with minimal human involvement [1, p.1-2], [2, p.1]. According to the definition of Quality 4.0: ASQ's (American Society for Quality) definition - Quality 4.0 brings together Industry 4.0's advanced digital technologies with quality excellence to drive substantial performance and effectiveness improvements [3, p.1]. The main tools of Quality 4.0 are the automation and digitization of quality assurance processes, and the ultimate goal of Quality 4.0 is to maintain constant quality using real-time data processing, the Internet of Things, artificial intelligence, and big data analytics [2, p.3]. Thanks to the creation of a European digital economy and society with long-term growth potential, the European Union plans to ensure competitiveness in the market [4, p.2]. This can be achieved through the digital transformation of society with digitization of evaluation processes and quality assurance of products, goods, and services based on the European metrological cloud [5, p.2].

Automation can help optimize quality management processes, reducing time and labor costs. Robotic process automation is a popular example of automation used in quality management. However, it is necessary to determine the polling frequency of the measuring channels.

Proposals to improve methods of product quality assessment

In the conditions of fierce competition, products, goods, services must be evaluated in real time according to an integral indicator, which is determined by the totality of all functional, aesthetic and economic properties, that is, characterized by the totality of consumer value and total costs for its production, sale (supply) and operation [6, p. 56]. It is obvious that in modern conditions, thanks to the high level of microelectronic and information technologies development, we can talk about an attempt to digitize the processes of determining the entire evaluation process in a real time scale of an integral quality indicator. That is, we can already talk about an attempt to build a cyber-physical system of quality assurance, support and evaluation. Thus, in the ideal case, during the construction and implementation of QMS at the current stage of technology development, we can talk about digital management in the quality management system (Fig. 1). The structure of the digital management system in the QMS can be presented as a set of five links that provide digital feedback in the real-time system of ensuring such a level of product and service quality that meets the customer's requirements. Digital measurement and assessment of object quality indicators by analogy with digital management of technical objects will play the role of a bridge connecting the control object with the main link of the QMS, which performs the task of generating control commands in accordance with the current requirements of the customer [7, p .145].

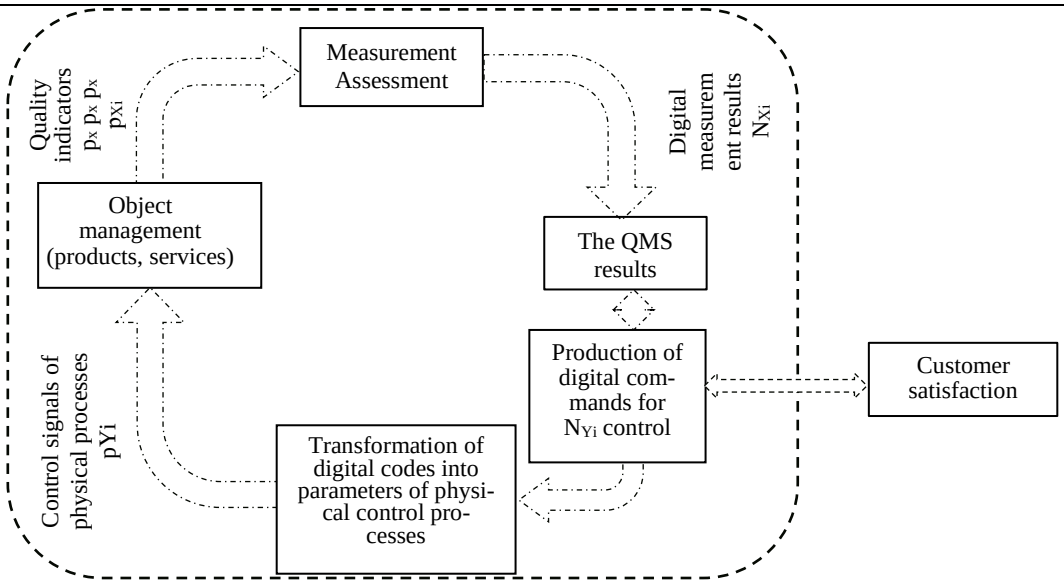

Fig. 1 – The structure of the digital management system in the QMS

The measurement or evaluation link should provide digital information about indicators of the quality of products and services (effectiveness of QMS). This information is compared in real time with the level of consumer satisfaction, and digital facility management commands are produced to maintain consumer satisfaction. This digital information is transformed into a set of control signals for the physical processes of the control object so as to satisfy the current or anticipated needs of the consumer. Digital management will ensure an increase in the objectivity of the implementation of all management processes and principles in the QMS.

Determination of the minimum survey frequency for each of the measured (evaluated) quality parameters

The object of management (products, services) in the general case has an infinitely large number of quality indicators (physical quantities), which in turn are reflected by an infinite number of numerical ratios. A more detailed analysis shows the need to choose such a number of quality indicators and a finite number of numerical ratios about their values that would currently satisfy the customers, as well as the foreseeable and unforeseen impact on the relevant stakeholders. Here we can draw a conclusion about the dynamism of the concept of quality of products and services, which will primarily depend on the foreseeable and unforeseen impact on all interested parties according to ISO 9001:2015. Since the introduction of QMS is a strategic decision of the organization, which can help improve its overall effectiveness and provide a solid basis for sustainable development initiatives, the choice of a certain number of quality indicators by the organization should be constantly changing [6, p.152]. This leads to the establishment of requirements for the flexibility of the structure of the developed QMS and the possibility of operationally changing the number of indicators of the quality of products and services in accordance with changes in the satisfaction of all interested parties. and building an extensible block for measuring/evaluating their values. It is expedient to determine the finite number of numerical ratios about the values of quality indicators of products and services in real time on the basis of ratios that follow from a theorem similar to the counting theorem (Nyquist-Shannon) [8, p.630], [9, p.14]. If the quality indicators can be approximated by a continuous signal x(t) with a spectrum limited by the frequency F_{max}, then it can be unambiguously and losslessly reconstructed from its discrete readings taken at the frequency $f_{dsr}=2F_{max}$, or, in another way, from the readings taken from period $T_{dsr}=1/2F_{max}$.

Then, by analogy with the method of determining the modulation error of the conversion with modulation-demodulation, it is possible to set the minimum value of the time of measurement/evaluation of the values of the quality indicators [10, p.67]: $T_{dsr} \geq (T_0/\pi) arcsin(\gamma_{max})$ (1)

here $T_{\Omega}=1/F_{max}$; T_{dsr} the minimum time duration for measurement/evaluation of the quality indicators values;

γ_{max} is the maximum value of the relative modulation error

When determining physical quality indicators, it should be taken into account that the speed of modern ADCs is usually much higher than the change time of these measured quality indicators. When evaluating qualitative quality indicators, one should take into account their very slow change, usually much smaller even compared to labor-intensive and time-consuming expert methods.

Establishing the number of numerical ratios about the value of product quality indicators

In order to guarantee the achievement of the required quality level of goods, products, and services produced with the measuring equipment (ME), modern international regulatory documents recommend systematic and complete control of measurement processes as a separate and long-term procedure. Traditionally, differential, complex and mixed methods are used to assess the quality of any product of the same type. Disadvantages of the differential method include a high degree of subjectivity and low accuracy in determining the quality factor [6, p. 29]. When using the complex method, it is necessary to choose a natural generalized quality indicator for a given type of product and to determine its functional dependence on the main

single indicators that, to one degree or another, affect its quality. The mixed method is based on the isolation of a number of separate groups covering the most essential properties of products, for which generalized comprehensive quality indicators are determined, followed by their comparison by the differential method with the corresponding indicators of the basic products [6, p.36].

It is natural to consider the object of measurement as a source, and the ME as a receiver of measurement information. This analog information is transmitted through the communication channel, in which the noise reduced to the input of the ME operates. It is known that the equivalent variance of the input random noise signal is defined as the sum of the variances of individual sources. During its determination, it is necessary to take into account the sources of both thermal and flicker noises. Then it is proposed to determine the amount of measurement information M_x received by the ME during measurement on the basis of the theorem of K.-E. Shannon [9, p.15]:

$$M_x = Ct_x = t_x B\, log_2\left(1+\frac{S_x}{N_n}\right) = t_x B\, log_2\left(1+\frac{U_x^2}{D_{nU}}\right), \quad (2)$$

where C is the performance of the measuring channel; t_x – measurement time;

$B=f_H-f_L$ is bandwidth of the measuring channel;

$S_x = (U_x^2/R_{in})t_{mx}$ is useful signal energy;

$N_n = (U_n^2/R_{in})t_{mx} = (D_n/R_{in})t_{mx}$ is energy of equivalent input noise;

U_x is measured voltage; R_{in} is input resistance of the ME;

U_n, $D_{nU} = D_{1U} + R_x D_{Iin} + 4kTR_x B$ is respectively, the voltage and variance of the equivalent input noise;

D_{n1U}, D_{Iin} is dispersion of equivalent noise by voltage and by current, respectively; k is the Boltzmann constant;

T is the temperature of the internal resistance of the source of the measured voltage.

On the other hand, the main purpose of the measurement process is to obtain measurement information, the numerical value of which is usually determined through entropy (Shannon's measure) or logarithmic measure of uncertainty (Hartley's measure). It is natural to assume that the input uncertainty is equal to the width X_2-X_1 of the ME measurement range, and the uncertainty after the measurements will be determined by the error of discrimination Δ_p of individual measurement results. Then, under the equal probability laws of the distribution of the measured value and the discrimination error Δ_p, the amount of information obtained after measurement can be estimated according to the ratio [11, p. 536]:

$$H_{mx} = log(X_2 - X_1) - log\,\Delta_p = log\,\frac{X_2-X_1}{\Delta_p}, \quad (3)$$

here X_2-X_1 is the width of the measurement range of the ME;

Δ_p is the error of distinguishing individual measurement results with the data of the ME.

The coefficient of quality K_x or the efficiency of ME can be presented in the form of the product of both quantities obtained as a result of the measurement of information:

$$K_x = M_x H_{mx} = t_x B\, log\left(1+\frac{X^2}{D_n}\right) log\,\frac{X_2-X_1}{\Delta_p}, \quad (4)$$

here $X=U_x$; I_xR_{sh}; $I_{sc}R_x$ – input electrical signals when measuring voltage, current, and resistance, respectively.

From the analysis of expression (4), we conclude that, all other conditions being the same, the amount of measurement information obtained with the help of a given ME will be determined by the errors of the measuring circle, which are determined by such factors as the characteristics of the ME, the object, measurement conditions, the qualification of the operator, time, etc. [10, p. 48]. When using a polynomial model, in most practical cases, the expression for the discrimination error can be represented by a quadratic function [10, p.58]. It is clear that at the same time data on the laws of probability distribution of elementary errors are needed to find the distribution of the resulting error based on their composition. According to this distribution, the confidence coefficient k(P) is correctly determined, the value of which depends on the value of the confidence probability P. The analysis of the above leads to the conclusion about the practical difficulty of estimating the value of the discrimination error. In addition, with the passage of time t due to the aging and wear of the ME, its error changes (degrades). Therefore, in order to ensure the metrological reliability of the ME, it is released from production or repair with a certain technological reserve, the value of the coefficient of which is k_{mn}=0.4...0.8 of the permissible error value [10, p.58]. In most practical cases, the expression for the error of the ME $\Delta_{pe}(x, P, \vec{Q}, \vec{\xi}, k_н, t)$ in the working conditions of operation and at the moment of time t can be given as:

$$\Delta_{pe}\left(x, P, \vec{Q}, \vec{\xi}, k_н, t\right) = \bar{\Delta}\left(x, \vec{Q}, \vec{\xi}, k_н, t\right) \pm k\left(P, \vec{Q}, \vec{\xi}, t\right)\sigma\left(x, P, \vec{Q}, \vec{\xi}, k_н, t\right) =$$
$$= \Delta_{0pe}(P, \vec{Q}, \vec{\xi}, k_н, t) + \delta_s(P, \vec{Q}, \vec{\xi}, k_н, t)\cdot x + \varepsilon(P, \vec{Q}, \vec{\xi}, k_н, t)\cdot x^2, \quad (5)$$

here $\Delta_0(P, \vec{Q}, \vec{\xi}, k_н, t) = \bar{\Delta}_0(\vec{Q}, \vec{\xi}, k_н, t) \pm k(P, \vec{Q}, \vec{\xi}, t)\sigma_0$ is the ME additive error component (AEC);

$\delta_s(P, \vec{Q}, \vec{\xi}, k_н, t) = \bar{\delta}_s(\vec{Q}, \vec{\xi}, k_н, t) \pm k(P, \vec{Q}, \vec{\xi}, t)\sigma_\delta$ is the coefficient of the ME multiplicative error component;

$\varepsilon(P, \vec{Q}, \vec{\xi}, k_H, t) = \bar{\varepsilon}(\vec{Q}, \vec{\xi}, k_н, t) \pm k(P, \vec{Q}, \vec{\xi}, k_н, t)\sigma_\varepsilon$ is the coefficient of the ME quadratic error component;

$\vec{Q}$ is the ME parameters vector;

$\vec{\xi}$ is the vector of elementary errors;

k_H is the ME nominal coefficient of transmission;

P – confidence probability.

The random component of the AEC will be determined by the noises of the components of the HRT, and thermal noises and noises of the 1/f type should be taken into account. In connection with the divergence of the noise spectrum 1/f in the low-frequency limit, the question of its stationarity arises. However, if the lower limit of the frequency range of the ME is taken to be the frequency f_{kl} of its calibrations (setting of "zero" readings), and the upper frequency f_{hf} of transmission, then its 1/f noise will be frequency limited and, in the first approximation, stationary in a broad sense, the amplitude which are distributed according to the normal law [12, p. 165]. The dispersions D_{nU} and D_{nI} of the noise signal, reduced to the input of the ME, in the frequency band from $\omega_{kl}=2\pi f_{kl}$ to $\omega_{hf}=2\pi f_{hf}$ can be determined by the Wiener-Hinchin theorem according to the relation [10, p.58]:

$$D_n = \lim_{\tau \to 0} D_n(\tau) = A_{0e}(f_{hf} - f_{kl}) + A_{fe} f_{fe} \ln \frac{f_{hf}}{f_{kl}}, \quad 8.6)$$

here A_{0e}, A_{fe}, ω_{fe} is the spectral densities of the equivalent densities of thermal and 1/f noises and the circular frequency of the conjugation of these noises respectively;

$D_n=D_{nU}$; D_{nI}.

Therefore, the device that implements feedback in the system of digital control of the object, from a metrological point of view, will perform the task of a precision multi-channel DAC and must have high metrological characteristics.

Conclusions

In the era of digital technologies, both the classical approach to defining the concept of quality and its provision are changing significantly. Orientation to the current and future needs of consumers requires operational monitoring and regulation of product quality parameters on a real-time scale. Based on the forecast of the development of Quality 4.0 quality management systems, the structure of a digital system for ensuring the level of product quality required by the consumer is proposed. Proposals for determining the minimum frequency of surveys for each of the measured (evaluated) quality parameters have also been developed. A mathematical model for establishing the number of numerical ratios in relation to the value of individual indicators of product quality is also proposed.

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CONSTRUCTION AND RESEARCH OF STATIC CHARACTERISTICS OF AN ASSYNCHRONIZED GENERATOR

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ПОБУДОВА І ДОСЛІДЖЕННЯ СТАТИЧНИХ ХАРАКТЕРИСТИК АСИНХРОНІЗОВАНОГО ГЕНЕРАТОРА

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Abstract
In the article without using an equivalent circuit analytical expressions for constructing external characteristics and transmitted power are obtained directly from the dynamics equations of an assynchronized generator (ASG). A comparative analysis of the static characteristics of ASG in asynchronous and synchronous operating modes was carried out.

Анотація
У статті без використання схеми заміщення безпосередньо з рівнянь динаміки асинхронізованого генератора (АСГ) отримані аналітичні вирази для побудови його зовнішніх характеристик і активної потужності. Проведено порівняльний аналіз статичних характеристик АСГ в асинхронному і синхронному режимах роботи.

Keywords. Assynchronized generator, mathematical model equations, external characteristics, type of electrical load, stability margin.
Ключові слова. Асинхронізований генератор, рівняння математичної моделі, зовнішні характеристики, тип електричного навантаження, запас стійкості.

Постановка проблеми. Збільшення значень реактивних опорів, а також зростання довжини ліній електропередачі та їх потужностей приводить до зниження динамічної стійкості електричних систем. Важливу проблему, з якою пов'язана експлуатація генераторів, представляє також робота енергосистеми в години зниження активного навантаження. Виникаючий при цьому надлишок реактивної потужності може призвести до неприпустимого підвищення напруги в лінії. Для запобігання цього в системі повинні бути передбачені пристрої, що споживають надлишок реактивної потужності. АСГ завдяки своїм можливостям допускає багатоцільове використання. Він застосовується не тільки для виробництва електроенергії, але також може використовуватися як кероване джерело реактивної потужності з великим регулювальним діапазоном, особливо у напрямку її споживання. При обертанні вала із синхронною швидкістю АСГ працює як звичайний синхронний генератор з живленням обмотки збудження постійним струмом. На виході генератора утвориться синусоїдальна напруга необхідної частоти, наприклад 50 Гц. При зміні швидкості обертання вала зміниться також частота напруги на затискачах статора. Для того, щоб на виході АСГ створити напругу незмінної частоти, як це потрібно від якісного генератора, необхідне обертання поля збудження відносно ротора з частотою ковзання. Цього можна досягти при живленні обмоток ротора струмом частоти ковзання. Тоді поле збудження починає обертатися відносно ротора, що дозволяє компенсувати обертання ротора зі швидкістю, відмінною від синхронної. Асинхронізовані генератори відрізняються від традиційних синхронних турбогенераторів наявністю на роторі двох обмоток і двоканальною системою збудження, що забезпечує незалежне керування електромагнітним моментом (активною потужністю) і напругою (реактивною потужністю). За рахунок такого керування і можливості переміщення відносно ротора магнітного поля, створеного обмотками збудження, АСГ має значно кращі, ніж синхронні генератори, показники статичної і динамічної стійкості. Це дозволяє використовувати АСГ у режимах глибокого споживання з мережі реактивної потужності для нормалізації рівнів напруги, у чому виникає необхідність

при надлишку реактивної потужності в мережах, обумовленому наявністю високовольтних кабельних і повітряних ліній електропередач, недостатністю засобів, що компенсують, зниженням навантажень, особливо в літній період і нічний час [1].

АСГ є різновидом машини подвійного живлення, можливості якої з генерації і споживання реактивної потужності докладно досліджені в роботі [2]. У статті [3] для асинхронного режиму роботи АСГ побудовані залежності активної і реактивної потужностей статора у функції величини ковзання ротора. При цьому діапазон зміни ковзань узятий незначний і тільки для швидкостей обертання ротора нижче синхронної швидкості. У [4] створена динамічна модель АСГ в осях d,q, що працює на автономне навантаження. Наводяться характеристики холостого ходу і зовнішні характеристики при різних типах навантаження. Однак відсутні виведення формул і не дані кінцеві вирази, за якими будувалися представлені графіки статичних характеристик. У [5] представлена схема набору моделі АСГ у середовищі Matlab Simulink без запису яких-небудь рівнянь динаміки і статики. Звідси не до кінця зрозуміло, як створена модель і побудовані представлені характеристики. Криві переданої потужності і зовнішні показані тільки для активного навантаження АСГ.

У статті ставиться задача з рівнянь динаміки як найбільш загальної моделі АСГ отримати формули для розрахунку статичних характеристик АСГ при різних видах електричного навантаження, що підключається до статора.

Виклад основного матеріалу. Для побудови статичних характеристик прийнята узагальнена математична модель АСГ, представлена рівняннями [6]:

$$\vec{U}_s = \vec{I}_s R_s + \frac{d\vec{\Psi}_s}{dt} + j\omega_k \vec{\Psi}_s; \quad \vec{U}_r = \vec{I}_r R_r + \frac{d\vec{\Psi}_r}{dt} + j(\omega_k - \omega)\vec{\Psi}_r;$$

$$\vec{\Psi}_s = \vec{I}_s L_s + \vec{I}_r L_m; \quad \vec{\Psi}_r = \vec{I}_s L_m + \vec{I}_r L_r. \qquad (1)$$

У векторній формі система рівнянь (1) у сталому режимі записується в такий спосіб

$$-\vec{U}_s = R_s \vec{I}_s + j\omega_0 \vec{\Psi}_s; \quad \vec{U}_r = R_r \vec{I}_r + j(\omega_0 - \omega)\vec{\Psi}_r;$$

$$\vec{\Psi}_s = L_s \vec{I}_s + L_m \vec{I}_r; \quad \vec{\Psi}_r = L_m \vec{I}_s + L_r \vec{I}_r. \qquad (2)$$

При орієнтації системи координат за будь-яким вектором, її швидкість обертання в статиці буде постійною і рівною круговій частоті поля в зазорі машини ω_0. До рівнянь (2) потрібно додати рівняння навантаження

$$\vec{U}_s = R_н \vec{I}_s + L_н \frac{d\vec{I}_s}{dt} + j\omega_0 L_н \vec{I}_s, \qquad (3)$$

де $R_н, L_н$ – активний опір і індуктивність навантаження фази статора генератора.

У рівняннях напруг (2) замість потокозчеплень підставляємо їх значення, записані через струми, а вектор $\vec{U}_s$ замінюємо виразом (3). Тоді після спрощень одержимо

$$0 = R_\Sigma \vec{I}_s + jX_\Sigma \vec{I}_s + jX_\mu \vec{I}_r;$$

$$\vec{U}_r = R_r \vec{I}_r + jsX_\mu \vec{I}_s + jsX_r \vec{I}_r, \qquad (4)$$

де $X_н = \omega_0 L_н; X_\mu = \omega_0 L_m; X_s = \omega_0 L_s$;

$X_r = \omega_0 L_r$; $R_\Sigma = R_s + R_н; X_\Sigma = X_s + X_н$.

З першого рівняння (4) знаходимо струм ротора

$$\vec{I}_r = \frac{j\vec{I}_s(R_\Sigma + jX_\Sigma)}{X_\mu}. \qquad (5)$$

Підставляємо співвідношення (5) у друге рівняння (4), після розв'язання якого відносно струму статора маємо

$$\vec{I}_s = \frac{-jX_\mu \vec{U}_r}{sX_\mu^2 + (R_r + jsX_r)(R_\Sigma + jX_\Sigma)}. \qquad (6)$$

Напруга на затискачах фаз генератора в статиці визначається за формулою

$$\vec{U}_s = (R_н + jX_н)\vec{I}_s. \qquad (7)$$

Зовнішні характеристики будуються для заданого значення ковзання $s_0 = \text{const}$. Напруга збудження $\vec{U}_r = U_{ru} + jU_{rv}$ визначається в такий спосіб. Проекція U_{rv} дорівнює у відносних одиницях прийнятому ковзанню [6]:

$$u_{rv} = \frac{U_{rv}}{U_{rm}} = s_0, \qquad (8)$$

де U_{rm} – амплітуда фазної напруги нерухомого ротора. Реактивна складова напруги ротора U_{ru} підбирається так, щоб при номінальному струмі статора його напруга дорівнювала номінальному або близькому до нього значенню.

Усі розрахунки виконувалися для асинхронної машини з фазним ротором з номінальними даними:

$P_н = 110$кВт, $U_{нф} = 220$В , $\omega_c = 157\text{с}^{-1}$.

При побудові зовнішніх характеристик струм статора змінюється шляхом зміни опору навантаження $R_н + jX_н$. Дорівнювали нулю одну зі складових навантаження і варіювалася інша складова. Таким чином, навантаження виходить цілком активним, чисто індуктивним або ємнісним. Побудова характеристик проводилася в програмі Mathcad. Після обчислення комплексів струму і напруги статора за (6) і (7) визначаються їх діючі значення за формулами

$$I_s = \frac{\sqrt{\text{Re}(\vec{I}_s)^2 + \text{Im}(\vec{I}_s)^2}}{\sqrt{2}},$$

$$U_s = \frac{\sqrt{\text{Re}(\vec{U}_s)^2 + \text{Im}(\vec{U}_s)^2}}{\sqrt{2}}. \qquad (9)$$

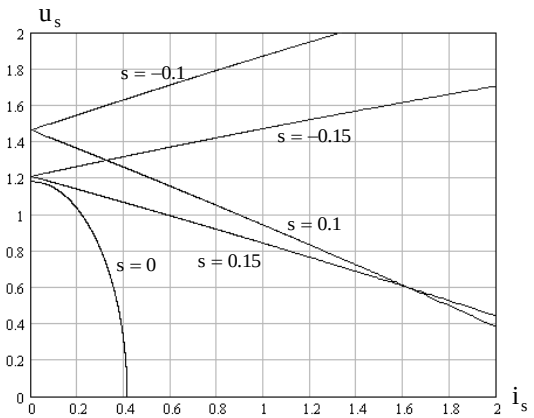

Рисунок 1 – Зовнішні характеристики АСГ при активному навантаженні $(\cos\varphi_н = 1)$ *і різних ковзаннях ротора*

Зовнішня характеристика будується як залежність діючого значення напруги статора АСГ від діючого значення струму статора, тобто $U_s(I_s)$. Для обчислення напруги холостого ходу, коли $\vec{I}_s = 0$, підставляємо це значення струму в рівняння (2) і після перетворень одержимо наступну формулу

$$\vec{U}_s = \frac{-jX_\mu \vec{U}_r}{R_r + jsX_r}. \qquad (10)$$

На рисунку 1 показані зовнішні характеристики АСГ при активному навантаженні і частоті напруги статора 50 Гц. Для всіх графіків асинхронного режиму напруга ротора однакова. Напруга і струм статора представлені у відносних одиницях: $i_s = I_s/I_{sн}$, $u_s = U_s/U_{sн}$. З графіків можна зробити ряд висновків. В асинхронному режимі характеристики істотно більш жорсткі, чим у режимі синхронного генератора. При одному напрямку обертання поля збудження і ротора напруга, що генерується, зменшується зі збільшенням струму навантаження. Це обумовлюється тим, що потік статора (реакція якоря) для $s > 0$ спрямований зустрічно потоку збудження (ротора) і робить на машину дію, що розмагнічує. В міру зростання струму статора потік реакції якоря збільшується і результуючий потік АСГ, а також індукована їм ЕРС статора, зменшуються, що приводить до зниження напруги на навантаженні.

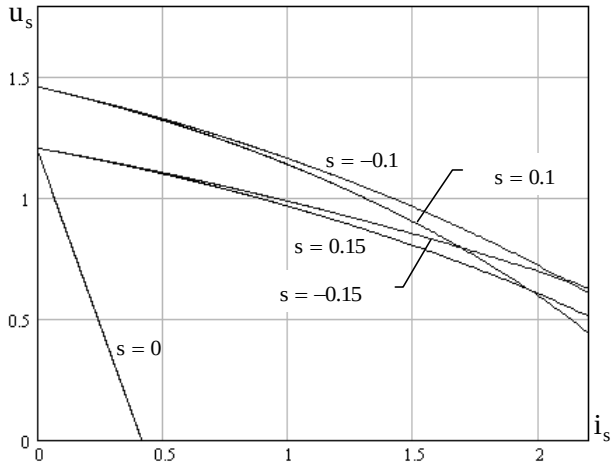

Рисунок 2 - Зовнішні характеристики АСГ при індуктивному навантажені $(\cos\varphi_н = 0, \varphi_н > 0)$ *і різних ковзаннях ротора*

При зустрічному напрямку обертання поля збудження і ротора $(s < 0)$ напруга статора генератора при зростанні струму збільшується. Зовнішня характеристика стає зростаючою тому, що реакція якоря спрямована так само, як і потік збудження, тобто АСГ намагнічується ще більше струмом статора. У такому випадку збільшується результуючий потік у зазорі машини і, отже, у міру зростання струму статора індукована ЕРС зростає. Це призводить до збільшення напруги на виході генератора.

Чим вище частота струму ротора (поля збудження), тим жорсткіше зовнішні характеристики і слабкіше залежність напруги статора АСГ від навантаження. Це обумовлюється тим, що при збільшенні частоти струму ротора відбувається більш повна компенсація реакції якоря полем збудження. Синхронні генератори не здатні стійко працювати в режимі глибокого споживання реактивної потужності навіть при наявності регуляторів сильної дії.

Якщо навантаження цілком індуктивне, то зовнішні характеристики АСГ спадні при будь-яких знаках ковзання, що зображено на рисунку 2. Для швидкостей більше синхронної $(s<0)$, жорсткість характеристик вище, ніж у характеристик, побудованих по тим же даним, але з позитивним ковзанням $s>0$. Це обумовлюється меншою дією потоку, що розмагнічує, статора (якоря) при швидкостях вище синхронної. Якщо навантаження чисто ємнісне, тобто $\cos\varphi_н = 0,\ \varphi_н < 0$, то зовнішні характеристики генератора будуть зростаючими при будь-яких ковзаннях.

Розглянемо характеристики генерації потужності. Активна потужність статора генератора з урахуванням (7) визначається за формулою

$$P_s = \frac{3}{2}\mathrm{Re}\left[\vec{U}_s\vec{I}_s^{*}\right] = \frac{3}{2}\mathrm{Re}\left[\left(R_н + jX_н\right)\vec{I}_s\,\vec{I}_s^{*}\right] = \frac{3}{2}\left[\left(R_н + jX_н\right)\left(I_{su}^2 + I_{sv}^2\right)\right] = \frac{3}{2}R_н I_s^2 . \qquad (11)$$

З виразу струму статора (6) виділяються дійсна і уявна частини множенням знаменника дробі на сполучений комплекс. Після перетворень отримані наступні вирази для проекцій вектора струму статора

$$I_{su} = \frac{X_\mu U_{rv}\left(sX_\mu^2 + R_r R_\Sigma - sX_r X_\Sigma\right) - X_\mu U_{ru}\left(R_r X_\Sigma + sX_r R_\Sigma\right)}{\left(sX_\mu^2 + R_r R_\Sigma - sX_r X_\Sigma\right)^2 + \left(R_r X_\Sigma + sX_r R_\Sigma\right)^2}; \qquad (12)$$

$$I_{sv} = \frac{-X_\mu U_{ru}\left(sX_\mu^2 + R_r R_\Sigma - sX_r X_\Sigma\right) - X_\mu U_{rv}\left(R_r X_\Sigma + sX_r R_\Sigma\right)}{\left(sX_\mu^2 + R_r R_\Sigma - sX_r X_\Sigma\right)^2 + \left(R_r X_\Sigma + sX_r R_\Sigma\right)^2}. \qquad (13)$$

По співвідношеннях (11)-(13) будуються залежності потужності, переданої від генератора в навантаження, від струму статора при різних ковзаннях. Залежності активної потужності $p_s(i_s)$ у відносних одиницях ($p_s = P_s/P_н$) представлені на рисунку 3.

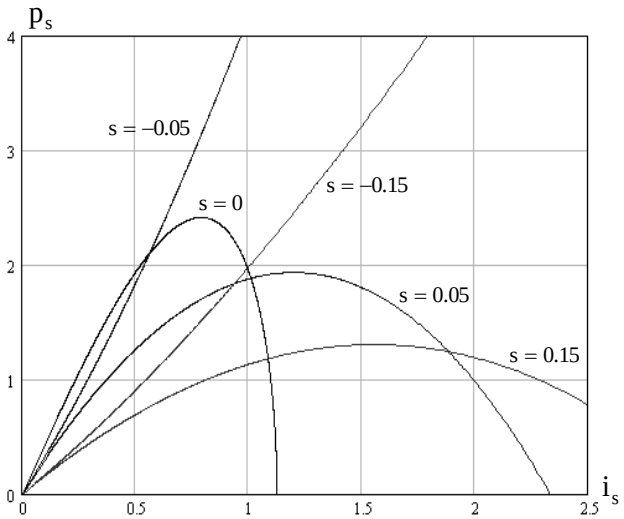

Рисунок 3 – Залежність потужності, що генерується, від струму навантаження при різних частотах збудження АСГ

З графіків видно, що в синхронному режимі (s=0) у генератора відбувається різке зниження потужності, що віддається в навантаження, чого не відбувається при $(s \neq 0)$ змінній напрузі збудження. Зрив генерації потужності в синхронному режимі обумовлюється різким зниженням напруги статора АСГ через дію потоку якоря, що розмагнічує і, отже, зменшення ЕРС статора. В асинхронному режимі дія струму навантаження (статора), що розмагнічує, призводить до зменшення проти-ЕРС у колі ротора (збудження) і, як наслідок, до збільшення струму збудження при заданому векторі напруги ротора. У цьому виявляється ефект автоматичної компенсації реакції якоря. У синхронному режимі реакція якоря не компенсується, так що результуючий магнітний потік знижується значно швидше, ніж в асинхронному режимі роботи. Тому при швидкостях нижче синхронної $(s>0)$ екстремум активної потужності, що генерується, досягається при струмах статора помітно перевищуючих таке його значення для синхронної швидкості. При швидкостях вище синхронної напруга на активному навантаженні генератора зростає зі збільшенням струму, а не зменшується, що пов'язано з дією потоку статора, що намагнічує. При цьому екстремум за потужністю відсутній.

Висновки. З аналізу побудованих за запропонованою методикою статичних характеристик АСГ можна зробити наступні висновки. Затрачувана на збудження АСГ потужність в асинхронному режимі більше, ніж у синхронному режимі і збільшується в міру зростання частоти струму ротора. Однак асинхронний режим синхронного генератора забезпечує більшу стійкість перетворення механіч-

ної енергії в електричну, чим традиційний синхронний режим. Це виявляється в більш високій жорсткості зовнішніх характеристик і віддачі більшої потужності в навантаження при струмах статора більше номінального. Зі збільшенням частоти струму ротора збільшується стабільність напруги на затискачах АСГ по відношенню к струму навантаження.

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