



*I international scientific conference
Brussels. Belgium
15-16.04.2025*

DIALOGUE OF TIMES: PAST, PRESENT, FUTURE

Proceedings of the I International Scientific
and Practical Conference

15-16 April 2025

BRUSSELS. BELGIUM

2025

UDC 001.1

BBC 1

I International Scientific and Practical Conference «Dialogue of times: past, present, future», April 15-16, 2025, Brussels. Belgium. 107 p.

ISBN 978-91-65424-16-6

DOI <https://doi.org/10.5281/zenodo.15256023>

Publisher: «SC. Scientific conferences»

Main organization: 

Editor: Hans Muller

Layout: Ellen Schwimmer

The conference materials are in the public domain under the CC BY-NC 4.0 International license.

The publisher is not responsible for the materials published in the collection. All materials are provided in the author's edition and express the personal position of the participant of the conference.

The sample of the citation for publication is Gugin Aleksandr, Lisnievska Yuliia ANTI-ADVERTISING IN THE HOTEL BUSINESS // I International Scientific and Practical Conference «Dialogue of times: past, present, future», April 15-16, 2025, Brussels. Belgium. Pp.9-11, URL: <https://sconferences.com>

Contact information

Website: <https://sconferences.com>

E-mail: info@sconferences.com

Content

Agricultural sciences

Jamalova R.H., Chiragli A.E. OBTAINING MINERAL FERTILIZERS FROM PHOSPHORITES PROCESSING WASTES	4
Ibrahimov S. K., Abbasova L.M. WAYS OF FORMATION AND ELIMINATION OF ALKALINITY IN SOILS	8

Arts

Dadashov Eldar Agha Dadash COMMENTARY FEATURES OF THE OVERTURE FROM THE KOROGHLU OPERA IN NIYAZY'S INTERPRETATION	12
---	----

Chemical sciences

Iryna Koshchii, Yuri Klimko, Oleksandr Vasilkevich SYNTHESIS OF POTENTIAL CORROSION INHIBITORS BASED ON QUATERNARY SALTS OF PYRIDE-CONTAINING AMIDES AND UREAS	15
--	----

Economic sciences

Huseynov Nihad IMPORTANT ASPECTS OF DEVELOPMENT OF INFRASTRUCTURE OF TOURISM ENTERPRISES OF AZERBAIJAN	22
Sevinc Ibrahimova, Mayil Orujov, Azer Orujov, Nermin Orujova DIVERSIFICATION OF THE NON-RESOURCE SEKTOR OF THE ECONOMI OF THE PEPUBLIC OF AZERBAIJAN BASED ON SUSTAINABLE DEVELOPMENT AND ANALYSIS OF THE EXPERIENCE OF FOREIGN COUNTRIES IN THIS AREA	27
Muftaydinov Kyyomiddin PERIOD OF SMALL AND MEDIUM BUSINESS DEVELOPMENT IN THE COUNTRY AND CRITERIA FOR DETERMINING	40
G. Akybayeva, Z. Yeskerova, S. Mambetova, S. Daribekov, Sh. Niyazbekova WOMEN'S LEADERSHIP IN KAZAKHSTAN'S PUBLIC ADMINISTRATION SYSTEM	44
Umarov Ilhomjon Yuldashevich IMPLEMENTATION AND DEVELOPMENT OF INNOVATIONS IN THE TRADITIONAL ECONOMY OF UZBEKISTAN	50

Historical sciences

Abdullaly Sanan Ragib THE ROLU AND PLACE OF AZERBAIJAN IN ENERGY SECURUTY SYSTEM OF THE USA	53
---	----

Mathematical sciences

Sahib Ali oglu Aliyev, Aygun Nadir gizi Mammadova ULTRATRANSFER JACOBIAN POLYNOMIALS	56
--	----

Medical sciences

Arman Khozhayev, Aina Uaissova, Diana Forsh, Madina Mardenova, Adiya Arkeyeva, Xeniya Dissayenko, Serik Baizakov THYROID CANCER: CONTEMPORARY STATE OF THE PROBLEM	59
Spartak Sirakanyan CLASSIFICATION OF NORMAL AND PATHOLOGICAL ECG SIGNALS BASED ON DEEP LEARNING	67

Pedagogical sciences

Abdrasilova A.M., Sydykbayeva S.A. ARTIFICIAL INTELLIGENCE CAPABILITIES: STRATEGIES FOR IMPROVING THE QUALITY OF CHEMICAL EDUCATION	69
Faizulla B.A., Kudaibergenova M.R. THE BENEFITS OF DEVELOPING SOCIO-CULTURAL COMPETENCE IN ENGLISH LESSONS	71
Eshimbetova G.S., Baitasheva G.U. MODERN APPROACHES TO EVALUATING THE EFFECTIVENESS OF FIELD TRAINING: THE POTENTIAL OF QUALIM-ETRY	73
Nurmatkyzy Zhasmin, R.K.Rahmetullaeva WAYS OF DEVELOPING THE INFORMATION AND COMMUNICATION COMPETENCE OF STUDENTS THROUGH THE USE OF INTERACTIVE METHODS IN TEACHING ORGANIC CHEMISTRY	77
Tolegenov Erasyl Zhandosulu, Tataeva Roza Kabdygalievna HISTOLOGICAL EXAMINATION OF THE NEUROBIOLOGICAL FOUNDATIONS OF SUICIDAL BEHAVIOR	79

Philological sciences

Kruhliakova Kateryna, Grynko Olga

SPECIFIC FEATURES OF TRANSLATING PHRASEOLOGICAL UNITS IN THE TV SERIES GOOD OMENS

82

Akhmetov Yersultan Abdrakhmanuly, Ablayeva Raikhan Babaibekovna, Bokhanova Aigul Serikbayevna

M. BULGAKOV'S NOVEL "THE MASTER AND MARGARITA" SEMANTIZATION OF COGNITIVES OF THE CONCEPT "DEPRIVATION"

93

Technical sciences

Abdiyeva Meltem Tahir

ELECTRONIC CADASTRE DATABASES AND CARTOGRAPHIC DATA IN THE CIS

100

Amirkhan Shakizan

OPPORTUNITIES AND CHALLENGES OF DIGITALIZATION IN ENTERPRISES

103

Agricultural sciences

OBTAINING MINERAL FERTILIZERS FROM PHOSPHORITES PROCESSING WASTES

Jamalova R.H.

Chiragli A.E.

Azerbaijan State Oil and Industry University

Abstract

The article presents the results of studies on the separation of liquid and solid phases of the decomposition products of mineralized mass – waste from enrichment of phosphorites of the Nakhchivan with nitric acid. It is shown that the resulting pulp has a non-stratifying consistency and is not subject to filtration. Optimum technological parameters of the phase separation process by preliminary ammonization of the pulp with gaseous ammonia to pH 5-7.5 are established.

Keywords: mineralized mass, nitric acid, ammonization, filtration, fertilizer precipitate, liquid nitrogen-calcium fertilizers.

Due to the reduction of soils suitable for agriculture, shortage of fresh water and the increase in the population of the planet, the provision of the world's population with food has become much more urgent. One of the ways to solve the food problem is to increase the yield of agricultural crops, introduce the latest soil cultivation technologies, use high-yielding crop varieties and water-saving methods of growing plants, use mineral and organomineral fertilizers, plant protection products, plant growth and development stimulants, microelements [1-4]. It provides the agro-industrial complex with the necessary mineral fertilizers, pesticides, defoliants and other means of chemicalization. Today, agriculture is fully provided with nitrogen and potassium fertilizers, while the need for phosphorus-containing fertilizers is met by 30-35%. There are practically no productions of complex NPK fertilizers for drip irrigation, organomineral and micronutrient fertilizers.

Chemical plants producing phosphorus fertilizers operate on phosphate raw materials mined in the Nakhchivan with a low phosphorus content (16.2% P_2O_5), high carbonate content (up to 30% CO_2) and an increased calcium modulus ($CaO : P_2O_5 = 2.8-3.5$). Such raw materials are practically unsuitable for processing into phosphorus-containing fertilizers [8, 9]. The plants are supplied with washed, roasted phosphorus concentrate obtained by complex enrichment of phosphorus ore, which produces a large amount of phosphorus-containing waste, which is 42% of the original amount of P_2O_5 in the original ore [10]. More than 14 thousand tons of waste in the form of mineralized mass, enrichment tailings, and dust fraction have accumulated at the Nakhchivan phosphorus complex. Every year, more than 135 thousand tons of P_2O_5 are sent to waste during the enrichment of phosphorites of the Central Complex. If we take into account the phosphorus content in the enrichment waste, the reserves of ore of unenriched phosphate raw materials and find a way to involve them in industrial production, then it is possible to increase the supply of phosphorus-containing fertilizers to agriculture. In this regard, the most promising methods are nitric acid processing [6,8,9].

The advantage of nitric acid is that the formation of both solid and liquid waste is practically excluded, since nitric acid is used both ways: as a source of active hydrogen ion, for the decomposition of phosphate raw materials, and as a carrier of nitrogen - a useful component of liquid and solid fertilizers. The absence of production facilities in Azerbaijan for obtaining phosphorus and liquid fertilizers by nitric acid processing of phosphorites of Nakhchivan is associated with the difficulties of separating the decomposition products of phosphorites of Nakhchivan with nitric acid and the need for freezing or binding calcium nitrate into calcium sulfate by introducing sulfuric acid or sulfate salts. Thus, research aimed at finding effective ways of processing secondary resources of the chemical industry - waste from the enrichment of phosphorites of Nakhchivan - mineralized mass (MM) into the production of mineral fertilizers is very relevant from both environmental, social and economic points of view [5,7].

To study the process of processing the waste from the enrichment of phosphorites of Nakhchivan, we used the following MM composition (wt. %): P_2O_5 -13.36; CaO – 41.75; MgO – 0.75; Fe_2O_3 – 1.25; Al_2O_3 - 1.04; CO_2 – 11.66; SO_3 – 1.85; F - 1.82, n.o. – 10.95, H_2O – 1,02 with a calcium module of 3.09, non-concentrated 55% nitric acid and gaseous ammonia. The studies were carried out on a laboratory

setup consisting of a glass reactor with a mechanical stirrer and placed in a thermostat. The analysis of the feedstock, semi-finished products, and finished fertilizers for the content of the main components was carried out using known methods of chemical analysis [17-19]. The effect of temperature and duration of the process on the degree of MM decomposition with 40-42% nitric acid at its rate of 107% was studied at temperatures of 40, 60 and 70°C and a constant stirring rate. The results are presented in Table 1. The data in the table show that the process of MM decomposition with nitric acid occurs at a high speed and during the first minute of interaction 93.00-95.05% P_2O_5 , 90.14-93.22% CaO and 85.05-87.96% fluorine are converted into acid in the temperature range of 45-65°C. The decomposition process is almost complete within 5-10 minutes and the degree of P_2O_5 extraction is 98.15-99.95%. Under these conditions, the degree of CaO extraction is lower than P_2O_5 and is 96.98-98.10%, which is explained by the presence of up to 2,5% calcium sulfate in the MM composition. The degree of fluorine extraction is 91.85-94.88%.

Figure 1 shows the data on the degree of P_2O_5 extraction into a solution of 40-42% nitric acid depending on the temperature and duration of interaction of the components. It is evident from the figure that the process of P_2O_5 extraction exceeds 98-99% after 6 minutes.

Taking into account that when neutralizing nitrate-phosphate solutions up to pH 3,5, the filtration efficiency of wet unwashed sediment increases from 160 kg/m²·h, in the absence of ammonium nitrate, to 1350-1650 kg/m²·h, in the absence of ammonium nitrate, the influence of the degree of ammonification of nitric acid decomposition products MM in the interval pH 3,5-7 was studied. The obtained data are shown in table 2.

Table 1.
The influence of temperature and duration of the process on the degree of extraction of P_2O_5 , CaO and F from MM in a solution of 35-37% nitric acid at a rate of 100-103%.

№	Time, min	Degree of extraction, %		
		P ₂ O ₅	CaO	F
Temperature 40 °C				
1	5	99,13	97,39	92,29
2	15	99,36	97,71	94,09
3	30	99,53	97,78	96,18
Temperature 50 °C				
4	5	99,39	97,88	93,48
5	15	99,61	97,98	94,88
6	30	99,69	98,28	97,68
Temperature 60 °C				
7	10	99,97	-	-
8	15	99,97	98,18	96,55
9	30	99,96	98,35	98,15

If the nitric acid pulp with pH -1.25 has a non-flaking consistency and practically does not filter, then at pH 3,5 the filtration rate of the pulp is 526 kg/m²·h, 1654 kg/m²·h at pH 5,5 and 2370 kg/m²·h at pH 7-7,5.

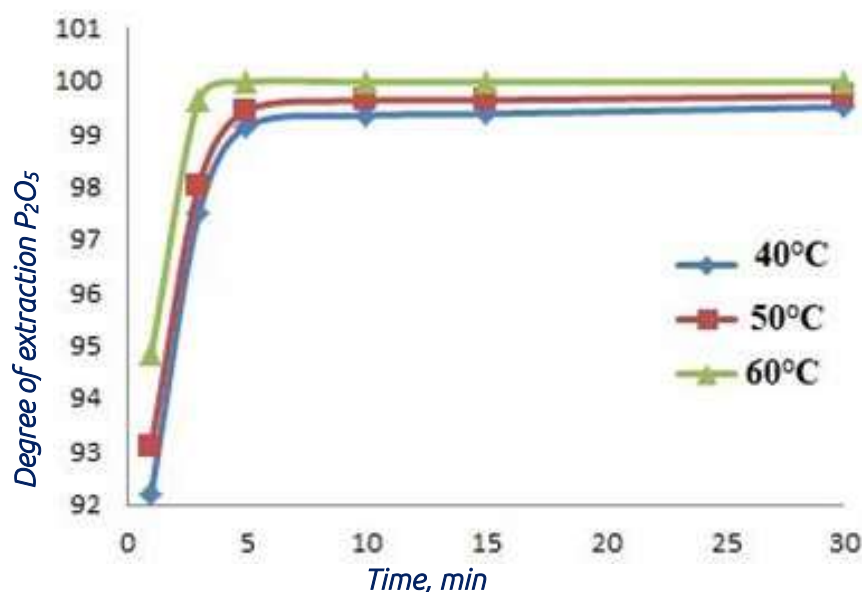


Figure 1. Effect of temperature and process duration on the degree of P_2O_5 extraction

Based on the obtained results on the separation of ammoniated products of MM decomposition with nitric acid, a technical solution has been developed for the possibility of obtaining two types of fertilizers in one technological cycle - liquid nitrogen-calcium fertilizer and slow-acting fertilizer precipitate.

Table 2.

Effect of the degree of ammoniation of nitric acid pulp on the filtration process

№	pH	Filtration rate, kg/m ² · h		
		by pulp	by filtrate	by sediment
Almost not filtered				
1	3	523	373	123
2	5	1650	1170	455
3	7	2378	1673	659

Liquid nitrogen-calcium fertilizer is an effective remedy for saline and slightly saline soils, and the precipitate is a valuable phosphorus fertilizer for application under fall plowing.

When neutralizing the decomposition products of the mineralized mass with gaseous ammonia to pH 3,5, phosphates of sesquioxides and partially calcium precipitate. Further ammoniation of the filtrate to pH 7-7.5 allows obtaining liquid nitrogen-calcium fertilizer. The sediment obtained at pH 3,5 is a phosphate sludge in the form of iron, aluminum, fluoride and calcium phosphate phosphates. The sediment at pH 7,5 is mainly dihydrate dicalcium phosphate. The conducted studies made it possible to establish the possibility of processing technogenic waste from phosphorite enrichment by nitric acid processing into two types of mineral fertilizers in one technological cycle. To do this, it is necessary to neutralize the decomposition products of the mineralized mass with nitric acid gaseous ammonia to pH 3,5 or 7,5 and separate the resulting sediments. The sediment at pH 3,5 is a fluorophosphate sludge, and at pH 7,5 it is a precipitate purified from sesquioxides and calcium fluoride. The liquid phase is a liquid nitrogen-calcium fertilizer.

References

1. Kanoatov H.M., Sherkuziev D.Sh., Ortikova S.S., Namazov Sh.S., Mamataliev A.A. Development of technology for producing single and complex fertilizers based on phosphorites of the Central Kyzylkum Desert. Tashkent, Navruz Publishing House, 2019. 193 p.
2. Beglov B.M., Namazov Sh.S., Dadakhodjaev A.T., Yuldashev Sh.Kh., Ibragimov G.I. Calcium nitrate, its properties, production and application in agriculture. Tashkent. - "Mehnat", 2001. 280 p.
3. Melnikov L.F. Organomineral fertilizers. St. Petersburg. Publishing House of the Polytechnic University, 2013. 542 p.
4. Khamrakulov Z.A., Tukhtaev S.T., Askarova M.K. Calcium-magnesium chlorate defoliant based on mineral raw materials of Uzbekistan. Fergana, Fargona Publishing House, 2017. 163 p.

5. Khamidov E.Kh., Sharipov H.T. *Plant growth stimulants based on guanylhydrozones and their complexes with metals. Proceedings of the Republican Scientific and Practical Conference. Tashkent, 2022. Pp. 272-273.*

6. Turaev Z., Shamshidinov I.T., Usmanov I.I. *Technology of single and complex fertilizers with microelements. Lambert Academic Publishing, 2020. 159 p.*

7. Kostin V.I. *Application of growth regulators and boric acid for foliar feeding. /V.I.Kotin, O.G.Muzurova, E.E.Syapukov. Sugar beet. – 2012. - No. 5. – P. 19-20.*

8. Beglov B.M., Namazov Sh.S. *Phosphorites of the Central Kyzylkum and their processing. – Tashkent, 2013. – 460 p.*

9. Mirzakulov Kh.X. *Physico-chemical foundations and technology for processing phosphorites of the Central Kyzylkum. – Tashkent, Navruz Publishing House, 2019. 416 p.*

10. Kakharov E.M., Seitnazarov A.R., Mirsalimova S.R., Namazov Sh.S. *Mechanical activation of phosphate ore in the presence of nitrogen salts. Proceedings of the Republican Scientific and Industrial Complex, Tashkent, 2022. – P. 69-71.1*

UOT: 631.6:54

WAYS OF FORMATION AND ELIMINATION OF ALKALINITY IN SOILS**Ibrahimov S. K.
Abbasova L.M.***Azerbaijan State Oil and Industry University
Azadlig 16, Baku city, Azerbaijan***Abstract**

The article provides extensive information about soils with high alkaline properties that are widespread in the territory of the Republic of Azerbaijan. The distribution area of this type of land and the ways of their improvement are indicated. The causes of alkalinity in different regions have been investigated.

Keywords: *Alkalinity, salinization, salinization, melioration, mechanical composition, washing, waterproofing.*

Introduction. *Of the 8.6 million hectares of the republic, 4.5 million hectares are arable land, of which 3.2 million hectares are irrigated. The areas where the soils with an alkaline environment are more widespread are the Kura-Araz plain, Karabakh, Mil and Mughan plains. Such soils are found in certain parts of the Caspian coastal areas, mainly in the Khizi-Siyazan massif. Alkaline soils are sodium and sodium sulfated soils. Soils enriched with sodium in the areas of Kura-Araz lowland, and the main area where soda-alkalized soils are distributed is the Karabakh plain. It is possible to find such soils in the plains of Mil and Mughan. At the same time, it is present in alkaline soils enriched with magnesium in the territory of the republic.*

In our country, 25-30 million hectares of shorakat and shorakat lands are chestnut soil zone, and 10 million hectares are brown and gray soils. Despite the fact that salinization and salinization are natural processes in the soil, when the necessary measures are not taken in time, it expands its area and negatively affects both the production of agricultural products and the winter pastures and lowland forests, which are typical for lowland areas. Therefore, such lands are considered to be ecologically and meliorationally unfavorable. It is important to take appropriate measures to prevent the negative dynamics of such lands and to restore them. In order to solve this problem, it is required to improve the land through land reclamation. The main means to combat salinization and salinization of soils, to increase their fertility and to increase the productivity of agricultural plants grown in these areas is the construction of a collector-drainage network in the soil, the implementation of washing meliorative measures, and the implementation of chemical meliorative measures. Therefore, one of the main tasks before us is to increase the productivity of cultivated plants in the field of rural management, as well as to expand the arable land. Increasing the fertility of these long-used lands and improving the condition of less fertile lands requires research and study, and is the most important and urgent issue that awaits the solution of the day.

The object of the study. *These are soils with high alkaline properties, widespread in the territory of the Republic.*

The purpose of the research is to develop a plan of meliorational measures that improve the meliorational biological and agronomic properties and the scientific-practical basis of their application to production.

Research methodology. *The conducted researches were conducted on the basis of methodologies applied in the territory of the republic and approved for many years. During the research, chemical analyzes of the soil and groundwater taken from the experimental area were carried out in the mass soil analysis laboratory of "Baku Abadlig Service" LLC.*

Analysis and Discussion. *Alkaline soils are soils in which readily soluble salts accumulate in quantities that cause the destruction of plants. These soil types include saline soils, saline soils and shorakats. Such lands cover an area of approximately 120 thousand hectares in the territory of the republic. The main distribution zones are dry steppes, semi-deserts, taiga forest and taiga forest-steppe [1]. In the upper layer of these soils, a very small amount, and sometimes not at all, and in the lower layers, on the contrary, more water-soluble salts are collected [2].*

Another negative characteristic of soils with an alkaline environment is that these soils have specific agrophysical properties and a good agronomic structure.

Alkaline soils are usually very hard when dry. When wet, they are sticky and dry very late. Cementation after soil drying results in damage to machinery during plowing and cultivation of those areas.

On soils with high alkalinity, we can see the formation of a thick and firm crust after irrigation. These listed features have a negative impact on the quality and quantity of cultivated crops, first of all, on the development of agricultural plants in alkaline soils.

This type of soil is often found in the plain regions of Azerbaijan. These areas include the northwestern Caspian coastal plain, the northwestern parts of the Karabakh plain, the southern and northern parts of the Mil plain and the Mughan plain, the southeastern Shirvan plain and the southeastern part of Gobustan [4; 5; 6; 7; 8].

In different regions of the republic, alkaline soils are formed in different ways. The reason for this is the diversity of physical and geographical conditions of the area. Formation of soils by alluvial means - alluvial formation in soils mainly occurs as a result of the enrichment of the alkaline soil solution with sodium cations, directly caused by the erosion of the parent rock. Alluvial soils formed in the alluvial way are distributed in the drainage part of the terrain [9]. Deluvial formation of these soils is widespread in the country, mainly in the Siyazan-Sumgait massif, in the southern part of the Shirvan plain, in the areas located in the southern and northwestern parts of Karabakh, in the southern Mil plains and other foothill regions [10; 11; 12].

Plants play the main role in the biological acidification of soils, that is, in increasing the alkalinity of their soil solution. There are two ways in which plants affect the fertilization process. First, plants affect the progress of this process with their life activity. At the next stage, after vegetation, it affects soil fertilization with the progress of rotting process. As a result of the rotting of plant residues, salts are formed, which increase the alkalinity of the soil. These plants include wormwood xerophytic plants, etc. is attributed. As a result of the rotting of these plants, there are a lot of sodium cations, so these plants rot and sodium, sodium carbonate (Na_2CO_3) and sodium bicarbonate salts are formed. The Na cation contained in the plants displaces the Ca cation contained in the complex absorbed by the soil and replaces it. Thus, the process of biological fertilization takes place in the soil. In this way, with the help of sulfate and anaerobic bacteria and sodium sulfate salt in the soil, organic residues begin to rot. As a result, soda is formed, which contributes to the formation of high alkalinity in the soil:

$\text{Na}_2\text{SO}_4 + \text{organic substances} + \text{Na}_2\text{S} + \text{Na}_2\text{CO}_3 + \text{H}_2\text{S}$ alkaline soils are divided into the following types with a high degree of alkalinity:

1. Soda sodas with excess Na_2CO_3 and NaHCO_3 salts along with sulfate salts due to their salt content;

2. According to the composition of the collected plains, the chlorinated - sulfated soils, where the amount of Na_2SO_4 and MgSO_4 salts prevails.

According to the high alkalinity and salinity, the soils are classified as follows according to the depth of distribution of water-soluble layers:

1. Saline brackish soils - brackish soils where salts accumulate in the plow layer at a depth of 0-35 cm;

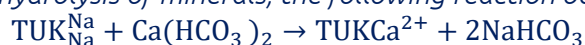
2. Saline soils - brackish soils where salts accumulate below the plow layer at a depth of 35-75 cm;

3. Deeply saline soils - saline soils where salts accumulate at a depth of more than 75 cm.

Soils with an alkaline environment have poor water physical properties, very weak and unstructured dewatering capacity, so the water, air, heat and nutrient regimes are disturbed and the normal development of plants is not ensured in them. If we summarize all the theories in this field, the common feature of alkaline soils is sodium ion, which causes the formation of unfavorable properties of these soils.

K.K. According to the Hedroys theory, salines with an alkaline environment are formed as a result of the desalination of salted brines due to neutral sodium salts. A large increase in sodium ion in the soil causes an alkaline reaction, and as a result, the solubility of organic-mineral compounds in the soil increases. At this time, soil particles do not change their aggregate state due to sodium ion hydration. Colloids are enriched with sodium and swell greatly due to their ability to hold water on their surface. They are more resistant to coagulation.

As a result of the exchange of calcium carbonate salts in the soil solution with sodium in the absorbing complex and the hydrolysis of minerals, the following reaction occurs:



The alkalized solution causes the dispersion of colloids in the soil. Colloids are washed from the upper layer and collected in the form of a gel at a certain depth [13; 14].

The amount of water-soluble salts in the soil increases until the absorption complexes are saturated with sodium, and the soil is gradually acidified. As a result of researches, in recent years, as a result of the excessive absorption of soda, which is a source of sodium, from the soil solution, the formation of salinized soils without experiencing the salinization phase is also observed.

The following conclusions were reached based on the conducted research and analysis of literature data.

The result

1. Soils with high alkaline characteristics are mainly distributed in the Kura-Araz plain, in the west of the Shirvan plain, in the southern and northern parts of the Mil plain, in the Mughan and Salyan plains.

2. Soils found in the territory of the republic are divided into neutral and alkaline (soda) saline soils.

3. In order to expand agricultural areas, alkaline soils with alkaline properties are used as a reserve. However, the fertility level of these soils is very low, so they cannot be used without improvement measures.

4. The most convenient method for improving alkaline - alkaline soils is the washing method with late application. With this method, the hydro-physical, chemical and agronomic properties of the soil are improved. Sulfuric acid and calcium salts are used in addition to chemical treatment. Besides chemical treatment, there are other improvement measures. Among these measures, the removal of sodium by deep plowing and exposing the gypsum horizon is a more convenient method. Also, thanks to these methods, the alkalinity of shorak soils decreases, and moisture increases due to water permeability. Basic agro-ameliorative measures applied for the improvement of other crops include the application of organic and mineral fertilizers without deep plowing, as well as the methods of sowing grass on the background of irrigation. Here, the role of organic fertilizers is to activate microbiological activity, improve the physical properties of soils and nourish them. Based on this, it is more appropriate to give organic and mineral fertilizers at the same time. Nitrogen and phosphorus fertilizers are applied as mineral fertilizers.

In contrast to grassland and steppe soils, earthing operations are used to rehabilitate degraded soils in the black soil zone. The essence of this operation is to bring a mass of fertile soil (2-3 cm thick) from the outside and pour it on the fertile soil.

Literature

1. G. Mammadov - Social and ecological basis of efficient use of land resources of Azerbaijan, Baku, "Elm" - 2009, p. 522-559.

2. M. Abduev - "Shared lands in Azerbaijan and their distribution" CBS polugrahic Production, Baku 2012 p. 60-82.

3. G. Mammadov - "Fundamentals of soil science and soil geography". Teaching materials, Baku, "Science" - 2007, p. 44-75.

4. Ibrahimov S.K. "The influence of some industrial wastes on increasing the efficiency and quality of leaching of heavy saline soils of Absheron." Collection of scientific works of the All-Union Research Institute of Hydraulic Engineering of Land Reclamation named after A.N. Kostyakov, Moscow, 1987, p. 6.

5. S.K. Ibrahimov, Teymurov K.H., Eminov S.A., Shirinov I.N. "The application of gypsum in the reclamation of the Caspian coastal soils." Agricultural News No. 75, Baku, 1987, p. 4.

6. Ibrahimov S.K., Shirinov I.N., Ibadova R.M. "The use of some wastes for washing heavy saline solonetzic soils of the Caspian lowland." Abstracts of the report. Ways to increase the fertility of irrigated and eroded soils. Elm, 1987, p. 2.

7. Ibrahimov S.K., Shirinov I.N., Kuliev R.F. "Technological schemes for the reclamation of saline lands of the Shurabod massif of the Absheron region." Collection of scientific works of the All-Union Research Institute of Hydraulic Engineering of Land Reclamation named after A.N. Kostyakov. Moscow, 1986, p. 6.

8. A. Ahmadzadeh, A. Hashimov, "Theoretical and practical basis of reclamation of salinized soils" Baku, 2019, p. 65-66.

9. A. Ahmadzadeh, A. Hashimov. Encyclopedia: reclamation and water management. Baku 2016,

10. Ibrahimov S.K, T.S. Guliyeva "Effect of plastering on cotton plant productivity in the land of Shirakat Shirvan." Information sheet, agricultural scientific news, No.-88, Baku, 1988, p. 3.

11. Ibrahimov S.K., K.G. Teymurov "Chemical treatment of sea water of the Caspian Sea for use in irrigation." *Express information "Reclamation and water management."* 2 issue series *Integrated use and protection of water resources* Moscow, 1988, p.7.

12. Ibrahimov S.K., Jamalova R. Kh., Yusifova Kh.H. "Soils of deluvial-proluvial salinization of winter pastures of the Caspian lowland and their experimental leaching." *"Ecology and Construction" scientific peer-reviewed international journal* No. 4, 2021, p. 10-17.

13. S.K. Ibrahimov, Yusifova Kh.H. "The use of industrial waste in the ecological rehabilitation of degraded lands." *News collection "Natural and technical sciences" series, Ganja.* No. 1(80), 2021, p. 58-67.

14. S.K. Ibrahimov, I. N. Shirinov, T.A. Khalilov, E.M. Musayeva "Causes of soil fertility and ways to eliminate it." *Baku State University. Materials of the republican scientific-practical conference dedicated to the 94th anniversary of the birth of national leader H. Aliyev on "Global economic conditions and the economic-geographical position of Azerbaijan".* Baku, 2017, p. 202-207.

Arts

COMMENTARY FEATURES OF THE OVERTURE FROM THE KOROGHLU OPERA IN NIYAZI'S INTERPRETATION

Dadashov Eldar Agha Dadash

associate prof., Honored Culture Worker,

Faculty of Arts, Department of Music Studies, Baku Choreography Academy

Abstract

The presented article is devoted to the issues of interpretation of the opera "Koroghlu" in the interpretation of the world-famous conductor Maestro Niyazi. The opera "Koroghlu" by the genius Uzeyir Hajibeyli and Adnan Saygun, one of the prominent members of the Turkish Five, is examined here. The issues of interpretation of the Overture from the opera "Koroghlu" are considered. At the same time, the similarities and differences of both operas are revealed and interpretation features are determined. In Niyazi's interpretation, the conducting issues of the opera "Koroghlu" by both composers are considered, and the composition of the score is compared. In the end, we come to the conclusion that "Koroghlu" opera in Azerbaijan and Turkey is a work of art that has entered the world musical treasury and has national and human value. Even in the 21st century, opera "Koroghlu" amazes us with its artistic qualities, unusual proportional form, and classical clarity, and will probably decorate the stages as a masterpiece of our music for many more years and centuries.

Keywords: Niyazi, Koroghlu, opera, Uzeyir Hajibeyli, Adnan Saygun, interpretation, conductor, mime, folk epic, motif, overture, chorus.

Introduction. The genius composer Uzeyir Hajibeyli's opera Koroghlu represents the highest peak in the development of Azerbaijani opera and constitutes an important milestone in our musical culture. Composed in 1937 based on the libretto by Heydar Ismayilov and Mammad Said Ordubadi, the opera was staged at the Azerbaijan Opera and Ballet Theater and achieved great success in Moscow in 1938. Koroglu has been staged in multiple productions, performed in various languages, and involved artists from different nations.

The opera's libretto, based on the folk epic Koroglu, reflects the psychology, traditions, and outlook of the Azerbaijani people. The creation of the opera marked a turning point in Azerbaijani opera, where the composer brought to life dynamically developed and lyrically nuanced images of its heroes.

The main part. Various pieces of the opera are remarkable as masterpieces of Azerbaijani symphonic music and have been transcribed for folk instruments and orchestras. The overture of the opera holds an important place in the repertoire of Azerbaijani conductors and is often included in educational programs. It is widely recognized for its heroic character and serves as a vital dramaturgical element.

To enrich the figurative content of the work with national intonations, Hajibeyli combined traditional folk instruments, such as the saz, with the symphony orchestra for the first time. The artistic influence of national music is especially evident in Koroghlu, where Koroghlu is portrayed as a hero who leads the people in their struggle, a lover who plays the instrument and composes poetry, and a person who loves Nigar deeply. The scenes connected to Koroghlu's heroism are based on the Rast mode, while his love for Nigar is embodied through the Segah moment, and their separation is expressed through the Bayati-Shiraz mode.

Upon analyzing the overture, it is immediately apparent that it unfolds in a single, continuous metro-rhythmic movement, creating a sense of unity and coherence in its development. The overture, composed in sonata form, starts with the Shur mode in 2/4 time and an Allegretto tempo. The world-renowned Maestro Niyazi enhanced the emotional impact of the work by adjusting the tempo, interpreting it at an Allegro pace.

The introductory theme is in the Shur mode with the "do" vowel, and the melodic progression follows the traditional cadence of the Shur mode. Niyazi's sharp, short accents at the opening of the overture prepared the orchestra for a solemn, heroic performance. As a talented conductor, he understood that an indifferent, mild interpretation would violate the composer's intentions. His firm direction of the

Shur theme highlighted Koroghlu's image as a national hero and lover. The melody's high tessitura and the cadence phrases from the *Shur* mode create enthusiasm from the very first bars.

In the second part of the introduction, the theme transitions into a more unstable character, setting the tonal foundation for the main theme. Niyazi handled the main theme in the *Re Chahargah* mode with special emphasis, revealing its grand, solemn character. The secondary theme, based on the *Sol Bayati-Shiraz* mode, presents a contrast to the previous intensity, with the conductor employing gentler gestures.

The middle section of the overture introduces instability in the tonality, with the main theme reappearing in *Re Chahargah*, performed by the first and second *kamanchas*. Niyazi expertly revealed the lyrical character of this moment with gentle gestures. The reprise section in the overture has a dynamic quality, and the themes from the exposition emerge in transformed versions. After the development section ends at *Chahargah*, the reprise begins in *Rast* without a transition, preserving the overall form and movement of the melody.

The overture's climax is a magnificent coda, consisting of two stages of development: a preparatory stage and a central stage. The second stage, in particular, is even more emotional in Niyazi's interpretation.

The overture of *Koroghlu* is remarkable for its compact and unique structure. Niyazi achieved its integrity and unity through masterful conducting techniques, one of which was his precise control of the *ostinato* rhythmic formula. This rhythmic pattern served as a leitmotif for the opera, connecting various thematic material. Niyazi's deep understanding of the unity of the musical form allowed him to seamlessly connect conflicting themes, presenting each new version as a continuation of the previous one.

Niyazi's expressive conducting, especially in the coda, inspired the orchestra to play with heightened patriotic spirit and grandeur. To emphasize the solemn character, Niyazi used broad hand gestures, holding half notes with his left hand and controlling the meter with his right hand. By integrating various national melodies, he created a rich, emotional cantilena in the opera.

The *Koroghlu* saga has resonated not only in Azerbaijan but also in Turkey, Transcaucasia, and Central Asia. Halil Altınköprü writes: "The second *Koroghlu* opera in the Turkish world was composed by Ahmet Adnan Saygun, one of the Turkish Five, based on the libretto by Selahattin Batu. Saygun is the composer of five operas, five symphonies, and numerous other works." [3, p. 12].

Unlike Uzeyir Hajibeyli's opera, Adnan Saygun's *Koroghlu* opera is structured in three acts and nine scenes, with the role of *Koroglu* performed by bass-baritone Ayhan Baran. The main cast includes Ana (mezzo-soprano Handan Sardağ), Seyis (bass Mustafa Itku), Gunayim (soprano Leyla Demirish), and others. In contrast to Hajibeyli, Saygun did not incorporate Turkish national instruments in his *Koroghlu* score. [4].

Adnan Saygun, who likened *Koroghlu*'s image to Atatürk, dedicated the opera to him. He wrote: "In order to revive the image of the hero Atatürk, Niyazi conducts very decisively, as if characterizing an invincible hero. His hand gestures are not large, but he emphasizes mimicry" [2, p. 105].

A. Saygun creatively used love music in the opera and gave the name "*Koroghlu*" to the "*Huseini*" *maqam* used in the opera.

While directing the opera, Maestro Niyazi embodies the circle of lyrical-dramatic and life-loving characters with gentle gestures, succeeding in revealing the song-like plasticity of lyrical characters, the rich melodiousness, simplicity and sincerity of the musical language. He revealed lyrical musical images by reducing the volume of hand gestures in the gradually dynamic parts, while trying to maintain the general solemn mood that unites all the parts in the opera.

Derya Agea expressed her opinion as follows: "For Adnan Saygun, *Koroglu* is a person who rebels against oppression, seeks peace and love; Çamlıbel is a place away from evils; "Girat is a symbol that brings people to the world of peace." [1, p. 21]

In his interpretation, Niyazi brings out both the lyrical and dramatic aspects of *Koroglu*'s character, portraying him as a passionate leader who calls the people to fight. *Koroglu* is also a folk singer and lover, and this love is clearly expressed in his music. His love songs, especially the aria dedicated to Gunayim, are poignant, bringing depth and sincerity to *Koroghlu*'s image.

The character of Gunayim, depicted with elegance and realism, plays a crucial role in the opera. Her aria, imbued with both sadness and heroism, represents her difficult fate. The leitmotifs associated with her express the strong connection between her love for *Koroghlu* and her attachment to the people.

In contrast, Beyoğlu is portrayed as a symbol of oppression, and his image is conveyed through the music in a laconic, forceful manner. The opera is rich in tonality contrasts, dynamic shifts, and polyphonic

elements. Although there is little overt conflict between characters, the development of themes is both purposeful and elegant.

Niyazi's hand gestures, fully synchronized with the orchestra's sound, embodied the character and emotion of the opera. His precision and expressiveness allowed him to convey the essence of the music with remarkable clarity.

Adnan Saygun's Koroghlu features unique syntheses, blending national music styles. Hayati Asilyazıcı notes, "The opera was first staged in 1973 at the Harbiye Cemil Topuzlu Açıkhava Theater and was directed by Niyazi. Saygun's close friend, Niyazi, played a significant role in writing the opera, contributing professionally to the orchestration and composition." [5, p. 1].

Conclusion. Thus, the "Koroghlu" opera in Azerbaijan and Turkey is a work of art that has entered the world musical treasury and has national and human value. Even in the 21st century, "Koroghlu" amazes us with its artistic qualities, unusual proportional form, and classical clarity, and will probably decorate the stages as a masterpiece of our music for many more years and centuries. Based on the analysis of the Overture from the "Koroglu" opera, it is clear that U. Hajibeyli tries to deviate from the composition-structural features already established in classical music in the sonata form. At the same time, "Hajibeyli style" consists of an organic unity of classical and national features. Classicism was the source for the composer, on the basis of which a new quality of nationalism is created. As a result, a unique sonata form was created in "Koroghlu", which is individually changed and enriched with national characteristics. The scene "Chahargah" characterized the excited feelings of the people, their faith in Koroghlu, the scene "Rast" was a symbol of the people's victory, and it is at this point that the Overture is completed.

Literature

1. Derya Agea. The place of the "Koroğlu" epic in the opera art of the Turkic world. Problems of the study of music culture of Turkic peoples. Baku, 2017, p. 19-21.
2. Yıldırım Dursun. "Central Asian Narratives of the Koroghlu Epic". Proceedings of the Koroghlu Seminary, Ankara, 1983, p. 105.
3. Altinköprü H. Hasan Ferid Alnar in the context of "Turkish fives". 17.00.02-Art of music. The abstract of the dissertation submitted for the candidate of art studies to receive the academic degree. Baku, 2009, İlay LLC printing house. 30 p.
4. Hayati Asilyazıcı. The story of the first performance of Adnan Saygun's Koroghlu Opera and Maestro Niyazi Taghizade. Istanbul, Aydınlık Gazette, 04.02.2012.

Chemical sciences

SYNTHESIS OF POTENTIAL CORROSION INHIBITORS BASED ON QUATERNARY SALTS OF PYR- IDE-CONTAINING AMIDES AND UREAS

Iryna Koshchii

PhD in Chemistry, Associate Professor
Department of Organic Chemistry and Technology of Organic Substances
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Yurii Klimko

PhD in Chemistry, Senior Lecturer
Department of Organic Chemistry and Technology of Organic Substances
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Oleksandr Vasilkevich

PhD in Chemistry, Associate Professor
Department of Organic Chemistry and Technology of Organic Substances
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Abstract

A method for the synthesis of quaternary salts of mono- and diquaternized N-arylnicotinamides and ureas as potential inhibitors of acid corrosion is proposed. Available reagents were used in the syntheses: benzyl chloride, allyl bromide, nicotinic acid chlorides, aromatic amines and isocyanates. Preparative yields are 67-87%.

Keywords: corrosion inhibitors, quaternary ammonium salts, N-arylnicotinamides, quaternized and diquaternized salts, quaternized salts based on nicotine-containing ureas.

Materials and methods

IR spectra of the synthesized compounds in KBr tablets were recorded on a Specord-75-JR instrument. PMR spectra were obtained on a JEOL spectrometer (90 MHz) in DMSO-d₆ and CDCl₃, chemical shifts were measured in the δ -scale.

N-phenylnicotinamide (9). Dissolve 4 g (0.043 mol) of aniline 6 in 50 ml of dichloroethane, add 12.06 ml (0.086 mol) of triethylamine and 7.6 g of hydrochloric acid (0.043 mol). After boiling for 7 h, wash twice with a dilute solution of soda and three times with water. Dry with sodium sulfate. Filter, wash the precipitate with chloroform. Remove the solvent. Add 250 ml of methanol and activated carbon to the precipitate, boil for 10-15 min. The resulting solution is filtered and the solvent is evaporated under vacuum. The precipitate is recrystallized from acetone. Yield 4.94 g (58%). M.p. = 127°C.

IR (KBr, cm⁻¹): 3365 (NH), 1705 (C=O).

¹H NMR (δ , m.p., CDCl₃): 8.43 (1H, s.s., NH), 9.05 (1H, d., j = 1.0 Hz), 8.70 (1H, d., j = 4.0 Hz), 8.16 (1H, d.d., j = 6.0 Hz, j = 1.0 Hz), 7.62-7.14 (m., 6H).

3-(*N*-phenylcarboxamido)-*N*-benzylpyridinium chloride (12). Dissolve 4.94 g (0.025 mol) of amide 9 in 50 ml of benzene (dry) and add 2.86 ml (0.025 mol) of benzyl chloride. The mixture is boiled for 6 hours and cooled. Then the precipitate is filtered off and washed several times with dry benzene to completely remove benzyl chloride. Dry in air. Yield 5.98 g (74%). Mp = 119°C.

IR (KBr, cm⁻¹): 3340 (NH), 1700 (C=O).

¹H NMR (δ , m.p., DMSO-d₆): 3.28 (2H, c., CH₂), 10.29 (1H, s.s., NH), 9.17 (1H, d., j = 1.0 Hz), 8.74 (1H, d.d., j = 4.0 Hz, j = 1.0 Hz), 8.30 (1H, d.d., j = 6.0 Hz, j = 1.0 Hz), 7.73-7.08 (m., 11H).

1-Naphthylnicotinamide (10). Dissolve 4 g (0.028 mol) of 1-naphthylamine 7 in 50 ml of dichloroethane, add 7.8 ml (0.056 mol) of triethylamine and 5 g of hydrochloric acid (0.028 mol). After boiling for 7 h, wash twice with dilute sodium hydroxide solution and three times with water. Dry with sodium sulfate. Filter, wash the precipitate with chloroform. Remove the solvent. Add 250 ml of methanol and activated carbon to the precipitate, boil for 10-15 min. The resulting solution is filtered and the solvent is evaporated under vacuum. The precipitate is recrystallized from acetone. Yield 3.53 g (51%). M.p. = 136°C.

IR (KBr, cm⁻¹): 3310 (NH), 1635 (C=O).

^1H NMR (δ , m.p., CDCl_3): 8.26 (1H, s.s., NH), 9.20 (1H, d., $j = 1.0$ Hz), 8.79 (1H, d.d., $j = 1.0$ Hz, $j = 4.0$ Hz), 8.26-7.51 (m., 9H).

3-(N-1-naphthylcarboxamido)-N-benzylpyridinium chloride (13). Dissolve 3.53 g (0.012 mol) of amide 10 in 30 ml of benzene (dry) and add 1.632 ml (0.012 mol) of benzyl chloride. The mixture is boiled for 5.5 hours and cooled. Then the precipitate is filtered off and washed several times with dry benzene to completely remove benzyl chloride. Dry in air. Yield 3.57 g (67%). M.p. = 128°C.

IR (KBr, cm^{-1}): 3340 (NH), 1680 (C=O).

^1H NMR (δ , m.ch., $\text{DMSO}-d_6$): 3.71 (2H, c., CH_2), 10.61 (1H, s.s., NH), 9.10 (1H, d., $j = 1.0$ Hz), 8.75 (1H, d.d., $j = 4.0$ Hz, $j = 1.0$ Hz), 8.49-7.48 (m., 14H).

2-Naphthylnicotinamide (11). Dissolve 4 g (0.028 mol) of 2-naphthylamine 8 in 50 ml of dichloroethane, add 7.8 ml (0.056 mol) of triethylamine and 5 g of hydrochloric acid (0.028 mol). After boiling for 7 h, wash twice with a dilute solution of soda and three times with water. Dry with sodium sulfate. Filter, wash the precipitate with chloroform. Remove the solvent. Add 250 ml of methanol and activated carbon to the precipitate, boil for 10-15 min. The resulting solution is filtered and the methanol is evaporated under vacuum. The precipitate is recrystallized from acetone. Yield 3.04 g (44%). M.p. = 161°C.

IR (KBr, cm^{-1}): 3250 (NH), 1625 (C=O).

^1H NMR (δ , m.h., CDCl_3): 8.43 (1H, s.s., NH), 9.12 (1H, d., $j = 1.0$ Hz), 8.73 (1H, d.d., $j = 1.0$ Hz, $j = 4.0$ Hz), 8.28-7.31 (m., 9H).

3-(N-2-Naphthylcarboxamido)-N-benzylpyridinium chloride (14). Dissolve 3.04 g (0.012 mol) of amide 11 in 30 ml of benzene (dry) and add 1.376 ml (0.012 mol) of benzyl chloride. The mixture is boiled for 5.5 h and cooled. Then the precipitate is filtered off and washed several times with dry benzene to completely remove benzyl chloride. Dry in air. Yield 3.3 g (72%). Mp = 148°C.

IR (KBr, cm^{-1}): 3350 (NH), 1670 (C=O).

^1H NMR (δ , m.ch., $\text{DMSO}-d_6$): 3.52 (2H, c., CH_2), 10.80 (1H, s.s., NH), 9.23 (1H, d., $j = 1.0$ Hz), 8.84 (1H, d.d., $j = 4.0$ Hz, $j = 1.0$ Hz), 8.54-7.41 (m., 14H).

3-(N-2-Naphthylcarboxamido)-N-allylpyridinium bromide (17). Dissolve 3.82 g (0.0154 mol) of amide 11 in 50 ml of benzene (dry) and add 1.33 ml (0.0154 mol) of allyl bromide. The mixture is boiled for 16 h and the solvent is removed. The product is washed with benzene and crystallized from methanol. Yield 4.03 g (71%). M.p. (dec.) = 283°C.

IR (KBr, cm^{-1}): 3350 (NH), 1685 (C=O).

^1H NMR (δ , m.h., $\text{DMSO}-d_6$): 5.85 (2H, c., CH_2), 8.10 (1H, s.s., NH), 6.01-7.95 (m., 14H).

3-(N-phenylcarboxamido)-N-allylpyridinium bromide (18). Dissolve 12.27 g (0.062 mol) of phenylnicotinamide 9 in 60 ml of benzene (dry) and add 5.4 ml (0.062 mol) of allyl bromide. The mixture is boiled for 10 h. A precipitate forms, which is filtered and dried in air. The product is crystallized from ethanol. Yield 16.4 g (83%). M.p. (dec.) = 221°C.

IR (KBr, cm^{-1}): 3350 (NH), 1695 (C=O).

^1H NMR (δ , m.ch., $\text{DMSO}-d_6$): 5.46 (2H, c., CH_2), 8.39 (1H, s.s., NH), 6.28-7.88 (m., 12H).

5-Bromo-2-benzoylamino-N-allylpyridinium bromide (19). Dissolve 6.67 g (0.024 mol) of 5-bromo-2-benzoylamino-N-allylpyridine 16 in 50 ml of benzene (dry) and add 2.1 ml (0.024 mol) of allyl bromide. The mixture is boiled for 16 h and the solvent is removed. The residue is washed with benzene and crystallized from methanol. Yield 7.28 g (76%). M.p. (dec.) = 238°C.

IR (KBr, cm^{-1}): 3330 (NH), 1650 (C=O).

^1H NMR (δ , m.ch., $\text{DMSO}-d_6$): 8.29 (2H, c., CH_2), 8.94 (1H, s.s., NH), 7.54-7.87 (m., 11H).

N-(2-pyridyl)nicotinamide (25). Dissolve 1.03 g (0.011 mol) of 2-aminopyridine 22 in 50 ml of chloroform (dry), add 3.09 ml (0.022 mol) of triethylamine and 2 g (0.011 mol) of hydrochloric acid. After 8 h of boiling, cool and wash with dilute sodium hydroxide solution. Then the residue is recrystallized from benzene. Yield 0.9 g (41%). M.p. = 144°C.

IR (KBr, cm^{-1}): 3200-2910 (NH), 1650 (C=O).

^1H NMR (δ , m.h., CDCl_3): 9.36 (H5, s.s., NH), 9.14 (H1, d., $j_{1,4} = 1.5$ Hz), 8.75 (CH_2 , d.d., $j_{2,3} = 4.5$ Hz, $j_{2,4} = 1.5$ Hz), 8.31-8.12 (m., H6, H9), 7.74 (H8, $j_{8,9} = 6.5$ Hz, $j_{8,9} = 1.5$ Hz), 7.40 (H3, d.d., $j_{3,4} = 6.5$ Hz, $j_{3,2} = 4.5$ Hz), 7.29 (H4, d., $j_{4,3} = 6.5$ Hz), 7.04 (H7, d.d., $j_{7,8} = 6.5$ Hz, $j_{7,6} = 4.0$ Hz).

3-(N-(2-pyridyl)carboxamido)pyridyl-N,N-dibenzylpyridinium chloride (28). Dissolve 2.33 g (0.012 mol) of amide 25 in 50 ml of benzene (dry) and add 2.75 ml (0.024 mol) of benzyl chloride. The mixture is boiled for 16 hours and cooled. Then the reaction mixture is filtered and dried in air. Yield 1.78 g (33%). M.p. (dec.) = 129°C.

^1H NMR (δ , m.h., CDCl_3): 9.44 (3H, m.s., NH, CH_2), 8.22 (7H, m., CH_2 , Ph), 7.03 (3H, m., Ph), 7.38 (3H, m., Ph, Py), 7.74 (2H, m., Py), 8.76 (2H, m., Py), 9.18 (3H, m., Py).

N-4-pyridylnicotinamide (26). Dissolve 3 g (0.03 mol) of 4-aminopyridine 23 in 50 ml of chloroform (dry), add 8.4 ml (0.06 mol) of triethylamine and 5.4 g (0.03 mol) of hydrochloric acid. After 6 h of boiling, the reaction mixture is cooled and treated with a dilute solution of NaOH (10%), washed with water until neutral and dried with sodium sulfate. Then the chloroform is evaporated. Yield 4.82 g (38%). M.p. = 186°C.

^1H NMR (δ , m.p., CDCl_3): 9.51 (1H, s.s., NH), 8.32 (2H, d., $j = 6.0$ Hz), 8.11 (1H, s.), 7.83 (1H, d., $j = 6.5$ Hz), 7.57 (2H, d., $j = 6.0$ Hz), 7.52-7.28 (2H).

3-(*N*-(4-pyridyl)carboxamido)pyridyl-*N,N*-dibenzylpyridinium chloride (29). Dissolve 4 g (0.02 mol) of amide 26 in 50 ml of benzene (dry) and add 4.59 ml (0.04 mol) of benzyl chloride. The mixture is boiled for 16 hours and cooled. Then the reaction mixture is filtered and dried in air. Yield 2.99 g (44%). M.p. (dec.) = 174°C.

^1H NMR (δ , m.h., CDCl_3): 9.63 (3H, s.s., NH, CH₂), 8.52 (2H, d., $j = 6.5$ Hz), 8.24 (m., 7H), 7.87 (2H, d., $j = 6.5$ Hz), 7.29 (m., 7H), 5.91 (2H, s., CH₂).

N-3-quinolylnicotinamide (27). Dissolve 3.97 g (0.027 mol) of 3-aminoquinoline 24 in 100 ml of chloroform (dry) and add 4.9 g (0.027 mol) of hydrochloric acid. After 9 hours of boiling, a precipitate forms, which is filtered off and dissolved in a minimum amount of water. Then, excess KOH is added, a precipitate forms upon cooling. After that, the substance is filtered off and dried in air. Yield 4.06 g (62%). M.p. = 152°C.

IR (KBr, cm^{-1}): 3330-3050 (NH), 1640 (C=O).

^1H NMR (δ , m.p., CDCl_3): 9.87 (1H, s.s., NH), 9.13 (1H, s., CH), 8.92 (1H, s., CH), 8.34 (1H, d., $j = 6.0$ Hz), 7.94-7.41 (m., 7H).

3-(*N*-(3-quinolyl-*N*-benzylquinolilium chloride)carboxamido)pyridyl-*N*-benzylpyridinium chloride (30). Dissolve 3.56 g (0.014 mol) of amide 27 in 100 ml of chloroform (dry) and add 3.21 ml (0.028 mol) of benzyl chloride. After boiling for 10 hours, the chloroform is evaporated. Yield 6.23 g (87%). M.p. (with decomp.) = 136°C.

^1H NMR (δ , m.p., $\text{DMSO}-d_6$): 10.19 (1H, s.s., NH), 9.44 (2H, s.s., CH₂), 8.10-7.42 (m., 13H), 6.05 (2H, s., CH₂).

N'-(2-pyridyl)-*N''*-(phenyl)urea (31). Dissolve 5.0 g (0.05 mol) of 2-aminopyridine 22 in 50 ml of benzene (dry) and add 5.7 ml (0.05 mol) of isocyanate. The reaction occurs instantaneously upon heating – a white precipitate is formed. Then the reaction mixture is filtered, the precipitate is dried in air. Yield 10.83 g (96%). M.p. = 192°C.

IR (KBr, cm^{-1}): 3200-2910 (NH), 1690 (C=O).

^1H NMR (δ , m.h., CDCl_3): 11.31 (1H, s.s., NH), 10.21 (1H, s., NH), 8.21 (1H, d., $j = 7.7$ Hz), 7.75-6.93 (m., 8H).

N'-(2-pyridyl-*N*-benzylpyridinium chloride)-*N''*-(phenyl)urea (33). Dissolve 5.0 g (0.0235 mol) of urea 31 in 27 ml (0.2354 mol) of benzyl chloride and boil for 20 hours. Next, extract by mixing the reaction mass with water and methylene. Then, evaporate the water from the aqueous layer. Yield 4.72 g (59%). M.p. (dec.) = 179°C.

^1H NMR (δ , m.p., CDCl_3): 10.45 (1H, s.s., NH), 9.20 (1H, s.s., NH), 7.93 (1H, d., $j = 6.8$ Hz, CH₂), 7.50-6.71 (m., 14H), 4.57 (1H, d., $j = 6.8$ Hz, CH₂).

N'-(4-pyridyl)-*N''*-(phenyl)urea (32). Dissolve 5.0 g (0.05 mol) of 4-aminopyridine 25 in 50 ml of chloroform (dry) and add 5.7 ml (0.05 mol) of isocyanate. After 8 hours of boiling, the chloroform is evaporated and the product is dried in air. Yield 11.15 g (99%). M.p. = 247°C.

IR (KBr, cm^{-1}): 3270-2960 (NH), 1800 (C=O).

^1H NMR (δ , m.c., CDCl_3): 8.50 (1H, br.s., NH), 8.25 (2H, d., $j = 6.4$ Hz), 7.63-6.93 (m., 8H).

N'-(4-pyridyl-*N*-benzylpyridinium chloride)-*N''*-(phenyl)urea (34). Dissolve 11.27 g (0.053 mol) of urea 32 in 120 ml of chloroform (dry), add 6.08 ml (0.053 mol) of benzyl chloride and boil for 10 hours. Then the resulting substance is filtered off and left to dry in air. Yield 13.82 g (77%). M.p. (dec.) = 225°C.

IR (KBr, cm^{-1}): 3270-2960 (NH), 1750 (C=O).

^1H NMR (δ , m.ch., CDCl_3): 11.91 (1H, s.s., NH), 9.58 (1H, s.s., NH), 8.40 (2H, d., $j = 7.0$ Hz), 8.02 (2H, d., $j = 7.0$ Hz), 7.67-6.95 (m., 10H), 5.49 (2H, p., CH₂).

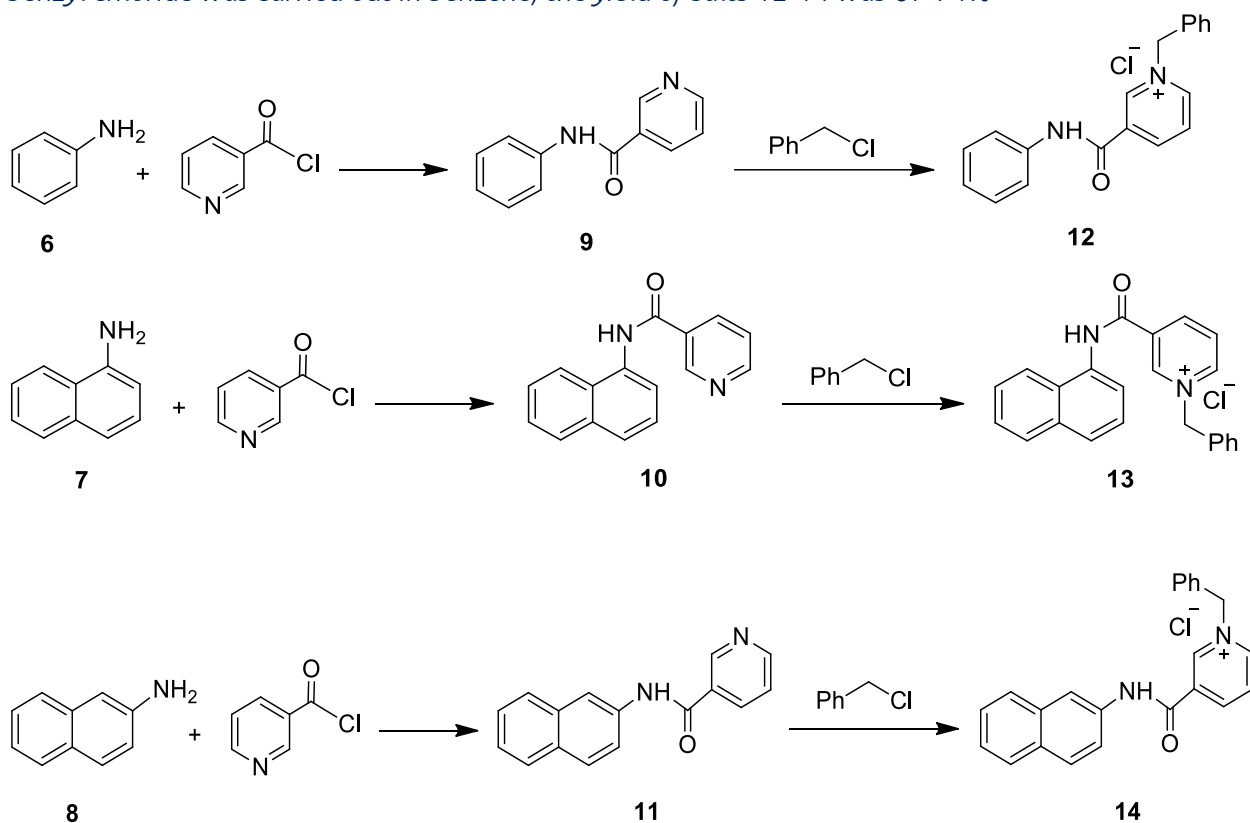
Results and discussion.

The search for effective adsorption inhibitors of acid corrosion of metals and bactericidal preparations is an urgent task. The compounds used to create the specified industrial reagents include quaternary ammonium salts. For example, it is known [1] that the greatest anti-corrosion effect is exhibited by

such quaternary ammonium salts, in the structure of which, in addition to the adsorption center - the quaternary nitrogen atom - there are several adsorption centers of different types: nitrogen atoms with a free pair of electrons, oxo groups, which are characterized by donor-acceptor interaction with the metal surface. The creation of such additional adsorption centers allows obtaining compounds, the action of which as corrosion inhibitors can be enhanced by combining several inhibitory effects. Quaternary ammonium salts are also part of disinfectants for medical and household purposes [2]. It is known that quaternary salts of the pyridine series have a wide range of useful properties. First of all, it is necessary to emphasize their use in technological processes as inhibitors of acid corrosion of metals and antimicrobial drugs [3, 4]. For the development of new promising technologies, it is necessary to develop measures to protect metals from corrosion, and the emergence of resistance in microorganisms to existing bactericides requires the use of new, more effective disinfectants. In this regard, it becomes important to obtain new quaternary salts of the pyridine series, which have the specified properties, based on available and cheap reagents.

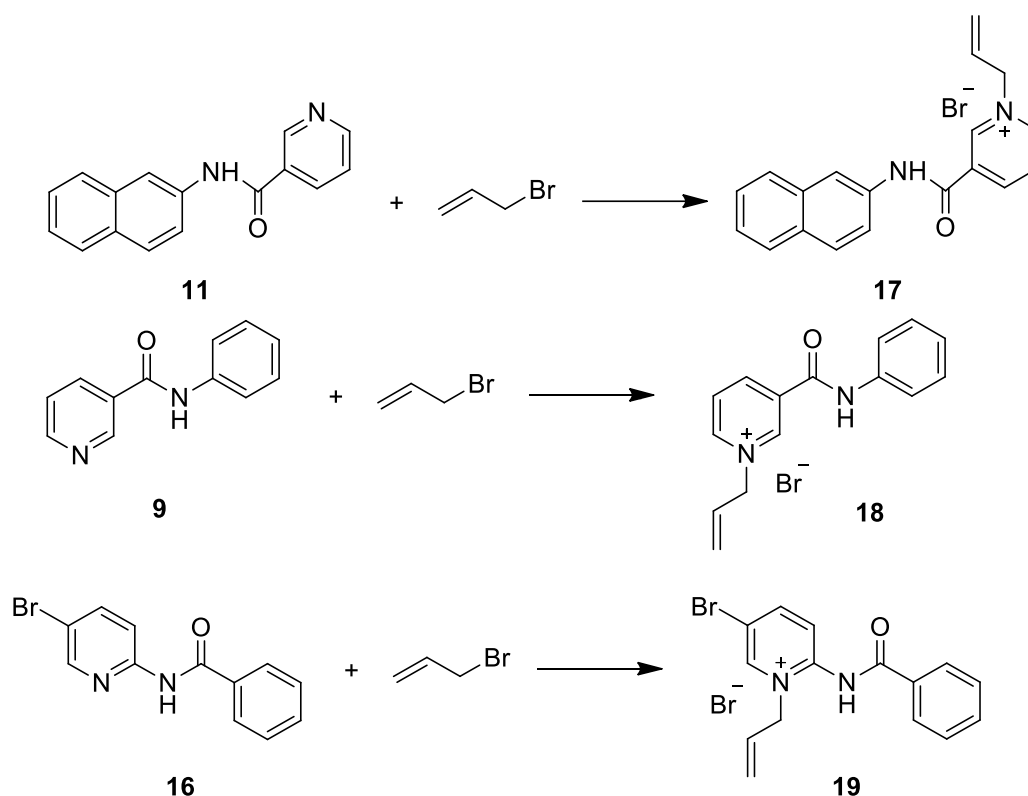
1. Synthesis of monoquaternized amides

N-phenylnicotinamide 9, 1-naphthylnicotinamide 10 and 2-naphthylnicotinamide 11 were obtained by acylation of aniline 6, 1-naphthylamine 7 and 2-naphthylamine 8 with nicotinic acid chloride, respectively. For the experiments, reagents of the "pure" brand were used. Quaternization of 9-11 with benzyl chloride was carried out in benzene, the yield of salts 12-14 was 67-74%



The synthesized salts were purified by recrystallization from benzene. Confirmation of the structure of salts 12-14 was carried out using IR and PMR spectra. Absorption bands characteristic of the amide group are present in the IR spectra at frequencies of 3340-3350 and 1670-1700 cm⁻¹. In the PMR spectra of these salts there are signals of protons of the NH group at 10.29-10.75 m.p. and methylene protons of the benzyl radical at 3.28-3.71 m.p.

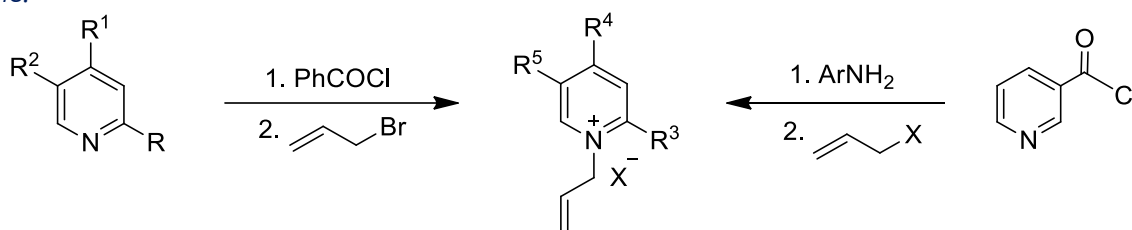
The following substituted *N*-allylpyridinium bromides were also synthesized:



signals of the NH N-arylnicotinamides 11 and 9 were synthesized by acylation of aniline and 2-naphthylamine with nicotinic acid chloride in benzene. Benzoylaminopyridine 16, required for quaternization, was obtained by boiling a mixture of benzoyl chloride and the corresponding amine in a 1 : 1 ratio in chloroform and purified by recrystallization from benzene. Allyl bromide was used for quaternization of N-arylnicotinamides 11 and 9.

Quaternization of benzoylaminopyridine 16 with allyl bromide was carried out by boiling in benzene. The structure of the compounds was confirmed by IR and PMR spectra. Absorption bands characteristic of the amide group appear in the IR spectra at 1650-1695 (C=O), 3330-3350 (NH) cm^{-1} . The PMR spectra contain -group proton at 8.1-8.9 ppm, methylene protons of the allyl radical at 5.24-5.9 for salts 17 and 18 and at 8.3 for salt 19.

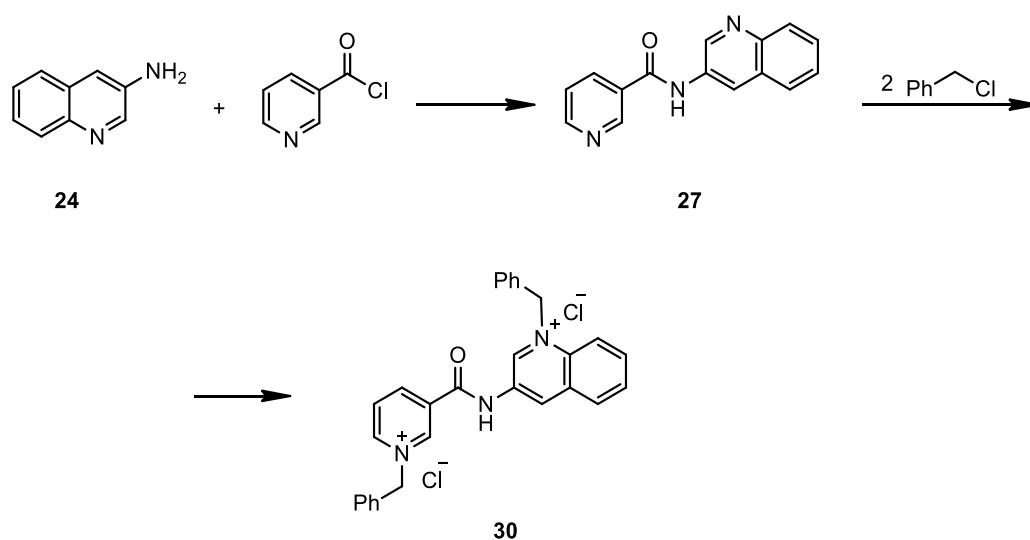
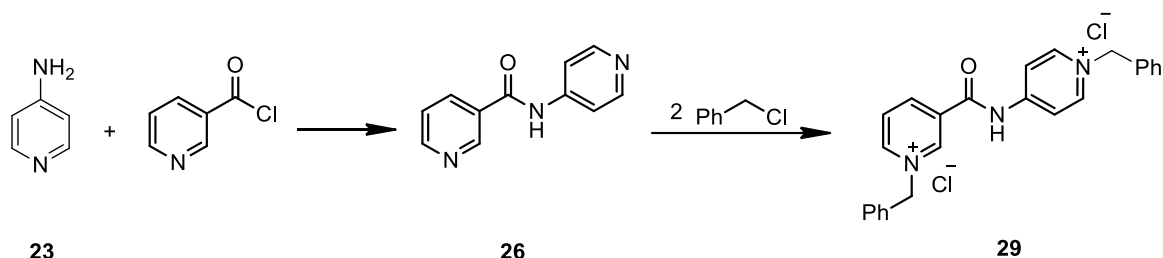
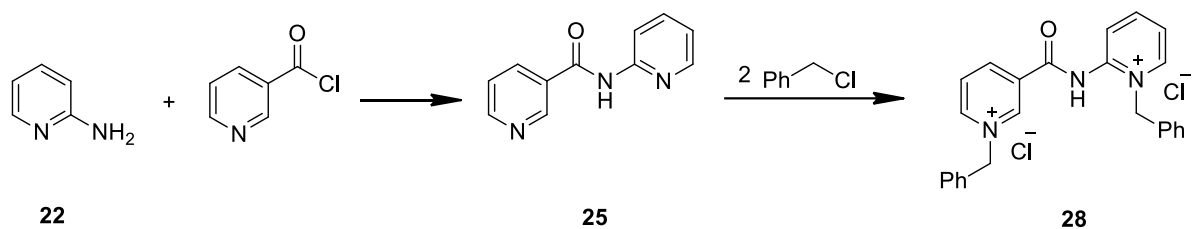
The synthesis of substituted N-allylpyridinium halides was carried out according to the general scheme:



2. Synthesis of diquaternized amides

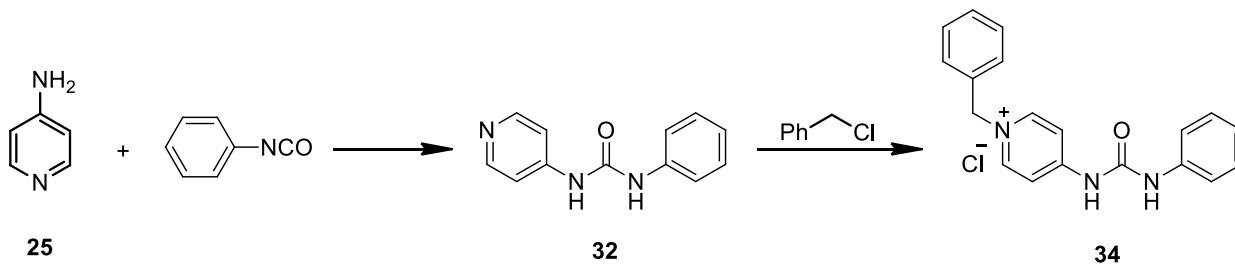
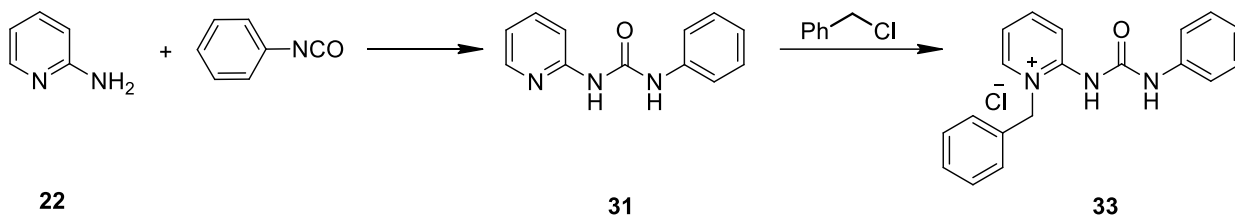
N-2-pyridylnicotinamide 25, N-4-pyridylnicotinamide 26 and N-3-quinolylnicotinamide 27 were obtained by acylation of 2-aminopyridine 22, 4-aminopyridine 23 and 3-aminoquinoline 24 with nicotinic acid chloride, respectively. Quaternization of 25-27 with benzyl chloride was carried out in benzene or chloroform. The yield of the synthesized salts 28-30 is 33-87%.

Confirmation of the structure of salts 28-30 was carried out using PMR spectra. Characteristic signals of protons of the NH group at 9.44-10.19 ppm and methylene protons of the benzyl radical at 9.44-6.05 ppm are present. The latter is possibly explained by the fact that the mutual influence of protons of CH₂ groups leads to their shift into a weaker field.



3. Synthesis of urea-based salts

N'-(2-pyridyl)-*N''*-(phenyl)urea 31 and *N'*-(4-pyridyl)-*N''*-(phenyl)urea 32 were obtained by the interaction of phenylisocyanate with 2-aminopyridine 22 and 4-aminopyridine 25, respectively. "Pure" reagents were used for the experiments. Quaternization of 31 and 32 with benzyl chloride was carried out in chloroform, the yield of salts 33 and 34 was 59-77%.



The structure of salts 33 and 34 was confirmed by IR and PMR spectra. In the PMR spectra of these salts there are signals of protons of the NH group at 11.91-9.20 m.p. and methylene protons of the benzyl radical at 7.93-4.57 m.p. Absorption bands characteristic of the diamidocarbonate group are present in the IR spectrum of salt 34 at frequencies of 3270-2960 (NH) and 1750 (C=O) cm⁻¹.

Conclusions

1. A method for the synthesis of quaternary salts of mono- and diquaternized N-aryl nicotinamides and ureas as potential inhibitors of acid corrosion is proposed. Available reagents were used in the syntheses: benzyl chloride, allyl bromide, nicotinic acid chlorides, aromatic amines and isocyanates. Preparative yields are 67-87%.

2. All synthesized substances will be tested as corrosion inhibitors and antibacterial drugs.

References

1. Kuznetsov Yu.I. Chemistry advances. / Yu.I. Kuznetsov. - 2004.
2. Tedder J. Industrial organic chemistry. / Tedder J., Nekhvatal A., Jubb A. - Moscow: Mir, 1977. - 670 p.
3. A.s. 280162 USSR, MKI C23F11/04. Method of protecting metals from acid corrosion.
4. A.s. 557793 USSR, Antimicrobial preparation. Bull. of invention. 1977, No. 18.

Economic sciences

IMPORTANT ASPECTS OF DEVELOPMENT OF INFRASTRUCTURE OF TOURISM ENTERPRISES OF AZERBAIJAN

Huseynov Nihad

Doctoral student of Sumgait State University
AZ 5008, Republic of Azerbaijan, Sumgait, 43rd quarter.

Abstract

The article discusses the current problems and trends in the development of improving the infrastructure of tourism enterprises in Azerbaijan. The directions of development and potential of tourism are analyzed. The importance of developing infrastructure in the tourism sector is substantiated. The multiplier effect of tourism as a profitable sector of the economy is given. The possibilities of expanding tourism in the Karabakh and East Zangezur economic regions are noted. The constituent elements of the corresponding concept for the development of infrastructure in the country's tourism sector are explained. A number of proposals on the problems and trends in the development of infrastructure of tourism enterprises in Azerbaijan in the near future have been prepared.

Keywords: Azerbaijan, tourism, tourism sector, infrastructure of tourism enterprises, current infrastructure problems, infrastructure development trends.

It should be noted that the impact of transformations and global problems that have occurred in the world economy over the past ten years. The negative impact on our economy of global financial problems that began at the end of 2008 continues [1]. We believe that diversification of the country's economy is characterized as one of the important issues [2]. In this regard, it is extremely important to prepare new mechanisms and effectively use the capabilities of economic territories with dynamic development characteristics [3]. In this regard, tourism development can be very effective [4]. Tourism in particular has the potential to play a multiplier role in the development of regions [5]. According to the World Tourism Organization, international tourism has become the second largest economy in the world, accounting for 10% of the world economy and 4-5% of average annual growth rates [6]. Tourism activity is defined as social interaction of people working in this area [7]. Tourism activity is characterized by a large number of entities engaged in the production and promotion of tourism services [8]. Logical relationships are established between market entities (tourism enterprises, associations, travel agents, tour operators, etc.) to achieve the strategic goals of the tourism industry, which requires management of this type of activity [9]. Effective management of tourism activity depends on the correct formation of its goals, objectives and infrastructure [10].

The main condition for the successful development of tourism enterprises is the organization of a multidisciplinary and high-quality tourism infrastructure that fully meets all the needs of potential tourists [11]. Therefore, the organization of the infrastructure of tourism enterprises at a high level is an important task. The competitiveness of the tourism infrastructure is based on the following: firstly, on the resources of tourism, recreation and natural infrastructure, secondly, on the ability to use them effectively, thirdly, on attracting investors on a bilateral basis to attract material resources for the development of infrastructure [12]. Tourism infrastructure can have a significant impact on the effectiveness of social structures [13].

Despite significant research work on the nature of tourism infrastructure, there is no single acceptable definition of this concept. In general, infrastructure is a set of industries and activities that serve the production and population of a country. Thus, tourism infrastructure is understood as a complex material-economic, historical-cultural and social complex aimed at organizing health, recreational, educational activities to meet the various needs of people [14]. The infrastructure block of tourism enterprises includes roads, transport, hotels, entertainment centers, etc. includes. The hotel itself consists of a number of components, including furniture, equipment and utilities. This activity covers various sectors of the economy. For example, the construction of a hotel in any region requires not only

money, but also the allocation of land by local governments, the creation of architectural projects, etc. depends [15].

At the same time, some researchers distinguish three groups of organizations that are the main elements of the infrastructure of tourism enterprises. The first group includes organizations and enterprises engaged in the provision and development of basic tourism services: tour operators and travel agents, accommodation enterprises, public catering and transport companies. The second group includes tourist services and specialized organizations providing special-purpose services: excursion agencies and guide-interpreters; health complexes of recreational tourism; tourist bases of various profiles; training centers for preliminary qualification of tourists; sports complexes and camps for holding sports competitions and competitions; enterprises engaged in the production and sale of tourism goods; organizations for the provision of services in the field of international tourism and legal; organizations providing services for the regulation of various tourism formalities. The third group includes organizations specializing in the reproduction of tourism activities: organizations for the professional training and retraining of personnel for the tourism sector; personnel agencies for professional selection; training courses for guides and guide-interpreters; organization of certification, accreditation and control of persons engaged in tourism activities [16]. Formation, preservation and improvement of tourism infrastructure is of particular importance for the development of tourism enterprises. The main mechanism for the development of tourism enterprises is the development of technologies for the formation, modernization and management of tourism infrastructure, strengthening the role of state regulation in this area. The main goals, objectives, principles and directions of the state policy of the Republic of Azerbaijan comply with international standards and are also regulated by the legal norms of the country. The main principles of state regulation of tourism enterprises in the Republic of Azerbaijan are, first of all: 1) promoting the development of tourism and creating favorable conditions for its development; 2) defining and supporting priority areas of tourism activity; 3) forming the image of the Republic of Azerbaijan as a country favorable for tourism; 4) supporting and protecting Azerbaijani tourists, tour operators, travel agencies and their associations.

After the state has selected priority areas for tourism development in our country and the main principles of its impact on tourism activities, specific goals are set. These are, first of all: 1) ensuring rest, free movement and other rights of citizens during travel; 2) ensuring environmental protection; 3) creating conditions for holding individual events aimed at improving the health of tourists, their upbringing and education; 4) developing a tourism industry that meets the needs of citizens during travel, creating new jobs, increasing the income of the state and citizens of the Republic of Azerbaijan, developing international relations, protecting tourism resources, and effectively using natural and cultural heritage. In the system of state regulation, the effectiveness of the tourism sector, like any other industry, is assessed by a number of indicators. The growth of indicators reflects the economic feasibility of investing in the tourism infrastructure of the region, its further expansion and popularization. Therefore, the development of tourism infrastructure is one of the main strategic goals [17].

In our country, special attention is paid to the development of the infrastructure of tourism enterprises. The continuous development of tourism enterprises has become the main driving force of the socio-economic development of this sector [18]. This is reflected in the creation of new jobs and the creation of tourism infrastructure. The infrastructure of tourism enterprises in Azerbaijan plays a decisive role in the diversification of this type of activity and the regional development of the country [19]. The competitiveness of Azerbaijan in the field of tourism can be assessed very highly. The basis for this are our natural resources, historical monuments and rich heritage, 9 out of 11 types of climate in the world [20]. The development of the infrastructure of tourism enterprises depends on their comprehensive assessment. A comprehensive assessment of the development of the infrastructure of tourism enterprises should be based on a comprehensive consistent analysis of its constituent elements [21]. The most complete and objective method for assessing the infrastructure of tourism enterprises is the method based on existing tools and taking into account official statistics [22]. In addition, this methodology can be supplemented with the help of expert assessments and the results of a survey conducted both among tourists and among tourism industry enterprises [23]. The newly created Karabakh and East Zangezur economic regions have wide opportunities for tourism [24]. In general, the economic development potential of these newly created economic regions is growing rapidly [25]. It should be noted that the city of Shusha has enough tourism and recreational opportunities [26].

The priority of high technology development and the use of digital mechanisms is the formation of new opportunities [27]. This will also increase the investment attractiveness of the region and accelerate the inflow of foreign investment [28]. The declaration of territories liberated from occupation as green

energy zones makes these territories more interesting for entrepreneurs and tourism enterprises [29]. The prospects for creating free economic zones in these territories are also highly valued, and the processes of creating tourist and recreational zones can be intensified [30]. At the same time, the possibilities of the tourism sector in terms of ensuring innovative development and organizing innovative enterprises deserve attention [31]. The tourism development strategy can play an important role in the effective organization of the infrastructure of tourism enterprises [32]. The tourism development strategy should include: development of domestic and foreign tourism; unification of the quality of tourism services in the country, adaptation to international standards; strengthening the role of tourism in the education of the population of the regions and the formation of their cultural and spiritual potential; coordination of efforts of all regions to promote the country's tourism product [33]. The main positive economic effects of sustainable tourism are associated with an increase in foreign exchange earnings, government revenues and employment. One of the most important economic benefits is the economic growth that sustainable tourism brings [34]. In recent years, Azerbaijan has taken a number of serious steps towards attracting investment to the country: a) open door policy; b) activation of electronic services in many areas; c) protection of investors' rights by judicial procedures, etc. All these measures have played an important role in increasing the efficiency of infrastructure facilities of tourism enterprises [35].

We believe that a number of measures should be taken to develop infrastructure areas of tourism enterprises in Azerbaijan:

- effective informing of clients about the tourism potential of Azerbaijan;
- ensuring the safety and comfort of tourists;
- conducting a large-scale advertising and information campaign in the media of Azerbaijan and abroad;
- development of exhibition and fair activities in the field of tourism in the main tour-sending countries in order to demonstrate tourism opportunities;
- creation of a network of information centers for foreign and local tourists in the center of the tourist flow;
- creation of favorable investment conditions for business entities in the field of tourism and certain benefits and advantages for investors, etc.

References

1. Алиев, Ш.Т. Влияние финансового кризиса мира на экономические процессы Азербайджанской Республики // Журнал Финансы и кредит. № 8 (344). Москва, 2009. С. 78-82.
2. Aliyev, Sh.T. Problems Of Diversification Of Azerbaijani Economy In Modern Conditions / VIII International scientific and practical conference «Current problems of social and labor relations» (ISPC-CPSLR 2020), Makhachkala. 17-18 December 2020. – P.38-44.
3. Алиев, Ш.Т. Важность применения новых экономических инструментов в экономических процессах Азербайджана // Национальные интересы: приоритеты и безопасность. 2009, № 12. С. 80–90.
4. Киселева, И.А., Тримова, А.М. Влияние инновации на конкурентоспособность предприятий туристского бизнеса // Экономика, статистика и информатика. Вестник УМО. М.: МЭСИ, 2011. № 5. С. 115-119.
5. Aliyev, Sh.T., Babayev F., Gafarli G., Galandarova U., Balajayeva T. Economic security of regions: A prerequisite for diversifying the Azerbaijan economy // Journal of East European and Central Asian Research (JEECAR). 2023. September. Vol. 10 No. 5 (2023), p. 827-840. – <http://dx.doi.org/10.15549/jeecar.v10i5.1480>.
6. Толонов, Э.Н. Современное состояние туризма и его развитие / Э.Н.Толонов // Известия ВУЗов (Кыргызстан). – 2015. – № 2. – С. 165-166
7. Aliyev Shafa Tiflis, Guliyeva Zumrud Turab, Hasanova Sadagat Elshan, Babazade Mahammadali Mirhadi, Beybudova Tarana Yashar, Huseynov Elsun Vugar. "Current directions of development of the tourism sector in Azerbaijan" / XVII International Scientific and Practical Conference «The modern vector of the development of science», November 21-22, 2024, Philadelphia, USA. –p. 39-45. DOI <https://doi.org/10.5281/zenodo.14230404>.
8. Хрусталева, Е.Ю., Боташева А.С. Роль экологического туризма в развитии экономики региона (на примере Карачаево-Черкесской Республики) // Региональная экономика: теория и практика. 2011. № 28. С. 31-37.

9. Əliyev, Ş.T., Hüseynov, N.R. Azərbaycanın postkonflikt ərazilərində turizm sənayesinin rəqabət qabiliyyətinin yüksəldilməsində Türkiyə modelinin tətbiqi perspektivləri. // "Geostrategiya" jurnalı, Bakı, 2024, №01.–s.108-112. <https://geostrategiya.az/documents/2024/03/Geost-1709570612.pdf>.
10. Современные теории менеджмента: монография / Гужина, Г.Н. и др. Орел: Научное обозрение, 2014. – 110 с.
11. Киселева, И.А., Трамова, А.М. Риски при реализации инновационного проекта в туристической отрасли // Аудит и финансовый анализ. 2012. № 2. – с.182-185.
12. Моисеева Н.К. Стратегическое управление туристской фирмой: учебник. М.: Финансы и статистика, 2001. 208 с.
13. Каширин, В. Туристская инфраструктура как определяющий фактор развития туризма / В.Каширин // Социальная политика и социология. – 2012. – № 4(82). – С. 122-129.
14. Оборин, М.С. Туристская инфраструктура: социально-экономический анализ основных понятий и определений. Ученые записки Орловского государственного университета, 2014, №5 (61), с.87-93.
15. Толонов, Э.Н. Развития туристической отрасли в регионах и её перспектива / Э.Н.Толонов // Вестник Жалал-Абадского государственного университета. – 2018. – № 4(39). – С. 223-228.
16. Марьин, А.В., Фомин П.А. Инфраструктура туризма как платформа функционирования рынка туристских услуг // Экономика: вчера, сегодня, завтра. 2017. Том 7. № 4А. С. 155-164.
17. Панина, Л.В. Развитие туризма как стратегическая цель социально-экономического развития региона / Л.В.Панина, Т.О.Толстых // Вестник Воронежского института высоких технологий. – 2017. – № 4(23). – С. 221-225.
18. Алиев, Ш.Т. Проблемы организации и перспективы развития особых экономических зон. – Баку: Наука. – 2008. – 252 с.
19. Алиев, Ш.Т. Роль специальных экономических зон в развитии предпринимательства и инвестиционной активности// Российское предпринимательство. – Москва, 2012. № 7 (205), – с. 180-184.
20. Bilalov, B.Ə., Mustafayev, A.N. Azərbaycan Respublikasında turizm sənayesinin və otel təsərrüfatının inkişafı və müasir vəziyyəti. "Turizm və rekreasiya XXI əsrdə: problemlər və perspektivlər" mövzusunda IV Beynəlxalq elmi-praktiki konfrans, Bakı, 3-4 may 2019, s.224-227.
21. Алиев Ш.Т. Моделирование инноватизации национальной экономики в современных условиях // Научное обозрение, 2014, № 06, С. 342-346.
22. Piana, V., Aliyev, Sh.T. and etc. 2009 – Innovative Economic Policies for Climate Change Mitigation. Economics Web Institute, Rome.
23. Величкина, А.В. Оценка развития туристской инфраструктуры региона. Экономические и социальные перемены: факты, тенденции, прогноз 2 (32) 2014, с.239-250.
24. Əliyev, Ş.T. Qarabağ və Şərqi Zəngəzur iqtisadi rayonlarının yaradılmasının strateji aspektləri. // Geostrategiya jurnalı, – 2021. № 04 (64), – s.67-72.
25. Алиев, Ш.Т., Аббасова, Ч.И., Гамидова, А.М. Оценка потенциала и пути развития Карабахского экономического района Азербайджана / VIII International Scientific and Practical Conference International forum: problems and scientific solutions held in Melbourne, Australia. Scientific collection «interconf», September 6-8, 2021, № 73, p. 7-15. <https://ojs.ukrlogos.in.ua/index.php/interconf/article/view/14257/1307>.
26. Алиев, Ш.Т. Стратегическая важность возрождения Шуша в интенсификации социально-экономического развития Карабахского экономического района/ Ш.Т. Алиев, Л.А. Меликова// Современные тенденции развития науки и мирового сообщества в эпоху цифровизации: Сборник материалов VII Международной научно-практической конференции, Москва, 30 июня 2022. – с. 321-329.
27. Mamedov, Z.F. Aliyev Shefa. Digitalization of the economy: analysis of influence on the banking sphere in Azerbaijan in the context of world experience// 55th International Scientific Conference on Economic and Social Development, Baku, Azerbaijan.: 25 June 2020, Book of Proceedings Vol. 2/4. P 584-591.
28. Алиев, Ш.Т., Гусейнова, Н.Э., Яхьяева, А.Ю. Проблемы повышения инвестиционной привлекательности Карабахского региона Азербайджана и пути их решения/ II International Scientific and Practical Conference Current Issues And Prospects for the Development of Scientific Research held on in Orléans, France, May 7-8, 2021, p.13-19. -

<https://ojs.ukrlogos.in.ua/index.php/interconf/issue/view/7-8.05.2021/534>.
<https://doi.org/10.51582/interconf.7-8.05.2021.002>.

DOI:

29. Aliyev, S., Gulaliyev, M., Purhani, S., Mehdiyeva, G., & Mustafayev, E. (2024). Comparative Assessment of Energy Security Level: The Case of the South Caucasus Countries. *International Journal of Energy Economics and Policy*, 14(1), 651–662. <https://doi.org/10.32479/ijeep.14984>.

30. Əliyev, Ş.T. Azad iqtisadi zonaların inkişafının aktual aspektləri. Monoqrafiya. Sumqayıt. SDU-nun Redaksiya və nəşr işləri şöbəsi. 2022. – 422 s.

31. Елисеев, М.Е. Моделирование деятельности туристско-экскурсионного предприятия // сб. науч. трудов «Проблемы регионального и муниципального управления: управление, экономика, информатика». Таганрог: ТРТУ, 2001.

32. Alguliyev, R.M., Aliyev A.G., Aliyev Sh.T., Shahverdiyeva R.O. Development of information support systems for management of innovative structures / *The 8th IEEE International Conference on Application of Information and Communication Technologies (AICT2014)*, Astana, 2014. – 378-382.

33. Кабушкин, Н.И. Менеджмент туризма. Минск: Новое знание, 2005. 408 с.

34. Гуляев, В.Г. Туризм: экономика и социальное развитие. М.: Финансы и статистика, 2003. – 304 с.

35. Алиев, Ш.Т., Исраилова, С.Д. Проблемы и пути развития сектора туризма в Азербайджане // *Международный научный журнал ISJ Theoretical & Applied Science, USA, Philadelphia*, 2017. --с.30-35. <http://www.t-science.org/arxivDOI/2017/04-48/04-48-6.html>.

DIVERSIFICATION OF THE NON-RESOURCE SEKTOR OF THE ECONOMI OF THE PEPUBLIC OF AZERBAIJAN BASED ON SUSTAINABLE DEVELOPMENT AND ANALYSIS OF THE EXPERIENCE OF FOREIGN COUNTRIES IN THIS AREA

Sevinc İbrahimova

Associate Professor of Odlar Yurdu University, Baku, Azerbaijan
<https://orcid.org/0009-0004-3670-2132>

Mayil Orujov

Honorary Professor of SMBS (Swiss Montreux Business School),
 Odlar Yurdu University, Baku, Azerbaijan
<https://orcid.org/0009-0001-8177-3851>

Azer Orujov

Social Services Agency, Baku, Azerbaijan
<https://orcid.org/0009-0008-5638-8020>

Nermin Orujova

Social Services Agency, Baku, Azerbaijan
<https://orcid.org/0009-0007-1222-4238>

Abstract

In article experience of diversification of economy of the countries which economic complex is based on production of natural resources is investigated. In the context of the problems facing economy of Azerbaijan and in comparison to foreign countries the course and results of transformations, a role of non-oil sector in development of economy, the potential of positive impacts on country modernization and barriers on the way of realization are considered. The complex of factors – new technologies, institutional reforms, structural changes which in close interference significantly strengthened action of long-term sources of the advancing growth of branches of non-oil sector and its general economy role during the considered period is analyzed. Most important parties of transformation and diversification of economy are defined: transition of branches to modern technological base, functional complication of production, integration into the global markets. Mechanisms of achievement of sustainable development of non-oil branches of economy are characterized, influence of transformations is estimated. Need of development of the concept of sustainable development of not oil sector is noted. The purpose of article is the research of foreign experience of transformation and diversification of economy and development of recommendations about improvement of mechanisms and methods of achievement of sustainable development of non-oil branches of economy of Azerbaijan. In the context of transition of Azerbaijan to a way of innovative development it is important to compare the reached parameters of the considered sphere, to reveal common features and distinctions, to define weak links and comparative advantages of Azerbaijani non-oil sector.

Keywords: industrial diversification, alternative energy, national economy, economic restructuring, the petro exporting countries, non-oil sector, diversification of economy

Introduction

In the economy of Azerbaijan, based on oil and gas production, the main place is given to the mining industry, and the share of agriculture in the country's GDP is not high. During the course of very important processes for the Azerbaijani economy, in Azerbaijan, just like in other post-Soviet countries exporting oil and oil products, which make up about ninety percent of their total exports, due to a decrease in a sensitive volume in the world market of oil prices, has led to an unprecedented importance of ensuring the development of agriculture and diversification of the country's exports. 55.1% of the country's territory is land suitable for agriculture. 42.7% of these territories are used for crops.

Discussion

Oil production is the basis of the national income of the Republic of Azerbaijan, 37.0% of whose GDP is filled by the oil sector. The desire to move away from the raw materials export model of country development, which the economy of the republic has adhered to for decades, is based on the idea and principles of diversification and modernization. To this end, in recent years, not the extractive industries

of the economy have been developing at an accelerated pace in Azerbaijan, but its manufacturing industries - mechanical engineering, electrical engineering and light industry, agriculture, as well as the service sector.

At the same time, despite the positive results of the activities of the non-resource sectors of the economy of Azerbaijan recently achieved, their dynamics remain insufficiently stable. The oil extractive sector, being the basis of the economy of the republic, dominates the non-resource sector, negatively affecting the natural, industrial, technical and intellectual potential of the country as a whole.

Therefore, one of the primary tasks of the Azerbaijani economy is to find ways of sustainable development of the non-resource sector, ahead of the oil sector. In our opinion, the experience of foreign countries with a raw material orientation similar to Azerbaijan seems important and underestimated. This is especially consistent with the state policy of achieving sustainable development of non-raw material sectors of the economy. In a number of countries, economic diversification has already been mastered - these are Norway, Malaysia, Indonesia, Singapore; some countries are in a transitional stage, for example, Algeria, Nigeria; a considerable number of countries have short-term and long-term prospects for introducing diversification and modernization into their economic foundations, such as: Angola, Kazakhstan, Iran, Kuwait, Saudi Arabia [Mitchell, Stevens]. It was industrial diversification, focused on internal and external challenges and opportunities, that led to increased export flexibility and competitiveness of Norway, Holland, Latin American and East Asian countries in the 1980-1990s. Positive evidence of the development of the economies of a number of countries allows us to demonstrate how important it is to accept and change the development of national priorities in time towards industrialization. The study and theoretical and practical understanding of the advanced country experience can become the basis for ensuring high efficiency and competitiveness of non-resource sectors in the Republic of Azerbaijan. At the same time, the analysis of the developed methods and approaches in macroeconomic policy for the accelerated growth of the non-resource sector cannot but affect the implementation of the strategic goals set for the republic and the overall successful economic growth of Azerbaijan.

Experience of foreign countries in preventing the negative impact of oil revenues on the national economy

Norway, which is among the top ten oil-producing and oil-exporting countries, has the most useful experience in preventing the negative impact of oil revenues on the national economy. In this regard, the state has carried out a whole range of measures that have contributed to the liberation of the national economy from oil dependence. These include: the widespread use of transfers and the application of preferential tariffs to them in order to protect and dynamically develop industrial sectors of the economy; investing heavily in education, science and technology, and environmental protection; reforming the labor market in order to increase the level of employment; strengthening control over the level of wages in various sectors of the economy; reducing deductions from oil revenues to the sovereign wealth fund, etc. In general, Norway's economic policy is characterized by the fact that its oil sector acts as a locomotive that ensures the comprehensive development of the economy. However, one of the regulatory principles is the use of 50% of the funds received by the State Oil Fund for investment in the non-resource sector. It is therefore no coincidence that finished products from non-resource industries of Norwegian production are among the most competitive and high-tech on the world market.

Along with strengthening business ties with developed and developing countries, the Gulf countries pay considerable attention to internal development. Even during the global financial crisis of 2008-2009, their sovereign wealth funds significantly increased the amount of funds allocated for financing domestic investment projects; goals are being put forward to become centers of innovation, finance, logistics and tourism; much is being done in terms of infrastructure modernization. Thus, the sovereign wealth fund established in Abu Dhabi, the capital of the United Arab Emirates, the investment company Mubadala Development Company (MDC) with assets of \$55 billion (2013) proclaimed as its mission the transformation of the UAE into the business center of the Persian Gulf with a focus on international cooperation, creating business in strategic industries and working with foreign partners. MDC, in cooperation with the state corporation Dubai Aluminum, founded and put into operation the joint venture Emirates Aluminum (EMAL), smelting 720 thousand tons of aluminum per year. As a result, the UAE became one of the leading producers of aluminum in the world (5% of the world volume), supplying both for export (in particular, to Holland for the production of aluminum cars and to Italy for the company Piaggio Aero) and for the domestic market of the UAE [Shafique, etc.]. MDC also strives to take a strong position in high-tech industries. The beginning was the purchase of a stake in AMD, the world's second-largest manufacturer of computer microprocessors. At the same time, the fund and its branch Abu Dhabi Future Energy Company are implementing the Masdar Investiative project to develop energy production

technologies from renewable sources. For this purpose, a research center was created that has established ties with the Massachusetts Institute of Technology. To develop alternative energy, a special economic zone is being created in Abu Dhabi, where a kind of "city of the future" is being built - without cars and atmospheric emissions. The country is actively developing its own high-class healthcare system to provide high-quality medical care to its own citizens and residents of neighboring countries. In 2008, General Electric announced long-term cooperation with the MDC sovereign wealth fund, establishing a joint venture with an authorized capital of \$8 billion. We also consider it necessary to emphasize that in the UAE as a whole, a special financial market based on the principles of Islamic banking is becoming more relevant. The UAE government encourages foreign investment in the non-oil sector of industry, offering preferential loans and other preferences to private financial institutions through Emirates Industrial Bank. As a result, industry diversification, growth in production and export of non-resource sectors of the national economy have become the most important modern feature of the Persian Gulf countries as recipients of foreign direct investment. Saudi Arabia and the UAE have implemented a number of major projects: the construction of the King Abdullah Economic City industrial and residential complex and the Saudi energy system [Harvard Business Review, 2009]; In Dubai, the largest city in the UAE, aluminum production is well developed, and the electrical and textile industries are developing, which are actively seeking to conquer niches in global exports (for example, an industrial zone called "Textile City" with an area of more than 550 thousand square meters was created for the production of ready-made clothing). The tasks of increasing the role of non-resource industries as an indicator of diversification are emphasized in national program documents: in Saudi Arabia, by 2010, the contribution of these industries to GDP reached 71% [Diplomatic Service, No. 5], and according to the guidelines of the Long-Term Strategy for Economic Development By 2024, the share of all non-oil sectors of the economy should reach 82.9% with a growth rate of 7%.

The Strategy provides for benefits and financial assistance to small and medium-sized enterprises, which by 2016 should provide more than 30% of agricultural production. Given the frequent fluctuations in world prices for traditional energy sources, projects are being implemented in the field of alternative energy, primarily the use of solar energy, which is entirely conditioned by the climate. Intensive development of the petrochemical industry has allowed the country to become one of the world leaders in this area.

The Islamic Republic of Iran is moving towards the formation of its own market development model, distinct from others. At the same time, there is a convergence with world trends dictated by globalization. Today, in contrast to the Shah's period, a course has been taken to achieve self-sufficiency of the national economy and meet the needs of the population with industrial and agricultural goods of its own production. The basis of dynamic economic development was modernization with such characteristic features of this process as accelerated development of industry, giving it an export orientation. The strategic course of economic policy is the development of the manufacturing industry and the export of its products. To this end, the country is trying to diversify the economy, investing part of the profit from oil exports in the development of other sectors of the economy. The most export-oriented and competitive industries are energy, petrochemicals, and the production of mineral fertilizers. Emphasis is placed on creating a more favorable investment climate: the new Law on the Protection of Foreign Investments adopted in the summer of 2002 is recognized as more transparent and provides foreign investors with a considerable number of guarantees.

An extensive set of industrial policy instruments has become one of the manifestations of the active role of the state in the economic development of one of the newly industrialized countries - Singapore. Here, they sought to stimulate structural changes, choosing promising industries for support that are capable of creating new comparative advantages in the economy. Thanks to this approach, the Singaporean economy was already characterized by a high degree of diversification by the beginning of the 21st century. The outstanding results of selective industrial policy are largely due to the fact that, along with the selection of specific industries and incentive measures, the necessary set of tools and institutions for solving the tasks set were determined, and basic conditions for a long-term diversification process were created. Using a number of mechanisms, the government managed to restructure the economy, create such knowledge-intensive industries as chemical, petrochemical, biomedical, pharmaceutical, electronic and ICT. In our opinion, the experience of Singapore is especially valuable because the set of incentive measures, mechanisms and tools was periodically changed. At the initial stage of industrial policy (1959-1969), labor-intensive industries with elements of import substitution (textile and leather industries, semiconductor production) were stimulated above all. Individual projects were also carried out in capital-intensive industries, for example, oil refining and metallurgy. This stage was characterized by a

combination of elements of protectionism and a liberal regime with respect to foreign direct investment. The next stage (1966-1977) was marked by a transition to an export orientation, accompanied by the liberalization of foreign trade policy and the creation of free trade zones. Foreign investors were offered even more generous benefits. At the same time, the targeting of industrial policy increased, and government measures to influence the structure of the economy became more active and direct. Priority was given to the electronics, petrochemical, shipbuilding and ship repair industries. Then (1978-1985), special emphasis was placed on the creation and development of capital-intensive and high-tech industries (mechanical and machine tool building, chemistry and petrochemistry, electrical engineering, computer equipment production, etc.) with the parallel development of new service industries. At the new stage of economic restructuring (1986-1997), the main tasks are increasing production volumes in knowledge-intensive industries (electronics, chemical industry, biotechnology, pharmaceuticals, ICT), as well as developing the national R&D sector and services with high added value (logistics, financial, engineering, marketing). Against the background of gradual economic liberalization, national small and medium businesses received serious support. In recent years (from 1998 to the present), an active transition of the economy to innovative rails has been carried out. In the industrial sector, the emphasis is on the aerospace industry, biotechnology, pharmaceuticals and the production of medical instruments, as well as on the further development of existing industries - electronics, chemistry, etc. petrochemicals, shipbuilding and ship repair, ICT. A number of programs have been implemented to support small and medium-sized businesses operating in the field of innovative development.

An important feature of the economic development model of Singapore, which consisted in the fact that the formation of a diversified industrial structure took place here with the active participation of foreign capital, led to the massive use of fiscal instruments (tax incentives and discounts, VAT refunds, accelerated depreciation, etc.). As a result, they became a universal mechanism for implementing Singapore's industrial policy and were used in selective industrial policy to attract foreign direct investment and develop specific industries. First of all, this was manifested in the tax incentive regime and was a key argument for transnational companies when choosing the location of their production facilities.

Thus, tracing the evolution of Singapore's industrial policy, it can be noted that instead of rigid mechanisms (import quotas, tariffs and wage regulation), instruments of indirect influence and regulation, primarily fiscal ones, prevailed. This is due to the increasing involvement of Singapore in the global economy, where obligations under WTO agreements and the creation of free trade zones with a number of countries, as a rule, do not allow resorting to protectionist instruments. It should be noted that the Singaporean package of fiscal measures, although not unique, due to its thoughtfulness and clear targeting, ultimately led to the achievement of the set goals. The approach contributed to the solution of the tasks of Singapore's industrial policy and allowed diversification of the industrial structure, creating high-tech industries - electronics production, chemistry, petrochemistry, mechanical engineering, biotechnology. Therefore, it is no coincidence that many elements of Singapore's industrial policy were used in the Asian New Industrial Countries of the "second wave" (for example, Indonesia and Malaysia). The practice of using oil revenues and developing the non-resource sector in Indonesia seems to be very positive. Main factors:

a) the devaluation of the national currency in 1978 and 1983 allowed diversifying the economy, reducing dependence on the oil sector, promoting the development of local producers and the growth of exports of non-resource products;

b) due to the diversification of the economy, oil ceased to be the only source of export revenues;

c) during the oil booms, the country was a major exporter of non-resource products.

Against the background of Singapore, Indonesia, Malaysia, the negative practice of Venezuela in using income from the export of hydrocarbon raw materials for the development of the non-resource sector is of some interest. In this country, oil provides more than 90% of export revenues, 60% of government revenues and almost 25% of GDP. The Venezuelan reality confirms the ineffectiveness of managing oil revenues in the absence of restrictions on government spending and external borrowing. Here, the conclusion that the effective use of oil funds presupposes independent control is relevant for Azerbaijan.

Kazakhstan. For over 20 years, the world community viewed the republic exclusively as a country supplying raw materials (oil, gas, various metals, uranium) and grain to global commodity markets. However, it gradually became obvious that an economy based on the raw materials export model of economic growth was not capable of ensuring long-term sustainable development. In this regard, in 2003, a comprehensive program for modernizing the structure of the Kazakh economy was adopted - "Strategy for Industrial and Innovative Development". The goal was set to ensure diversification of economic sectors in a very short period of time, as well as to prepare the conditions for a long-term transition to a service-

technological economy. The following were defined as the main guidelines for the development of the non-raw materials sector: by 2020, to achieve qualitative changes in the structure of added value in the manufacturing industry, including increasing the share of high-tech products by more than 15 times compared to 2000. In the process of implementing economic diversification, Kazakhstan encountered constraints (see Table 1), many of which are also characteristic of Azerbaijan.

Table 1.

Limitations to diversification of the economy of Kazakhstan

Low investment attractiveness of the processing sector and infrastructure facilities for private investment	Uncoordinated development of strategic infrastructure, increasing the costs of its formation
Low levels of productive employment and labor productivity	Lack of serious progress in diversifying the economy and exports
Maintaining infrastructure restrictions on economic development and restrictions on market access	Mismatch between the qualification and professional structure of demand and supply of labor
Inconsistency of the qualification and professional structure of personnel training with the requirements of the labor market due to the imperfection of the content of educational programs at all levels	A complicated system of procedures for regulating business activity, an imperfect competitive environment and the presence of barriers to entry into the market for new companies

Source: Kelimbetov K.N. Diversification of the economy of Kazakhstan is the main problem of economic policy // Horn of economic integration. 2010. P. 142-151.

The development institutions of Kazakhstan acted as important instruments for implementing the industrial and innovation policy strategy. In this regard, it is necessary to highlight the management company JSC "Kazyna Sustainable Development Fund" created in 2006, which was designed to increase and stimulate investment and innovation activity in non-resource sectors of the economy through effective corporate management of development institutions. This Fund provided financial resources to subsidiaries, which, in turn, financed the economy. The fund's activities focused on financing investment projects within the framework of current activities, the 30 corporate leaders program, the priority action plan, as well as innovative projects of small and medium businesses. Business activity in the country, entrepreneurial initiatives in non-resource sectors, as well as "growth points" that provide the basis for the development of independent economic entities were stimulated. For example, the construction of a large tire plant operating on the most promising technologies of the Finnish company Nokia served as a natural powerful incentive for the formation of related enterprises around it and the formation of a petrochemical cluster. In general, the establishment of the Fund played a positive role in the process of diversification of the Kazakh economy and for the development of its non-resource sector, allowing to significantly increase its investment portfolio and attract strategic investors. Analysis of the structure of commissioned projects showed that about 61.0% were projects in the field of agro-industrial complex, chemical, textile and clothing industry, high technology and communications, food production. At the same time, the McKinsey&Company study revealed a suboptimal and too wide choice of priority industries for investment. As justification, the industries were indicated where the added value of the financial investor is limited at the early stages (metallurgy, chemistry, petrochemistry) and industries requiring significant investment. It was recommended to reduce the list of priority industries with a focus on competitive industries that ensure diversification of the economy (for example, agricultural processing, high-tech production based on rare metals, agrochemistry, innovative technologies), as well as on projects that ensure innovative development of the economy. The lack of scientific incubators and technopolises, as well as innovative entrepreneurship, was identified as one of the main problems hindering the diversification of the economy. This, in turn, predetermined the development of approaches to state policy in the field of innovative development.

Sovereign Wealth Funds Are an Important Financial Source for Accelerated Development of Non-Resource Industries

In the analyzed group of countries, one of the development trends observed since the early 2000s should be considered the dynamic growth of government reserves, which include international reserves of central banks and assets of sovereign wealth funds created through oil and gas revenues. Thus, as of 2023, in the total volume of international reserves (\$11.7 trillion), more than a third falls to countries exporting energy resources, primarily oil and gas [IMF Data]. The value of assets of sovereign funds reached \$6.044 trillion, which is 59% of the assets of all sovereign funds operating in the world [SWF Institute]. The implementation of economic policy in countries dependent on the export of oil and other non-renewable resources is complicated by a number of fundamental problems. These include, in particular, the effects associated with the "Dutch disease", the volatility of budget revenues due to the

unpredictable situation with world prices on the raw material markets, and the limited and non-renewable reserves of natural resources. To solve these problems, raw material exporting countries aim their economic policies at mitigating the negative impact of the external economic situation by pursuing a long-term budget policy and a government spending strategy. To implement this strategy, countries either withdraw excess revenues received due to high oil prices and accumulate them as balances in central bank accounts (Saudi Arabia, the United Arab Emirates, Algeria), or accumulate them in specially created non-renewable resource funds (Norway, Chile, Kuwait, Oman). Sovereign wealth funds formed in raw material exporting countries are an important potential financial source for the accelerated development of non-resource industries [Wharton Leadership Center, 2010]. The accumulation and use of funds has its own specifics and largely depends on the profit received from the export of raw materials. Sovereign funds of various types have been created and exist today in many countries of the world, including Norway, Russia, Kuwait, Saudi Arabia, the UAE, Libya, Algeria, Singapore, the USA, Kazakhstan, etc. (see Table 2). As a rule, these funds were created in countries whose well-being depends on the volume of export of natural resources (oil, gas, non-ferrous metal ores, etc.) and their prices on the world market.

Let us turn to the effective management experience of sovereign funding in countries that have achieved the greatest success in ensuring long-term macroeconomic stability and developing the non-resource sector.

Table 2.

Countries with the largest sovereign wealth funds (2023)

	Country	Name of the fund	Total assets, \$billion.
1	United Arab Emirates	Abu Dhabi Investment Authority, Dubai Investment Corporation, International Petroleum Investment Company and others.	850
2	Norway	State Pension Fund "Global"	720
3	China	Chinese investment company	482
4	Singapore	Government Investment Company of Singapore, Temasek Holdings	422
5	Hong Kong	Exchange fund	359
6	Kuwait	Kuwait Investment Authority	342
7	Russia	National Welfare Fund, Reserve Fund	171
8	Qatar	Qatar Investment Authority	115
9	Australia	Future Fund	88
10	Kazakhstan	National Fund, National Investment Corporation	96
11	Korea	Investment Corporation of Korea	57
12	Libya	Libyan Investment Authority	56
13	Algeria	Income Regulation Fund	55
14	Iran	National Development Fund	54
15	Malaysia	Government of Malaysia Strategic Investment Fund (Khazanah Nasional Berhad)	40

Source: Wharton Leadership Center. 2024

From the data in Table 2 it is clear that more than 50% of the largest funds were created in oil-producing countries (UAE, Norway, Kuwait, Russia, Qatar, Libya, Algeria, Iran). It is in these countries that the macroeconomic situation largely depends on the dynamics of world oil prices. Economic growth in general and growth of production in the non-oil sector had maximum rates during periods of rising oil prices and minimum rates during periods of falling prices [Rustamov]. Aggregated data for ten oil-exporting countries show a statistically significant correlation (about 0.7) between the growth of real non-oil GDP and the dynamics of oil prices during 1991-2007. This correlation is especially strong in countries with a high share of the oil sector in the economy. No less important is the high volatility (standard deviation) of fiscal indicators, in particular, non-oil revenues and total expenditures. In all the countries mentioned, the variability of expenditures significantly exceeds the variability of non-oil revenues: the ratio between the indicators ranges from 3-3.5 times in Iran and Kuwait to 7.5 in Nigeria and 17 times in Libya. Of particular interest is the consideration of the non-oil budget deficit and current account balance in oil-producing countries with varying degrees of dependence on oil exports. Foreign experts, having summarized the IMF country reports and data from the relevant central banks, concluded that in countries where the stage of active diversification of the economy has already been completed (Indonesia, Malaysia, Norway), the non-oil budget deficit is below 15% of non-oil GDP; at the same time, according to the non-oil current account balance, only Norway had a small deficit, while Indonesia and Malaysia had a surplus. Thus, in the above countries, there are stable positive signs of transition from a hydrocarbon

economy to a non-oil one. Let us recall that Norway set this task as a key one in its economic strategy back in 1971, and in subsequent years all state policy was subordinated to achieving this goal. Malaysia managed to reduce its excessive dependence on oil by focusing on the development of non-oil industries: first, these were the agro-industrial complex, and now – the knowledge-based economy. We would like to emphasize that all three countries used the development of the non-oil economy to create new jobs. Algeria (Revenue Management Fund) and Nigeria (Sovereign Investment Authority) are in the process of transition to a diversified economy. Previous attempts to eliminate hydrocarbon dominance have failed, and yet both countries are now looking for effective ways to achieve this goal. On the other hand, we consider it important to note Malaysia and Indonesia, which have a fairly diversified economy: an insignificant correlation with fluctuations in oil prices distances these countries from those who have yet to face the consequences of a rapid decline in oil production.

Using the model of permanent raw material income to select a vector for sustainable development of the non-resource sector

In commodity-oriented countries, the model of permanent commodity income is often used to determine a sustainable trajectory and forecast development scenarios for the non-commodity sector. Its core is the conceptual assumption that net national wealth, commodity wealth (e.g. oil), and net financial assets are spent at a constant rate, which ensures their equitable intergenerational distribution in accordance with a specifically defined criterion of social welfare. Although the application of this model may lead to higher levels of non-oil budget deficit in the short term, over long time horizons, when raw material reserves are close to depletion, it allows maintaining the deficit at a lower level. According to the model, the concept of sustainable development can be correlated with two types of social welfare criteria on the basis of which the distribution of net national wealth between generations is built:

- 1) a constant distribution of a certain share of non-oil GDP;*
- 2) the use of a constant value of commodity wealth in real terms.*

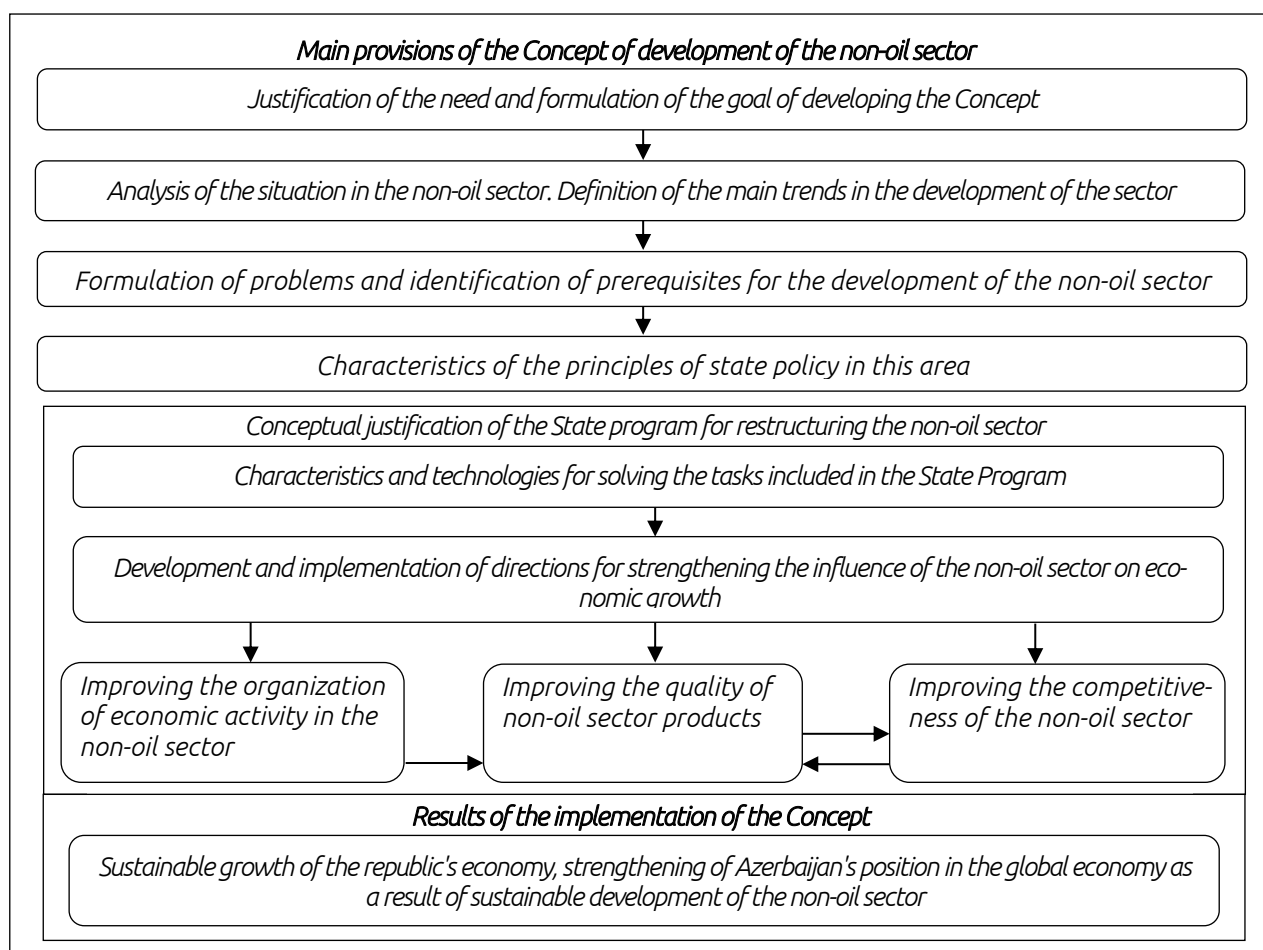


Figure 1: Proposed model of the Concept of transition of the non-oil sector of Azerbaijan to sustainable development. Source: compiled by the author

In the first case, a stable deficit of the non-oil sector will arise over time, and richer future generations (provided that non-oil GDP increases) will receive higher shares of oil wealth in real terms. In the second case, a reduction in rent expressed as a share of non-oil GDP will be observed, since real oil GDP will grow.

The need for accelerated development of non-oil sectors of Azerbaijan is due to the awareness of new challenges. Thus, the "Strategic Road Map for the Development of the Economy of Azerbaijan and its Sectors" clearly sets the task of ensuring high rates of economic growth based on sustainable development of the non-oil sector. This imperative of the republic's development should be met by a corresponding strategy in non-raw materials sectors (see Fig. 1). The guidelines put forward by the program documents require greater justification and specification. A new projection of the problems of this sector is advisable, arising from the fundamental changes in the nature of the social development of the republic, from the specifics of the current socio-economic situation and its immediate prospects. In our opinion, such a turn could be facilitated by the development of a Concept for the Development of the Non-Oil Sector of the Economy of Azerbaijan, which should include: an analysis of the current situation in the non-oil sectors; key problems and prerequisites for the development of these sectors; principles of state policy in this sector; theoretical and methodological justification for the corresponding state restructuring program; characteristics and methods for solving the program's tasks.

The purpose of developing the Concept is to define long-term strategic directions and priorities, balanced scenarios for the development of the non-oil sector of Azerbaijan. Based on the analysis of foreign experience in economic diversification, we note that in order to achieve the goal, Azerbaijan needs to solve the following problems:

- creation of effective incentives for employment growth for the economically active population of the republic through accelerated development of the non-oil sector;

- formation of the necessary conditions for the development of small entrepreneurship, activation of the activities of enterprises and organizations of the non-oil sector of Azerbaijan of all types of ownership and, on this basis, increasing the competitiveness of this sector;

- creation of institutional, economic and organizational conditions for the sustainable development of non-oil industries;

- creation of civilized mechanisms of entrepreneurial activity and favorable conditions for the work of non-oil sector enterprises, regulation of their relationships with social partners and consumers of products;

- ensuring the economic security of the republic through a consistent transition to an innovative path of development, increasing the efficiency of production and competitiveness of products.

Conclusion

The country's long-term goals and interests dictate the need to move away from raw materials specialization and form a new economic structure that would ensure its effective development and competitiveness in the global economy.

Sustainable development of the country's national economy is impossible without the progressive development of its non-resource sectors. The non-resource sector of Azerbaijan has grown and undergone many positive changes over the years of national economic reform. Currently, this sector of the national economy is making progress towards sustainable development. This trend can be characterized as a trajectory of diversification and effective development of the republic's economy as a whole.

The elimination of the negative consequences of raw materials orientation is seen in an effective state economic policy that ensures the profitability of production activities in non-resource sectors, a good investment climate, maintaining price proportions and other parameters of the economic mechanism that are favorable for the development of a new technological structure. The republic faces the most important task of accelerating the transition from an economy based on the exploitation of the oil and gas industries to a post-industrial economy based on the widespread use of information and telecommunication technologies. An analysis of foreign experience in economic diversification from the perspective of developing the non-resource sector of Azerbaijan allowed us to conclude that the country faces two strategic challenges:

I. The need to ensure accelerated growth of non-resource sectors of the economy. This will accelerate the diversification of the economy, make the most of its competitive advantages, and increase the growth rate of GDP and the well-being of the population with the help of new "development engines".

II. The need for organizational improvement of the economy of Azerbaijan based on the development of non-resource sectors on a territorial basis. It is necessary to optimize the placement and development of competitive non-oil industries in the regions of the republic based on the most favorable combination of necessary resources and factors.

Economic sustainability cannot be completely self-regulating. The experience of foreign countries shows that sustainable development of the non-resource sector should include scientifically based principles and methods for solving problems, justified goals and objectives of a long-term development strategy, mechanisms and tools for achieving them, as well as an assessment of the results. Based on the analysis of best practices, the authors identified one of the most important elements of sustainable economic growth: the development of state mechanisms aimed at activating innovation and investment activities in general, industry restructuring and reforming enterprises.

References

1. Orucov M.M. Directions for improving the new insurance consortium for the development of agricultural leasing in the Republic of Azerbaijan, *Scientific and Pedagogical News of Odlar Yurdu University*, 2018, № 49, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552

2. Orucov M.M, The current state of the Azerbaijani economy against the backdrop of changes in the world economy, *Scientific and Pedagogical News of Odlar Yurdu University*, 2018, № 50, ISSN: 1682-9123

DOI: 10.0318/OYU.2023735552

3. Orucov M.M, Characteristics of preparatory measures for membership in the World Trade Organization, , *Scientific and Pedagogical News of Odlar Yurdu University*, 2019, № 51, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552

4. Orucov M.M, Modern development model of the national economy, *Scientific and Pedagogical News of Odlar Yurdu University*, 2020, № 54, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552

5. Orucov M.M, *Diagnostiks of the main therats to agro-food industry and food safety*, Scientific and Pedagogical News of Odlar Yurdu University, 2020, № 58, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552.
6. Kasaev E. 2013. Prospective directions of economic development of the state of Qatar. World economy and international relations. No. 8. P. 86-87.
7. Orucov M.M, *Directions of development of export-oriented agriculture*, Odlar Yurdu University Integration of territories liberated from occupation after the Patriotic War into the Azerbaijani Economy: a conceptual view. Materials of the Republican Scientific-Practical Conference, February 10, 2021.
8. Fund Rankings / SWF Institute. – URL: <http://www.swfinstitute.org/fund-rankings>
68. International Financial Statistics Public Data / IMF Data. – URL: <http://www.elibrary-data.imf.org>
9. Mitchell J.V., Stevens P. 2008. *Ending Dependence. Hard Choices for Oil-Exporting States*. Chatham House Report. London: Royal Institute of International Affairs, PP. 25-28.
10. Krause L.B. 1988. Hong Kong and Singapore: Twins or Kissing Cousins? // *Economic Development and Cultural Change*. April. Vol. 36, № 3. PP. 45–66.
11. «Azərbaycan Dövlət Neft Fondunun yaradılması haqqında» Azərbaycan Respublikası Prezidentinin Fərmanı. <https://e-qanun.az/framework/5261> (1999).
12. Kazakhstan oil – a chance for development. World oil prices: trends, regularities, forecasts. Almaty, 2006. P. 37.
13. Mamedova N. 2008. *Iran's Economy and Globalization* // *Asia and Africa Today*. P. 11
14. Shafique A., Faheem M.A., Abdullah I. 2012, *Impact of Global Financial Crises on the Islamic Banking System* // *Arabian Journal of Business and Management Review (OMAN Chapter)*. Vol. 1, No.9. April PP. 124-134.
15. Orucov M.M. *Global dynamics of socially responsible investing (SRI): analysis motivating MNCS to use SRI strategies*. XVIII international scientific conference. Madrid. Spain. 25-26.03.2025.
16. Kelimbetov K. N. 2010. Diversification of the economy of Kazakhstan – the main problem of economic policy. The mouthpiece of economic integration. P. 142-151.
17. Orucov M.M. *Prospects for international settlements in digital currencies of Central Banks on a platform basis in foreign countries and Azerbaijan*, XVIII International Scientific and Practical Conference. Paris. France. 18-19.03.2025, ISBN 978-91-65424-12-8 DOI <https://doi.org/10.5281/zenodo.15095044>
18. Orucov M.M, *Analysis of the current state of the oil industry processing network and the modern state of marketing in this field*, International Scientific Conference on the topic "IV Industrial Revolution and Digitalization of the Economy" Odlar Yurdu University, 2023
19. Orucov M.M, *The level of organization of the oil and gas complex in the modern era, "IV sənaye inqilabı və iqtisadiyyatın rəqəmsallaşdırılması"* IV Industrial Revolution and Digitalization of the Economy" Odlar Yurdu University, 2023
20. Orucov M.M, *Analysis of structural changes in the national agricultural sector and assessment of import dependence*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
21. Orucov M.M, *Assessment of the level of readiness of Azerbaijan's agri-food market on the eve of WTO accession*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
22. Orucov M.M. *Modernization of marketing improvement in the oil refining industry in Azerbaijan*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
23. Orucov M.M. *Prospects for the development of marketing in the management of market processes in the oil refining sector*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552
24. (1995). *Azərbaycan Respublikasının Konstitusiyası* (12 noyabr 1995-ci il). <https://e-qanun.az/framework/897>
25. (2000). «Dövlət əmlakının özəlləşdirilməsi haqqında» Azərbaycan Respublikasının Qanunu. <https://e-qanun.az/framework/26044>

26. Orucov M.M. *Diagnostics of the agri-food market and main threats to food security in the Republic of Azerbaijan*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
27. (2021). «Azərbaycan 2030: sosial-iqtisadi inkişafa dair Milli Prioritetlər» haqqında Azərbaycan Respublikası Prezidentinin Sərəncamı). Bakı. 40
28. Orucov M.M. *Civil-legal contractual relations in business activities*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 62, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552
29. Orucov M.M. *Import substitution in the agri-food sector in Azerbaijan*, Heydar Aliyev-100. Import substitution, localization of production. Sustainable and preventive development. OYU. Scientific research work
30. Orucov M.M. *Fundamentals of National Security of the Republic of Azerbaijan*, Textbook -2024
31. Orucov M.M. *The Wreath of Victory*, a book dedicated to Mr. Ilham Aliyev's 20 years as President-2024
32. Orucov M.M. *Parameters for long-term forecasting of the world economy*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 63, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552
33. Orucov M.M. *Azerbaijani economy during Ilham Aliyev's presidency: a long way traveled in 20 years*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 63, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
34. Orucov M.M. *Theoretical and methodological aspects, characterizing innovative development of the agricultural industry*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 63, ISSN: 1682-9123 DOI: 10.0318/OYU.2023735552
35. Orucov M.M. *Foreign experience in stimulating the development of innovation activity in agriculture*, Scientific and Pedagogical News of Odlar Yurdu University, 2023, № 63, ISSN: 1682-9123
DOI: 10.0318/OYU.2023735552
36. Orucov M.M. *The concept of the "energy trilemma" as an expression of the energy aspect of sustainable development of Azerbaijan*, International Conference on Smart Environment and green Technologies İCSGET2024, Springer.ISBN978-3-031-81563-8 https://doi.org/10.1007/978-3-031-81564-5_43
37. Orucov M.M. *"Green economy" in the Republic of Azerbaijan: prerequisites and directions of development*, International Conference on Smart Environment and green Technologies İCSGET2024, Springer ISBN-978-3-031-81567-6 <https://doi.org/10.1007/978-3-031-81567-6>
38. Orucov M.M. *Algorithm for determining priority directions of innovative development of agricultural production*, XV International Scientific and Practical Conference «New problems of science and ways of their solution», October 22-23, 2024, Paris. France, ISBN 978-91-65423-91-6.
DOI <https://doi.org/10.5281/zenodo.14003470>.
39. Orucov M.M. *Analysis of structural change in the national agricultural field and assessment of dependence imports*, XV International scientific conference Madrid Spain 29-30/ 10/2024, ISBN 978-91-65423-92-3 DOI <https://doi.org/10.5281/zenodo.14040024>
40. Orucov M.M. *Monetary stabilization policy the financial crisis*, XIV international scientific conference. Tokyo. Japan. 31.10-01.11.2024 ISBN 978-92-44514-26-9 DOI <https://doi.org/10.5281/zenodo.14046748>
41. Orucov M.M. *Level of organization of oil and gaz refining complex in the modern period*, XVI international scientific conference. Manchester United. 05-06.11.2024, ISBN 978-91-65423-93-0
DOI-<https://doi.org/10.5281/zenodo.14091395>
42. Orucov M.M. *Analysis of foreign investment in Azerbaijani economy and directions to increase*, XVII International Scientific Conference. Dortmund. Germany. 07-08.11.2024, ISBN 978-92-44514-27-6
DOI <https://doi.org/10.5281/zenodo.14136799>
43. Orucov M.M. *The role of and gaz resources in enusiring socio-economic development of the Republic of Azerbaijan*, Norwegian Journal of development of the International Science No 144/2024, ISSN 3453-9875
44. Orucov M.M. *The role of the oil sector in ensuring sustainable development of the economy of Azerbaijan*, German International Journal of Modern Science, 20246 No92, ISBN 978-92-44514-27-6
DOI <https://doi.org/10.5281/zenodo.14136799>

45. Orucov M.M. Formation of the consumer market in the Republic of Azerbaijan as a factor in ensuring food security, XII International Scientific Conference Beijing China. 12-13.11.2024, ISBN 978-91-65423-94-7

DOI <https://doi.org/10.5281/zenodo.14178599>

45. Orucov M.M. The role of the consumer market in ensuring food safety of the Republic of Azerbaijan, The scientific heritage No 149 (2024) ECONOMIC SCIENCES, ISSN 9215 — 0365

46. Orucov M.M. Diversification of economy the Republics Azerbaijan on the base sustainable development of non-oil sector, XIV international scientific conference. Toronto. Canada. 14-15.11.2024, ISBN 978-92-44514-28-3 DOI <https://doi.org/10.5281/zenodo.14199182>

47. Orucov M.M. Elements of credit policy and stimulation of credit investments in the real economy, Sciences of Europe (Praha, Czech Republic) No 153 (2024, ISSN 3162-2364

48. Orucov M.M. Efficiency problems of the energy sector of Azerbaijan in the background of the green economy, XVII international scientific conference. Philadelphia. USA. 21-22.11.2024, ISBN 978-92-44514-22-1 DOI <https://doi.org/10.5281/zenodo.13929032>

49. Orucov M.M. Current status of education in the Republic of Azerbaijan in the context of global education challenges, XII international scientific conferences Roma, Italy. 19-20. 2024, ISBN 978-91-65423-95-4 DOI <https://doi.org/10.5281/zenodo.14218224>

50. Orucov M.M. Increasing the competitiveness of agricultural production, XIX International Scientific Conference. London. UK. 12-13.12.2024, ISBN 978-92-44514-32-0

DOI <https://doi.org/10.5281/zenodo.14518424>

51. Orucov M.M. Priority directions of state regulation of the agricultural and food market, XVI International Scientific Conference Madrid. Spain 17-18 2024, ISBN 978-91-65423-92-3

DOI <https://doi.org/10.5281/zenodo.14040024>

52. Orucov M.M. Concept, theories and legal basis of the succession of states, XIII International Scientific Conference Beijing China. 30-31.12. 2024, ISBN 978-91-65424-01-2

DOI <https://doi.org/10.5281/zenodo.14609837>

53. Orucov M.M. Civil legal contractual relations in the field of entrepreneurial activity in the Republic of Azerbaijan, XVIII international scientific conference - Philadelphia. USA. 09-10.01.2025, ISBN 978-92-44514-36-8 DOI <https://doi.org/10.5281/zenodo.14646632>

54. Orucov M.M. Evaluation of the membership process of the Republic of Azerbaijan to the world trade organization, XIII international scientific conference. Toronto. Canada. 14-15.01.2025, ISBN 978-91-65424-03-6 DOI <https://doi.org/10.5281/zenodo.14699449>

55. Orucov M.M. Impact of the oil and gas industry on the economy of the Azerbaijan Republic, XV international scientific conference. Vienna. Austria. 16-17.01.2025, ISBN 978-92-44514-37-5

DOI <https://doi.org/10.5281/zenodo.147182310>

56. Orucov M.M. New trends and challenges to the global economy, XIV international scientific conference. Stockholm. Sweden. 21-22.01.2025, ISBN 978-91-65424-04-3 DOI <https://doi.org/10.5281/zenodo.14749265>

57. Orucov M.M. Methods of assessing the impact of education on economic growth, XVIII international scientific conference. Tallinn. Estonia. 23-24.01.2025, ISBN 978-92-44514-38-2

DOI <https://doi.org/10.5281/zenodo.14754776>

58. Orucov M.M. Reducing transaction costs in the digital economy, XVII International Scientific and Practical Conference 28-29. 01. 2025, Paris. France, ISBN 978-91-65424-05-0

DOI <https://doi.org/10.5281/zenodo.14794434>

59. Orucov M.M. Artificial systems in today's economic environment, XIX international scientific conference. Dortmund. Germany. 13-14.02.2025, ISBN 978-92-44514-41-2

DOI <https://doi.org/10.5281/zenodo.14894330>

60. Orucov M.M. Forecast of global economy development, I international scientific conference. Marseille. France. 20-21.02.2025, ISBN 978-92-44514-42-9 DOI <https://doi.org/10.5281/zenodo.14932296>

61. Orucov M.M. Application of money supply targeting regime within the framework of monetary policy, I international scientific conference. Seoul. South Korea. 06-07.03.2025, ISBN 978-92-44514-44-3

DOI <https://doi.org/10.5281/zenodo.15020702>

62. Orucov M.M. Prospects for the formation of economic multipolarity, I international scientific conference. Helsinki. Finland. 13-14.03.2025, ISBN 978-92-44514-45-0 DOI <https://doi.org/10.5281/zenodo.15075323>

63. Orucov M.M. *Prospects for international settlements in digital currencies of Central Banks on a platform basis in foreign countries and Azerbaijan*, XVIII International Scientific and Practical Conference. Paris. France. 18-19.03.2025, ISBN 978-91-65424-12-8 DOI <https://doi.org/10.5281/zenodo.15095044>

64. Orucov M.M. *Economic effect of foreign direct investments in the oil and gas sector of Azerbaijan*, XVI international scientific conference. Vienna. Austria. 03-04.04.2025, ISBN 978-92-44514-48-1 DOI <https://doi.org/10.5281/zenodo.15181208>

UDC: 330.332.1.23.4

PERIOD OF SMALL AND MEDIUM BUSINESS DEVELOPMENT IN THE COUNTRY AND CRITERIA FOR DETERMINING**Muftaydinov Kyyomiddin**professor of Andijan state technical institute,
Doctor of Economics**ПЕРИОД РАЗВИТИЯ МАЛОГО И СРЕДНЕГО БИЗНЕСА В СТРАНЕ И КРИТЕРИИ ЕГО ОПРЕДЕЛЕНИЯ****Муфтаидин Киёмиддин**профессор Андижанского государственного технического института,
доктор экономических наук**Abstract**

The article has developed scientific proposals and recommendations for the development of small and medium-sized businesses in Uzbekistan and criteria for its definition. Also, based on foreign experience, criteria for measuring small and medium-sized businesses for the country were recommended.

Аннотация

В статье разработаны научные предложения и рекомендации по развитию малого и среднего бизнеса в Узбекистане и критерии его определения. Также, исходя из зарубежного опыта, были рекомендованы критерии измерения малого и среднего бизнеса для страны.

Keywords: small and medium business, criteria, microfirm, small and medium business.

Ключевые слова: малый и средний бизнес, критерии, микрофирма, малый и средний бизнес.

Президент Республики Узбекистан Шавкат Мирзиёев в своем Послании Олий Мажлису обозначил проводимые в нашей стране политические и социально-экономические реформы, а также приоритетные направления и задачи развития нашей страны в 2024 году и на ближайшие 8 лет. Стоит отметить, что в прошлом году экономический рост в нашей стране составил 5,6 процента, промышленное производство увеличилось на 6,6 процента, экспорт на 28 процентов, а наши золотовалютные резервы к 2024 году достигнут 2,2 миллиарда долларов. С 2024 года они увеличились до 28,6 миллиарда долларов. В результате реформ в прошлом году было создано 93 тысячи новых субъектов предпринимательства, что почти в два раза больше, чем в 2022 году.

Страна поднялась на 7 позиций в рейтинге Всемирного банка «Ведение бизнеса», заняв 8-е место из 190 стран по уровню регистрации предприятий и войдя в число лучших реформаторов.

Проводимые реформы получили признание международного сообщества, а одно из самых влиятельных мировых изданий, журнал The Economist, признал Узбекистан «Страной года» как страну, осуществившую самые быстрые реформы в 2019 году. Они подчеркнули, что такая награда вселяет в нас огромную гордость, честь и силу, вдохновляет на новые вершины.

Всех порадовало, что наш Уважаемый Президент назвал 2020 год «Годом развития науки, образования и цифровой экономики» в целях дальнейшего развития науки в нашей стране, воспитания нашей молодежи людьми глубоких знаний, высокой духовности и культуры, формирования конкурентоспособной экономики и вывода ее на новый, современный уровень.

Президент также выделил ряд проблем в развитии предпринимательства. В частности, сфера, которая больше всего беспокоит предпринимателей, - необходимость серьезного изменения лицензионно-разрешительных процедур, а среди примерно 280 действующих лицензий и разрешений есть те, которые вводятся в целях учета видов деятельности, сбора платежей или просто контроля за ними, и эти процедуры вызывают обоснованные возражения предпринимателей. В связи с этим Министерству юстиции, Торгово-промышленной палате и Бизнес-омбудсмену поручено до 1 марта 2020 года кардинально пересмотреть основания выдачи лицензий и разрешений и представить конкретное предложение по сокращению их количества

не менее чем в 2 раза. Конечно, сокращение этих процедур поможет стране войти в топ-50 стран в рейтинге Всемирного банка «Ведение бизнеса».

Президентом Азербайджанской Республики также была признана необходимость разработки законопроекта «О малом и среднем предпринимательстве», в котором должны быть предусмотрены критерии малого и среднего предпринимательства и механизмы поощрения представителей этого сектора.

На основе данного задания нами были изучены механизмы определения критериев малого и среднего бизнеса в зарубежных странах и их продвижения. Критерии отнесения субъектов малого предпринимательства в странах СНГ (Россия, Казахстан и Украина) определяются по-разному: по численности работников и годовой выручке, и подразделяются на микропредприятия, малые предприятия и средние предприятия.

Таблица 1

**Субъекты малого предпринимательства в странах СНГ
критерии идентификации [1]**

Штаты	Критерии	Микрофирма	Маленький предприятие	Середина предприятия
Россия	Количество сотрудников	До 15 человек	16-100 до человека	101-250 до человека
	Годовой доход	120 миллионов до рубля	800 миллионов до рубля	2 миллиарда. до рубля
Казахстан	Количество сотрудников	100	101-250	Более 250
	Годовой доход ЕКХК-2269 монет	до 30 000 эстонских крон*	3 миллиона до ОБСЕ	Более 3 миллионов ECSC
Украина	Количество сотрудников	10	50	250
	Годовой доход	2 миллиона. евро	10 миллионов евро	50 миллионов евро
Беларусь	Количество сотрудников	До 15 человек	16-100 до человека	101-250 до человека
Узбекистан	Количество сотрудников	До 2-20	25-200 шт.	-

В Российской Федерации критерии определения субъектов малого предпринимательства устанавливаются в соответствии с Федеральным законом от 24 июля 2007 г. № 209-ФЗ[2], которым устанавливаются среднегодовая численность работников и размер выручки от реализации продукции (товаров, работ). В частности, средняя численность работников на микропредприятиях обычно составляет до 15 человек, на малых предприятиях — до 100 человек, а на средних предприятиях - от 101 до 250 человек. Также размер дохода от реализации продукции (товаров, работ) в микрофирмах составляет 120 млн. до рублей, в малых предприятиях - 800 млн. до 100 млн рублей, а в средних предприятиях - до 2 млрд рублей. установлен в рублях[3].

В странах Европейского Союза субъекты малого предпринимательства подразделяются на микропредприятия, малые и средние предприятия, а в качестве критериев используются численность работников, годовой оборот и стоимость основных фондов:

Таблица 2

Критерии определения микро-, средних и малых предприятий в странах Европейского Союза[3]

Категория	Количество сотрудников	Оборот составляет миллион евро.	Основные средства млн евро
Микрофирмы	<10	<2	<2
Малый бизнес	<50	<10	<10
Средние предприятия	<250	<50	<43

Из таблицы видно, что годовой оборот микрофирм с численностью работников до 10 человек в странах ЕС составляет 2 млн. от евро и стоимость основных средств - 2 млн. являются предприятиями с оборотом не более EUR. На малых предприятиях численность работающих составляет от 10 до 50 человек, годовой товарооборот составляет 2 млн. от 10 млн до ЕВРО, а стоимость основных средств - 2 млн. не должна превышать одного евро. На средних предприятиях численность работающих составляет от 50 до 250 человек, годовой товарооборот составляет 10 млн. от 50 млн до 10 млн евро, а стоимость основных средств - 10 млн евро. с 43 миллионов планируется довести до евро. Так, в странах ЕС численность

работающих на крупных предприятиях превышает 250 человек, годовой товарооборот составляет 50 млн. от евро, а стоимость основных средств составляет 43 млн. установлен критерий более одного евро.

Следует отметить, что стратегия действий изложена в пункте 183 государственной программы. (7 февраля 2017 г., PF-4947) Поощрение расширения малого бизнеса и частного предпринимательства в целях создания конкурентоспособных компаний. При этом также ставится задача введения категории субъекта среднего предпринимательства и присвоения ему льгот. Однако на сегодняшний день эта проблема не решена.

Исходя из задач, поставленных нашим Президентом в Послании, и в соответствии с опытом зарубежных стран, считаем, что в критерии определения микрофирм и малых предприятий, наряду с численностью работников, необходимо включить объем реализованной продукции (товарооборот), а также включить критерии отнесения к микрофирмам, малым предприятиям и средним предприятиям. Исходя из опыта зарубежных стран, считаем, что в критерии определения микрофирм и малых предприятий, помимо численности работников, необходимо включить объем продаж (товарооборот), а также включить критерии отнесения к микрофирмам, малым предприятиям и средним предприятиям.

При этом численность работников на микропредприятиях составляет до 50 человек, а годовой оборот - до 1 млрд сумов, на малых предприятиях численность работников составляет до 51–100 человек, а оборот - от 1 млрд до 2 млрд сумов, а на средних предприятиях целесообразно иметь до 101–200 человек, а годовой оборот - более 2 млрд сумов. При расчете годового оборота необходимо будет учитывать размер базовой расчетной суммы (БС) (с 1 января 2020 года - 223 000 сумов).

Таблица 3

Критерии идентификации предлагаемых субъектов малого предпринимательства по отраслям[4]

Предприятие Категория	Количество сотрудников	Оборот	Критерии определения товарооборота
Микрофирма	50 до человека	1 миллиард. до суммы	ВН- до 4484 раз
Малый бизнес	До 51-100 человек	1 миллиард. из сумм– 2 миллиарда. до суммы	ВН до 4485 -8968
Среднее предприятие	До 101-200 человек	2 миллиарда. из суммы Вверх	Превышение ВН -8968

Пункт 95 Государственной программы «Год поддержки активного предпринимательства, инновационных идей и технологий» (ПФ-5308 от 22 января 2018 года) - внедрить систему, стимулирующую малые предприятия к быстрому развитию, увеличению численности занятых, переходу в категорию крупных предприятий. В этой связи поставлены задачи по внедрению механизмов стимулирования перехода малых предприятий, увеличивающих численность занятых и динамично развивающихся, в категорию крупных предприятий.

В обращении Президент поставил задачу разработать механизмы стимулирования представителей малого и среднего бизнеса к разработке законопроекта. Зарубежные страны В Японии, Сингапуре, США, Великобритании и странах ЕС малые предприятия облагаются налогом на прибыль предприятий по пониженной и дифференцированной ставке. Например: во Франции стандартная ставка составляет 33,33% для крупных предприятий, 15% для малых предприятий, в Великобритании стандартная ставка составляет 30% для малых предприятий, 20% для малых предприятий, в Японии стандартная ставка составляет 30% для малых предприятий, 18% для малых предприятий, в США стандартная ставка составляет 39% для малых предприятий, 20% для малых предприятий, в Южной Корее стандартная ставка составляет 24% для малых предприятий, 12%.

Исходя из опыта зарубежных стран, в целях снижения и стимулирования налоговой нагрузки на малые предприятия, уплачивающие налоги в общем порядке, необходимо применять пониженную ставку налога в размере 10 процентов по сравнению с действующей ставкой налога в размере 15 процентов и расслоить ее (регрессивно) по отношению к прибыли.

На основании вышеизложенного сделаем вывод:

-в ходатайстве указано на необходимость дальнейшего улучшения благоприятного инвестиционного климата и деловой среды в нашей стране, а также содействия развитию

субъектов предпринимательства путем их стимулирования в целях обеспечения реализации поставленных Президентом задач и задач;

-в целях снижения и стимулирования налоговой нагрузки на малые предприятия, уплачивающие налоги по опыту зарубежных стран, необходимо применять пониженную ставку налога в размере 10 процентов по сравнению с действующей ставкой в размере 15 процентов и осуществлять стратификацию (регрессию) прибыли.

Список использованной литературы

1. Урмонов Ж.Ж. Тадбиркорлик субъектларини солиққа тортиш механизмини такомиллаштириш масалалари. Монография.–Т.: IQTISOD-MOLIYA, 2018, -220 б.
2. Yuldashevich, U. I., & Mukhammadeldor, R. (2021). The impact of digital economy on the development of small business and private entrepreneurship. Восточно-европейский научный журнал, (2-3 (66)), 4-7.
3. Умаров, И. Ю., & Бегбутова, М. М. (2017). Роль иностранных инвестиций в устойчивом экономическом развитии страны. In Статистические методы исследования социально-экономических и экологических систем региона (pp. 161-166).
4. Umarov, I. Y. (2021). Use Of Innovations And Modern Methods In The Logistics Network. European Proceedings of Social and Behavioural Sciences.
5. Умаров, И. Ю., Режапов, Х. Х., & Узбекистан, Р. (2015). Международные рейтинги и рейтинговая система Узбекистана. Редакционная коллегия: ОК Акулова, директор Кировского филиала МФЮА ЕВ Каранина, доктор экономических наук, профессор СН Родыгина, кандидат философских наук, доцент, 428.
6. Умаров, И. Ю., & Бурибоевой, И. А. (2019). Пути повышения конкурентоспособности предприятий пищевой промышленности. Zbiór artykułów naukowych recenzowanych, 39.
7. Умаров, И. Ю., & Хусанова, З. Р. (2019). Применение инновационной деятельности в пищевой промышленности-как фактор повышения уровня жизни населения. In Материалы VII Международной научно-практической конференции «Актуальные проблемы социально-трудовых отношений», посвященной (pp. 367-369).
8. Umarov, I. Y. (2021). Use Of Innovations And Modern Methods In The Logistics Network. European Proceedings of Social and Behavioural Sciences.
9. Умаров, И. (2022). Озиқ-овқат саноати корхоналари бошқарувини ташкилий-иқтисодий механизмини баҳолаш услубиёти. Economics and Innovative Technologies, 10(3), 229-238.

WOMEN'S LEADERSHIP IN KAZAKHSTAN'S PUBLIC ADMINISTRATION SYSTEM

G. Akybayeva

c.e.s., Professor at Astana IT University

Z. Yeskerova

PhD student of Karaganda Buketov University

S. Mambetova

c.e.s., professor of Karaganda Buketov University

S. Daribekov

c.e.s., professor of Karaganda Buketov University

Sh. Niyazbekova

Docent of Financial University under the Government of the Russian Federation

Abstract

The purpose of the study, aimed at developing the public administration system for the development of women's leadership skills in the country, is to examine government policies and initiatives designed to enhance the role of women in the socio-economic and managerial spheres. In recent years, Kazakhstan has been advocating for gender equality and increase the representation of women in leadership and decision-making positions.

Methods: Content analysis of the legal framework of the Republic of Kazakhstan and other documents in the sphere of state policy on women's leadership, as well as statistical analysis in this area. These methods will help to better understand the mechanisms of state governance, assess current achievements and identify gaps in policies aimed at developing women's leadership.

Results: The formation of recommendations for improving the public administration of the Republic of Kazakhstan on the development of women's leadership can further strengthen gender equality and the active involvement of women in decision-making.

Conclusions: More effective public management of women's leadership development in Kazakhstan requires consideration of the multifaceted nature of gender equality, including legislative measures, educational initiatives, Removing stereotypes, aiding in the reconciliation of work and family responsibilities, and promoting international cooperation. By following these recommendations, women's leadership in Kazakhstan can be strengthened by creating an equal environment, creating more favorable conditions for women's equal participation in governance and leadership development, which will contribute to further socio-economic progress in Kazakhstan.

Keywords: *women's leadership, public administration, public policy, Kazakhstan, support for women.*

The political and economic potential of men and women in the modern world is unevenly distributed. In the formal sense, everyone is equal, but it should be noted that men dominate the national political system in Kazakhstan. In the public administration system, the representation of men and women is as follows: the share of men among administrative civil servants is 43.9 per cent of the total number, compared to 56.1 per cent of women. At the level of political civil servants, men account for 90.9 per cent of the total and 9.1 per cent of women.

Public management in the area of women's leadership in Kazakhstan aims to study and support women in management, taking into account institutional and socio-cultural factors. This policy provides for the development of recommendations that will help to improve women's participation in management processes, strengthen their position in government and create conditions for the development of equal participation. It is important to take into account the cultural specificities of the society and the country's legal system in order to successfully integrate women's leadership into government structures.

The focus of research is shifting towards the key role of women in the forward-looking development of the economy and society as a whole, emphasizing their influence on progressive socio-economic change. Analysts point to the critical importance of improving economic conditions for women as a means of achieving gender parity, reducing female poverty and reducing the number of unemployed women. While progress in women's economic empowerment alone does not eradicate gender inequality, it plays a significant role in the process. Improving the ability to study the changing position of women in

the economy continues to be in the spotlight as a necessary element in generating general well-being and development.

On the background of Kazakhstan's aspirations to become one of the 30 most highly developed powers in the world, the indicators used by the countries of the Organisation for Economic Co-operation and Development (OECD) are becoming key, especially with regard to guaranteeing equality between genders in education and employment. In this regard, two important aspects of women's advancement should be emphasised: their ability to make independent decisions and the achievement of social equality between the sexes.

In February 2024, at the Presidential Youth Talent Pool Forum, the President of Kazakhstan, Kassym-Zhomart Tokayev, addressed the important issue of the imbalance in the representation of women and youth in the State apparatus. He emphasised that the lack of participation of these groups in governance structures requires attention and practical steps to create a more inclusive and effective system of public administration.

The significance of this study is aimed at forming recommendations to improve the public administration of the Republic of Kazakhstan in the area of women's leadership development.

Governments around the world are now actively working to increase the representation of women in leadership positions, especially in public institutions, with the aim of increasing their representation to more than 29 percent. At the time the women had already taken their rightful place in the country's government, including ministerial posts, leadership of important state agencies, leading audit structures and even the Constitutional Court, not to mention the positions of deputy akims of provinces and cities.

Women are a significant part of society, and their active participation in public administration is necessary for more informed and inclusive decision-making. The presence of women in government allows a diversity of opinions and needs to be taken into account, which in turn contributes to better governance and social stability.

The development of women's leadership in Kazakhstan can be viewed in stages, divided into several key periods (Figure 1).

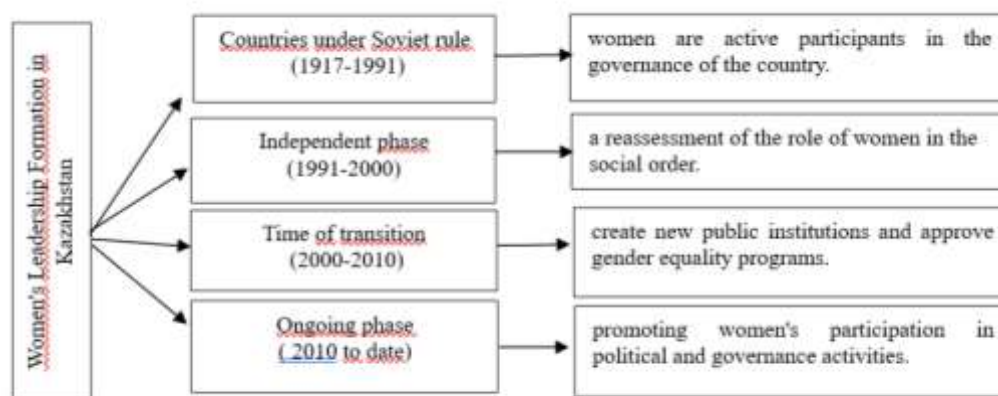


Figure 1: Development of Women's Leadership in Kazakhstan

* Compiled by the authors

Today, Kazakhstan's state policy aimed at developing women's political leadership relies on several key criteria that influence the strengthening of this institution:

- Institutional framework. The Framework provides a platform to fully support women's political participation, promote their involvement in decision-making and enable the successful development of women's leadership. A strong institutional framework has been established at the national level. The Ministry of Information and Social Development of the Republic of Kazakhstan is the designated entity responsible for women's welfare, family and population issues. One of the most important measures to improve gender equality and protect women's rights in Kazakhstan was the establishment in 2006 of the National Commission on Women's Affairs and Family and Demographic Issues under the Presidential Administration. This structure plays one of the key positions in the formation and implementation of the state policy focused on improving the status of women in political, social and economic spheres. Moreover, in 2022, the amount of funding for public projects aimed at eliminating gender inequality increased significantly to 293.7 million tenge, which demonstrates Kazakhstan's commitment to strengthening gender equality and supporting women in politics and public life. These resources are earmarked for

various programs aimed at eliminating gender stereotypes, empowering women and their active participation in public processes.

- The quota oversight mechanism is a critical tool for increasing women's participation in politics and governance in Kazakhstan. Quotas help to create an environment in which women have a better chance to participate in decision-making at various levels. In 2020, Kazakhstan's legislation introduced significant changes to the Basic Law on Elections in the Republic of Kazakhstan, which strengthened the quota system. These innovations made it possible to officially establish that party lists of candidates must include at least 30 percent of women and youth. This innovation is undoubtedly an important step in achieving gender equality and enhancing the political participation of youth.

By 2023, the rate of women in top management positions will be 8.1% (Figure 2) and the cumulative percentage of women in leading positions in the public service will be about 40%, bringing the total value of women in the public service to 49,000.



Figure 2: Women in leadership positions Kazakhstan

Note - compiled by the author according to the source

Figure 2 shows that the majority of women in top management positions are in public institutions in urban areas at 41.5 percent compared to rural areas at 38.6 percent.

In 2022, the number of women in local representative bodies (maslikhats) is 786, which is 21.02 percent of the total number of deputies shown in figure 3.

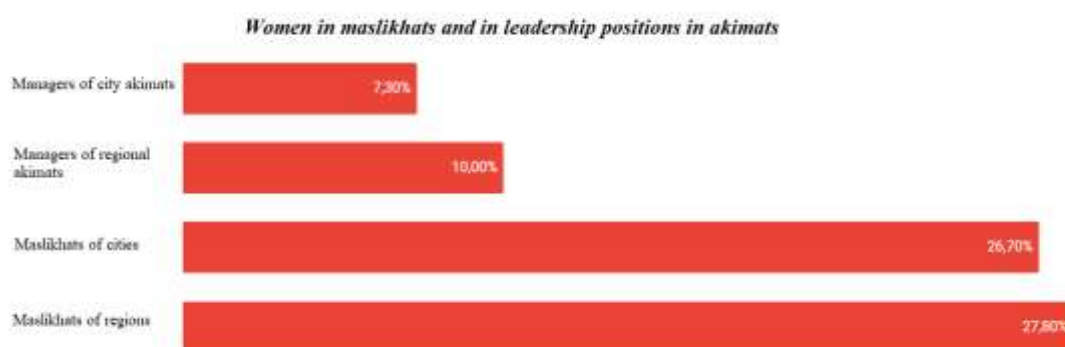


Figure 3: Women in Maslikhats and in leadership positions in akimats

Note - compiled by the author according to the source

However, women's representation has increased unevenly. For example, in Almaty, the number of women increased from 16 to 26 percent, while in Nur-Sultan it decreased from 32 to 25 percent.

Based on the results

- Kazakhstan's ratification of international conventions and treaties on women's rights demonstrates the country's commitment to international standards for gender equality and protection of women's rights. These measures help to enshrine international principles into national legislation and the strengthening of the institution of women's leadership. Since gaining independence, the State has taken significant steps in the area of human rights, including improvements in gender equality and women's rights.

Equal rights and opportunities for all citizens, regardless of gender, have been ensured through the introduction of reforms and laws. Kazakhstan became a member of OECD in accordance with the recommendations on gender equality in education, employment and entrepreneurship after receiving positive OECD ratings. Kazakhstan is dedicated to achieving the UN Sustainable Development Goals (SDGs), which includes gender equality.

- Measures to adopt legal and regulatory acts aimed at protecting women's rights and promoting their role in the political sphere in Kazakhstan are an important part of state policy to achieve gender

equality and strengthen women's role in decision-making. These measures include the adoption of legislative changes and initiatives that promote women's empowerment. The main measures include:

1. Kazakhstan's Constitutional Law on Elections, with an addition on quotas for women and youth (2020);
2. Law on Gender Policy (2009);
3. State Programme for Gender Equality (2006-2016);
4. Law on Combating Domestic Violence (2009);
5. In 2006, the National Commission on Women's Affairs and Family and President of the Republic of Kazakhstan developed policies on demographics;
6. Women in Politics and Governance Programme;
7. Measures to support women entrepreneurs;
8. Support for women's non-governmental organisations (NGOs). (Official statistics revealed that the number of women leaders of non-governmental organisations ranges from 34% to 37% from 2012 to 2022).

The intention of these measures is to expedite the process of increasing gender equality in the country's political system by increasing the number of women in decision-making positions and authorities.

Women face many challenges in modern society when it comes to professional growth and leadership in business and government. Good dynamics are observed in the measures mentioned above that are aimed at implementing state policy for the development of women's leadership skills. Stereotypes and cultural barriers, low levels of government participation, systemic support deficiencies, unequal access to resources and opportunities, low levels of women's political activism, violence and discrimination are all challenges that can hamper full implementation of these initiatives.

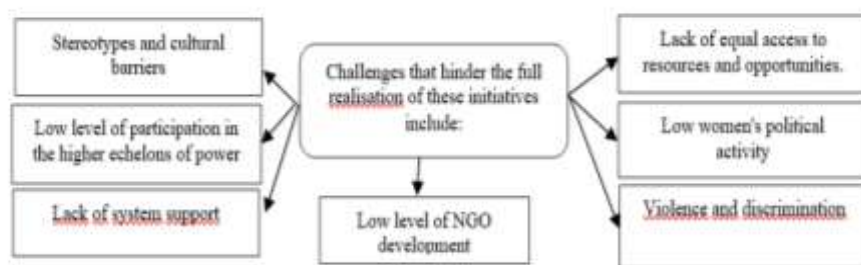


Figure 4: Challenges that hinder the full realisation of these initiatives

Note - compiled by the author according to the source

Improving public administration is necessary to achieve equal rights and inclusive participation of women in the political life of the Republic of Kazakhstan and develop women's political leadership. This policy direction aims to remove existing barriers and create an environment conducive to women's greater participation in decision-making and governance. That is, more efforts to overcome these challenges are needed to achieve more sustainable progress in women's leadership in Kazakhstan. More work is needed to change stereotypes, increase access to resources and support for women at all levels of political and public life.

To further effectively manage the development of women's leadership in public administration in Kazakhstan, the following recommendations can be offered (Figure 4) :

Ensuring women's equal rights and inclusive political participation requires improving governance to develop women's political leadership in the Republic of Kazakhstan, which is an important step. The policy aims to remove existing barriers and create an environment conducive to increasing women's participation in decision-making and governance. To achieve sustainable progress in women's leadership development in Kazakhstan, more efforts are needed to overcome these challenges. More needs to be done to change stereotypes, increase access to resources, and strengthen support for women at all levels of political and public life.

1. Develop and execute strategies and programs:

- Conduct research on the representation of women in different levels of government and leadership roles, gathering data from government institutions, businesses, and community organizations.
- Identify obstacles that hinder women's progress to leadership positions, such as social stereotypes, lack of mentorship, limited access to education, and professional development.
- Assess the effectiveness of current initiatives and programs aimed at enhancing

2. Enhancing the legislative and legal framework:

- Implementing quotas to ensure women's participation in politics and public institutions, potentially as a temporary solution to guarantee equal opportunities.
- Creating accountability systems to oversee adherence to gender quotas and track the advancement of women into leadership roles.

- Enact laws to support gender equality in the private sector, including tax incentives for companies that actively promote women to decision-making positions.

3. Improvement of educational level and professional training:

- Develop professional development programs for women to develop leadership, management, and decision-making skills.
- Support for women in STEM (science, technology, engineering, math) through specialized scholarships, grants, and mentoring programs.

- To avoid discrimination in the workplace, anti-bias trainings are being given to managers and HR departments of companies and government agencies.

4. Encouraging women's participation in the initiative and partnerships. Successful entrepreneurship is the basis for the development of multisectoral programmes, bringing together state institutions, businesses, NICs and international organisations.

5. Creating supportive infrastructure:

- Creation of a national network of mentors for women that would include successful women leaders in various industries.
- Development of experience exchange programs and professional communities where women could receive support and share successful practices.

- Supporting women's business clubs and forums where women's advancement to leadership positions is discussed.

6. Monitoring and evaluation of results:

- Establish independent commissions to monitor progress and evaluate the effectiveness of programs to increase the number of women in leadership positions.
- Regular surveys and research among women leaders and those seeking career advancement to obtain feedback and adjust programs.

7. Financial support and resourcing:

- Budgetary funding for national programs. The state can allocate separate budget lines to fund programs aimed at developing women's leadership. These funds can be used to provide training, conferences, internships and mentoring programs for women in public administration.
- Support non-profit organizations and educational institutions that encourage women to take up leadership positions. Grants may be provided to develop and implement initiatives to promote gender equality, training and women's leadership.

8. Working with public opinion and changing cultural stereotypes:

- Conducting awareness-raising campaigns. For example, Popularizing role models. An important step is to highlight successful women who are already in high positions. These examples can inspire other women and change society's perceptions of female leadership.
- Engaging men in the change process:

- Support HeForShe programs and other initiatives to engage men in promoting gender equality. Men should become active participants in changing stereotypes and support women on the path to leadership.

- Promoting the idea of shared parenting and equal sharing of responsibilities in the family to change the perception of women's and men's roles in society. Government programs that encourage men to take maternity leave or participate in childcare can help reduce pressure on women and give them more career opportunities.

- Male mentors. Involve male leaders in mentoring programs for women in public administration. This helps to show that men support women's advancement and are willing to share their experiences.

9. Strengthening inter-state cooperation:

- Sharing best practices with other countries that have already achieved success in gender equality in leadership positions.
- Support international initiatives such as UN gender equality programs and other global platforms that promote women's inclusion in politics and governance.

These recommendations will help create a more equitable and inclusive political environment where women will have equal opportunities to participate in governance and decision-making, which in

turn will strengthen democratic processes and social development in the country, and will also promote gender distribution of political power functions, taking into account the socio-cultural aspect.

References

1. Tokayev K. (2024) instructed to increase the proportion of women and youth in the civil service. 2024. URL: <https://vlast.kz/novosti/59016-tokaev-porucil-uvelicit-dolu-zensin-i-molodezi-na-goss-luzbe.html>. Date of access: 25.02.2024.
2. Lawless L., & Fox, R. (2010). *It still takes a candidate: Why women don't run for office*. Cambridge: Cambridge University Press, 2010 -doi:10.1017/CBO9780511778797; Whitaker L. *Women in politics: Outsiders or insiders?* (5th ed.) New York: Longman
3. Shvedova N.A. (2007). *Women in the USA: the mechanism of gender equality* // *Woman in Russian society*. - No. 4. - 22 p.;
4. Chiquet, M. (2018). *No shortcuts. A woman's perspective on leadership and success*. M.: Mann, Ivanov and Ferber, 225 p.
5. Zhylynska O.I., Horbas I.M., Prylutska T.Y. (2020) *Women in Management: Ukrainian Experience and Modern Realities* // *Business Inform*, no. 8(511), pp. 245–250. (In English)
6. Melero E. (2011). *Are workplaces with many women in management run differently?* // *Journal of Business Research*. no. 64(4), pp. 385–393.
7. *Report on the implementation of the Convention on the Elimination of All Forms of Discrimination against Women, approved by the Resolution of the Government of the Republic of Kazakhstan dated October 3, 2023 No. 851* // *Information and legal system of regulatory legal acts of the Republic of Kazakhstan "Adilet"*. - URL: <https://adilet.zan.kz/rus/docs/P2300000851>. Date of access: 02/16/2024.
8. Kakabadse N., Tatli A., Nicolopoulou K., Tankibayeva A., Mouraviev N. (2018) *A Gender Perspective on Entrepreneurial Leadership: Female Leaders in Kazakhstan*. *European Management Review*, 15 (2): 155–170.
9. *Global Gender Gap Report (2023)*. World Economic Forum. June 2023. URL: <https://www.weforum.org/publications/global-gender-gap-report-2023/>. Дата обращения: 20.02.2024.
10. *The proportion of women among members of parliament*. (2022). URL: <https://w3.unece.org/PXWeb/ru/Table?IndicatorCode=20>. Дата обращения: 19.04.2024.
11. Nadirova G., Kaliyeva Sh., Seytmetova J. (2022). *Women's leadership in Kazakhstan as a driver of social maturation*. *The journal of social policy studies*. Том 20. № 1. С.125-136.
12. Kurmanbekova A., Kobzhalalova M., Kaldarov S. (2023). *Gender Stereotypes and Inequality in Kazakhstan in the Context of the Works of Nobel Laureate Claudia Goldin*. URL: https://halykfinance.kz/download/files/analytics/Gendernyy_razryv_v_oplate_truda.pdf. Date of access: 25.03.2024.
13. Heilman, M. (2001). *Description and prescription: How gender stereotypes prevent women's ascent up the organizational ladder*. *Journal of Applied Social Psychology*, 31(4), 657-74. doi: 10.1111/0022-4537.00234
14. Hoyt, C. L. & Murphy, S. (2016). *Managing to clear the air: Stereotype threat, women, and leadership*. *Journal of Management*, 42(3), 387-399. doi:10.1016/j.jm.2015.11.002
15. Lipovka A., Yerimpasheva A., Rakhimbekova Zh., u Zakirova A. (2023). *Women's participation in political leadership: standpoints from Central Asia and 42 Central Europe* // *Journal of Eastern European and Central Asian research*. 2023. №10/3. С.376-386.

UDC: 33.118.144.149

IMPLEMENTATION AND DEVELOPMENT OF INNOVATIONS IN THE TRADITIONAL ECONOMY OF UZBEKISTAN**Umarov Ilhomjon Yuldashevich***Head of the department of "Accounting and management" of Andijan State technical institute, doctor of economics, professor***ВНЕДРЕНИЕ И РАЗВИТИЕ ИННОВАЦИЙ В ТРАДИЦИОННОЙ ЭКОНОМИКЕ УЗБЕКИСТАНА****Умаров Илхомжон Юлдашевич***Заведующий кафедрой «Бухгалтерский учет и менеджмент» Андижанского государственного технического института, доктор экономических наук, профессор***Abstract**

In this article, new and robotic processes used in the world industry, new methods of production organization, new or improved products and services introduced to the markets are introduced in the traditional economy of Uzbekistan. It is written about the rapid development of the importance of the industrial economy through the wider use of innovations in the modern technological world.

Аннотация

В данной статье в традиционную экономику Узбекистана внедряются новые и роботизированные процессы, используемые в мировой промышленности, новые методы организации производства, новые или усовершенствованные продукты и услуги, выводимые на рынки. Пишется о стремительном развитии значения индустриальной экономики за счет более широкого использования инноваций в современном технологическом мире.

Keywords: *economy, innovation, investment activity, light industry, food industry, robotic industry, investment concepts, capital, financial structures, foreign experience, cluster policy, technopark, technopolis.*

Ключевые слова: *экономика, инновации, инвестиционная деятельность, легкая промышленность, пищевая промышленность, роботизированная промышленность, инвестиционные концепции, капитал, финансовые структуры, зарубежный опыт, кластерная политика, технопарк, технополис.*

The direction of the economy is one of the most important sectors in the life of society. Today requires to include it in many areas and specialties of education. Using only traditional resources to ensure sustainable economic growth led to a narrowing of opportunities, and this situation showed the importance of innovative processes in the first place, that they are an integral part of economic changes. The issues of ensuring the scientific perfection and efficiency of innovative processes have become an important topic of scientists' activities.

In the general sense, the word "Innovation" comes from the Latin word "innovation" and the verb "innovate" which means "to change or modernize". Thus, innovation is a mechanism that renews the centrality and importance of the economy. The main goal of such an update is to live in harmony with the times, to act as a springboard for people to change their decision-making style, abandoning standard methods and making choices outside the framework of rules.

Today, innovations are becoming the main lever of economic development. Until recently, this name reminded me of an abstract concept that no one was interested in and was even not very clear, until now, both the innovation itself and its concepts have become a topic of equal interest to everyone. Along with the development of investment processes, the international capital market, which plays a significant role in the innovation process and is the main source of strategic resources for enterprises, is also expanding, and new financial structures are actively supporting and strengthening it. To increase the influence of Uzbekistan on the world stage and correctly determine the national dimensions in innovative development in 2022-2026, to ensure the innovative development of the country at the

international level, the innovative development strategy of the Republic of Uzbekistan was adopted, and one of the main tasks in it is the Global Innovation Index assessment of our republic until 2030. ranking among the top 50 countries. In the sub-index of all available resources and conditions for the introduction of innovations, our country rose 6 places from last year to 75th place; and in the sub-index of practical results achieved in the introduction of innovations, it rose 18 places and took the 100th place. The purpose of adopting these documents is to increase competitiveness and productivity in the industry, to encourage the increase of the share of high-tech products, to increase production, and to increase the share in the structure of production and export. is to expand the application of innovative technologies and advanced management. While analyzing the causes and factors of economic development, modern innovative theories of economic development first started in the middle of the 19th century.

The impact of innovative factors on increasing economic efficiency:

introducing a new product that is not familiar to the consumer or a new quality level for existing products.

introduction of new production methods, which means a new method of commercialization of products or raw materials based on scientific discoveries.

To accelerate the development of innovations in the industry, developed countries focus on structural changes, in particular, on their gradual modernization to identify and eliminate various development problems. Network development was evaluated as the main lever that moves and controls the dynamics of innovation development.

The concept of an innovative knowledge economy is based on new technological opportunities and non-standard forms of doing business. The foresight ability of the company's management to identify the technologies that can make a revolution in industrial enterprises, to correctly choose the effective areas of their production, and to apply innovations, provides an advantage over competing companies. In today's competitive environment, businesses need to be able to adapt and change if they are to survive.

Companies need stability and order to perform daily tasks efficiently and quickly. This is necessary for an organization to compete today. But to be competitive in the future, companies must also develop new ideas and new products. Therefore, creating a creative environment where ideas can be tested and developed remains the priority of dominant companies. Companies must ensure that their products are manufactured to exact specifications and delivered on time, day after day. Any inefficiencies or weaknesses must be eliminated so that the firm's costs are lower than those of its competitors. The company must be under constant pressure to reduce costs and improve efficiency. At the same time, it is important to provide opportunities for the development and improvement of new products.

Innovative developments in Uzbekistan are mainly concentrated in the fields of agriculture, construction, healthcare, industry, and education. Within the framework of the innovative development strategy of the Republic of Uzbekistan, the development of human capital as the main factor determining the level of competitiveness of the country is defined as the main goal. The main tasks to achieve the main goal:

- improving the quality of education;*
- increasing scientific capacity and effectiveness of scientific research;*
- increase the volume of investments in innovations;*
- introduction of modern management methods and tools;*
- development of public-private partnership;*
- creation of a sustainable socio-economic infrastructure.*

According to our scientists working in the field of economy, to ensure the innovation-oriented development of Uzbekistan, it is necessary to solve the following priority tasks:

- create a wider opportunity for free and stable operation of the private sector, which can increase the volume of exports through more effective competition. To inculcate in such enterprises the spirit of initiative, which is very important in the struggle of competition in world markets;*
- improvement of macroeconomic environment stability parameters;*
- raising the trade relations with the main consumer countries to a new level, first of all, increasing the opportunities to enter the main export markets by conducting negotiations on the reduction of tariffs for goods delivered by Uzbekistan;*
- modernization of the production sector using modern technologies and methods of production management in leading sectors to increase the competitiveness of Uzbekistan's economy among the world countries;*
- strengthening the scientific and technical potential necessary for further expansion of production of investment goods and diversification of products;*

- active support for technological re-equipment of production and introduction of innovative technologies;
- to create a single system of continuous training of personnel for small enterprises that can quickly adapt to constantly changing market conditions.

References

1. Mamayunusovich, P. O., & Nodirovna, M. S. (2022). Management of the Mechanism of Storage and Sale of Products in the Republic of Uzbekistan
2. M.S. Nodirovna, Shaptakov and Mamasoliyevna, K.C. (2022). Improving the Economic Impact of Increasing Foreign Investment in Uzbekistan in the Digital Economic Environment. *AcademicJournalofDigitalEconomicsandStability*, [online] 16, pp.160–165
3. Umarov, I. Y. (2021). Use Of Innovations And Modern Methods In The Logistics Network. *European Proceedings of Social and Behavioural Sciences*.
4. Yuldashevich, U. I., & Mukhammadeldor, R. (2021). The impact of digital economy on the development of small business and private entrepreneurship. *Восточно-европейский научный журнал*, (2-3 (66)), 4-7.
5. Умаров, И. (2022). ОЗИҚ-ОВҚАТ САНОАТИ КОРХОНАЛАРИ БОШҚАРУВИНИ ТАШКИЛИЙ-ИҚТИСОДИЙ МЕХАНИЗМИНИ БАҲОЛАШ УСЛУБИЁТИ. *Economics and Innovative Technologies*, 10(3), 229-238.
6. Умаров, И. Ю., & Безбутова, М. М. (2017). Роль иностранных инвестиций в устойчивом экономическом развитии страны. In *Статистические методы исследования социально-экономических и экологических систем региона* (pp. 161-166).
7. Умаров, И. Ю., & Бурибоевой, И. А. (2019). Пути повышения конкурентоспособности предприятий пищевой промышленности. *Zbiór artykułów naukowych recenzowanych*, 39.
8. Умаров, И. Ю., & Хусанова, З. Р. (2019). ПРИМЕНЕНИЕ ИННОВАЦИОННОЙ ДЕЯТЕЛЬНОСТИ В ПИЩЕВОЙ ПРОМЫШЛЕННОСТИ-КАК ФАКТОР ПОВЫШЕНИЯ УРОВНЯ ЖИЗНИ НАСЕЛЕНИЯ. In *Материалы VII Международной научно-практической конференции «Актуальные проблемы социально-трудовых отношений»*, посвященной (pp. 367-369).

Historical sciences

THE ROLU AND PLACE OF AZERBAIJAN IN ENERGY SECURUTY SYSTEM OF THE USA

Abdullaly Sənan Ragib

Master program student,
Department of History, geography and methodology
Sumgayit State University

Abstract

The main aim of the article is to study the role of Azerbaijan in energy security system of the USA. Diplomatic relations between the Republic of Azerbaijan and the United States of America were established on February 28, 1992. In the following years, relations with the United States have been one of the leading directions in the foreign economic policy of the Republic of Azerbaijan. The question of what form Azerbaijan's place and role should take in the energy security of the United States, which has always been an urgent issue in this system of relations, has gained importance.

Keywords: Azerbaijan, The USA, energy, security, oil, petrol

Introduction. Diplomatic relations between the Republic of Azerbaijan and the United States of America were established on February 28, 1992 [5].

Following the return to power of National Leader Heydar Aliyev in 1993, he assumed the responsibility of rescuing the state and the people from the severe economic and political crisis, as well as stabilizing the volatile situation that had emerged. Taking into account Azerbaijan's national interests and the mutual interests of foreign countries, Heydar Aliyev declared the country's readiness to engage in mutually beneficial cooperation with any nation interested in Azerbaijan's oil resources.

The United States, one of the world's leading powers and among the first to show interest in the oil and gas reserves of the Caspian region, became a key supporter of the newly independent Azerbaijan's emerging oil strategy. Following the dissolution of the Soviet Union in December 1991, the United States—possessing significant global economic and political influence—along with its allies, began to express interest in the South Caucasus, including the Caspian Basin countries such as Azerbaijan.

In this context, it can be asserted that oil was the primary driving factor behind the establishment and development of bilateral relations between the United States and Azerbaijan.

The main part.

Thus, on September 20, 1994, the "Contract of the Century" was signed at the "Gulustan" Palace in Baku. This agreement was concluded between the State Oil Company of the Republic of Azerbaijan (SOCAR) and a consortium of foreign companies, including those from the United States, for the joint development and production sharing of the "Azeri" and "Chirag" oil fields, as well as the deepwater portion of the "Gunashli" field, located in the Azerbaijani sector of the Caspian Sea. Under the terms of this agreement—commonly referred to as the "Gulustan Agreement"—the distribution of shares for American companies was as follows: AMOCO (17.01%), UNOCAL (11.2%), Pennzoil (9.81%), and McDermott (2.45%), with U.S. companies collectively holding a 40% share in the project.

In a telegram dated September 20, 1994, former U.S. President Bill Clinton stated: "The United States welcomes this agreement, the largest of its kind in history. It will be beneficial for all parties involved and will serve to strengthen the growing economic and trade relations between our countries."

On December 2, 1994, the Milli Majlis (National Assembly) of the Republic of Azerbaijan ratified the "Contract of the Century" and authorized its implementation. From that point onward, the agreement acquired full legal force. This development became a key factor in enhancing Azerbaijan's attractiveness as a partner in international economic relations. The successful implementation of the first phase of the contract contributed significantly to Azerbaijan's international prestige and bolstered confidence in its promising future [3, p.93].

Strategic agreements of this nature rendered Azerbaijan an appealing partner not only for the United States but also for many other countries. In addition to American and European interest, Israel—a close ally of the United States—also considered Azerbaijan to be of strategic importance. Strong

connections exist between Israeli and Turkish lobbies in various foreign countries, particularly in the United States. Cooperation between military and security institutions further underscores the strategic depth of these relations [4, p. 131].

The new oil policy of Azerbaijan, established with the signing of the "Gulustan Agreement," subsequently led to the conclusion of a series of contracts in which the United States also played a key role as a strategic partner. Notable agreements include:

- On November 10, 1995, at the "Gulustan" Palace in Baku, a production sharing agreement for the joint development of the "Karabakh" oil field was signed with the U.S. company **Pennzoil**, which held a 30% stake.

- On December 14, 1996, at the "Gulustan" Palace in Baku, another agreement was signed concerning the joint development of the "Ashrafi" and "Dan Ulduzu" fields. In this agreement, U.S. companies **PB/AMOCO** (30%) and **UNOCAL** (25.5%) participated.

- On August 1, 1997, at the White House in Washington, an agreement was signed for the joint development of the "Oguz" offshore block with **Mobil/Exxon**, holding a 50% share.

- On the same day, another agreement was concluded at the White House regarding the joint development of the "Absheron" offshore block with **Chevron** (30%).

- Also on August 1, 1997, an agreement was signed for the joint development of the "Nakhchivan" offshore block with **Exxon/Mobil** (50%).

- On June 2, 1998, at the "Gulustan" Palace in Baku, an agreement was signed for the joint development of the South-West Gobustan block, which includes the "Shikhsagirli," "Sheytanud," "Burgut," "Donquzduq," "Nardaran," "Ilkhichi," "West Hajivali," "Sundi," "East Hajivali," "Turagay," "Kanizadag," "West Duvanny," "Duvanny," "Solakhay," and "Dashgil" fields. The U.S. company **Union** participated with an 11% share.

- On July 21, 1998, in London, an agreement was signed for the joint development of the "Inam" offshore block with **AMOCO** (25%).

- Also on July 21, 1998, in London, agreements were signed for the joint development of the "Araz," "Alov," and "Sharq" offshore fields with **Exxon/Mobil** (15%) and **BP/AMOCO** (15%).

- On April 27, 1999, at the U.S. Senate building, an agreement was reached for the joint development of the "Savalan," "Dalgha," "Lerik Deniz," and "South" offshore blocks with **Mobil** (30%).

- On the same date and location, another agreement was signed for the joint development of the "Zafer" and "Mashel" fields with **Exxon/Mobil** (30%) and **Conoco** (20%).

- On September 12, 2000, at the U.S. Congress building, an agreement was signed concerning the joint development of the "Mishovdag" and "Kelamaddin" fields with **Pet Oil** (35.75%) and **KDK** (49.3%).

These successive agreements not only consolidated the strategic energy partnership between Azerbaijan and the United States but also underscored the growing geopolitical importance of Azerbaijan in the global energy landscape.

Following these developments, the primary issue that emerged was ensuring the safe transportation of Azerbaijan's natural wealth—its oil—to global markets. Naturally, the United States, which held a significant stake in Azerbaijan's oil sector, was deeply invested in this process. Consequently, Washington's growing influence in the region was met with unease by regional powers such as Iran and Russia.

After prolonged diplomatic negotiations, consensus was reached on constructing the **Baku-Tbilisi-Ceyhan (BTC) Main Export Pipeline**, intended to transport oil extracted under the framework of the "Gulustan Agreement." The initial political agreement on this project was formalized on **October 29, 1998**, in Ankara, where the presidents of **Azerbaijan, Turkey, Georgia, Uzbekistan, and Kazakhstan**, along with the **U.S. Secretary of Energy**, signed the "**Ankara Declaration**" in support of the BTC route.

It is important to emphasize that the **U.S. government**, in backing the BTC route, engaged in intensive negotiations not only with its own energy companies but also with **Turkey and Azerbaijan**, demonstrating considerable diplomatic effort to achieve consensus among all parties. Following a diplomatic visit to Turkey and Azerbaijan in December 1998, **President Clinton's Special Advisor and State Department representative, Richard Morningstar**, stated that the geopolitical significance of the BTC pipeline had been clearly conveyed to corporate leaders, noting that they were beginning to grasp the political realities underlying the project.

On **November 18, 1999**, during the **OSCE Istanbul Summit**, a landmark agreement was signed at the **Çırağan Palace** for the transportation of Azerbaijani crude oil via the BTC pipeline through the territories of Azerbaijan, Georgia, and Turkey. Additionally, the "**Istanbul Declaration**," signed at the same ceremony by the heads of state of **Azerbaijan, Georgia, Kazakhstan, Turkey, and the United States**, reaffirmed political support for the construction and operation of the BTC pipeline.

Result and Conclusion

As a result of these developments, cooperation between the **United States and Azerbaijan** in the field of energy security expanded significantly. Azerbaijan's new oil strategy had a profoundly positive impact on bilateral relations with the U.S. The American government unequivocally supported Azerbaijan's energy policy and the broader **East-West energy transportation corridor**, expressing confidence that these initiatives would contribute to development and stability not only in Azerbaijan but throughout the region.

To this day, the **U.S. administration** continues to view Azerbaijan's energy initiatives—particularly the BTC pipeline and related Caspian projects—as key instruments in strengthening the economic potential of Azerbaijan, ensuring the sovereign and stable development of the South Caucasus, and enhancing the geopolitical and strategic importance of the Caspian region. The United States remains committed to supporting the implementation of these vital energy projects.

Literature

1. Müasir beynəlxalq münasibətlər və Azərbaycanın xarici siyasəti. Dərslik. Bakı, "Azərbaycan" nəşriyyatı, Bakı: 2005, - 631 s. (In Azerbaijani)
2. Musatafayeva S., Qurbanova Ş., Cavadova Z. ABŞ-ın xarici siyasəti (1945-2010) Dərs Vəsaiti. Bakı:2011, -301s. (In Azerbaijani)
3. Məmmədova S. Azərbaycan Respublikasının İsrail Dövləti ilə münasibətləri (1991-2008), Monoqrafiya, Sumqayıt-2022, -177 (In Azerbaijani)
4. Mammadova Samira I. Azerbaijan-Israel, Turkey-Israel Relations based on analysis of experts (2016-2018). GRANI / ГРАНИ. Volume 26 № 2, Ukraine: 2023. (In English)
DOI: <https://doi.org/10.15421/1720232>

Internet resources:

5. mfa.gov.az
AZƏRBAYCAN RESPUBLİKASI XARİCİ İŞLƏR NAZİRLİYİ

Mathematical sciences

ULTRATRANSFER JACOBIAN POLYNOMIALS

Sahib Ali oglu Aliyev
Nakhchivan State University
Aygun Nadir gizi Mammadova
Nakhchivan Teachers' Institute

Abstract

We consider ultratransfer Jacobian polynomials, which are one of the classical orthogonal polynomials. These polynomials are first orthogonally defined, normalized, and shown to be orthonormal Jacobian polynomials. Using the well-known existence theorem, $P_0(x; \alpha), P_1(x; \alpha), P_2(x; \alpha) \dots$

This is because these polynomials are orthonormal.

Keywords: Orthogonal, Orthonormal, Polynomial, Theorem, Ultratransparent, Integral

We will look at Jacobian polynomials, one of the classical orthogonal polynomials. In particular, we will study ultratransfer Jacobian polynomials. Suppose that,

$$P_n(x; \alpha) = \frac{(-1)^n}{n! 2^n} (1-x^2)^{-\alpha} \frac{d^n [1-x^2]^{\alpha+n}}{dx^n}$$

Here $h(x) = (1-x^2)^\alpha, x \in (-1; 1), \alpha > -1$ is a weight function.

It is known that the US Jacobian polynomial is theoretically orthogonal. The main issue is to investigate whether the US Jacobian polynomial is orthonormal. First, we need to explicitly state the orthogonal polynomial.

$$P_0(x; \alpha) = \mu_0 > 0$$

$$\int_{-1}^1 h(x) P_0^2(x; \alpha) dx = \int_{-1}^1 (1-x^2)^\alpha P_0^2(x; \alpha) dx$$

It is known that,

$$P_0(x; \alpha) = (1-x^2)^\alpha [(1-x^2)^\alpha] = 1$$

So,

$$\int_{-1}^1 (1-x^2)^\alpha P_0^2(x; \alpha) dx = \int_{-1}^1 (1-x^2)^\alpha dx$$

If, $x = 2t - 1$ If we replace with, then

$$x = -1 \Rightarrow t = 0; \quad x = 1 \Rightarrow t = 1$$

$$\text{Then, } \int_0^1 2 - [1 - (2t-1)^2]^\alpha dx = 2 \int_0^1 [4 + (1-t)]^\alpha dt = 2^{2\alpha+1} B(\alpha+1, \alpha+1)$$

If we use the Eifer integral,

$$\int_{-1}^1 (1-x^2)^\alpha dx = 2^{2\alpha+1} B(\alpha+1, \alpha+1)$$

According to the beta function

$$B(\alpha+1, \alpha+1) = \frac{\Gamma^2(\alpha+1)}{\Gamma(2\alpha+2)}$$

As a result,

$$\int_{-1}^1 (1-x^2)^\alpha dx = 2^{2\alpha+1} \frac{\Gamma^2(\alpha+1)}{\Gamma(2\alpha+2)}$$

If we use the right-hand side of the last inequality,

$$2^{2\alpha+1} \frac{\Gamma^2(\alpha+1)}{\Gamma(2\alpha+2)} \quad \forall \alpha \quad P_0(x; \alpha) = 1$$

given that, then the square norm is defined as follows:

$$h_0(\alpha) = 2^{2\alpha+1} \frac{\Gamma^2(\alpha+1)}{\Gamma(2\alpha+2)};$$

$$\mu_0 = \sqrt{\frac{1}{h_0(\alpha)}} = \sqrt{\frac{\Gamma(2\alpha + 2)}{2^{2\alpha+1}\Gamma^2(\alpha + 1)}}$$

As a result,

$$P_0(x; \alpha) = \mu_0 \cdot P_0(x; \alpha) = \sqrt{\frac{\Gamma(2\alpha + 2)}{2^{2\alpha+1}\Gamma^2(\alpha + 1)}}$$

$\bar{P}_1(x; \alpha)$ if we examine the orthonormal polynomial

$$\bar{P}_1(x; \alpha) = -\frac{1}{2}(1-x^2)^{-\alpha} \frac{d[(1-x^2)^{\alpha+1}]}{dx} = -\frac{1}{2}(1-x^2)^{-\alpha} [(\alpha+1)(1-x^2)^\alpha \cdot (-2x)] = (\alpha+1)x$$

If we define the norm, then

$$I_1 = \int_{-1}^1 (1-x^2)^\alpha \cdot P_1^2(x; \alpha) dx$$

If we use the well-known formula, then

$$\begin{aligned} I_1 &= \frac{1}{2} \int_{-1}^1 \frac{dP_1(x; \alpha)}{dx} (1-x^2)^{\alpha+1} dx = \frac{\Gamma(2\alpha+3)}{2^2 \Gamma(2\alpha+2)} \int_{-1}^1 \frac{dP_1(x; \alpha)}{dx} (1-x^2)^{\alpha+1} dx \\ &= \frac{2\alpha+2}{2^2} \int_{-1}^1 (1-x^2)^{\alpha+1} dx \end{aligned}$$

If we substitute

$x = 2t - 1$ again, then by Leibniz's formula

$$\begin{aligned} \int_{-1}^1 (1-x^2)^{\alpha+1} dx &= 2 \int_0^1 [1 - (2t-1)^2]^{\alpha+1} dx = 2 \cdot \int_0^1 4^{\alpha+1} \cdot t^{\alpha+1} \cdot (1-t)^{\alpha+1} dt \\ &= 2^{2\alpha+3} \cdot B(\alpha+2, \alpha+2) = 2^{\alpha+\beta+3} \cdot \frac{\Gamma^2(\alpha+2)}{\Gamma(2\alpha+4)} \end{aligned}$$

As a result,

$$h_1(\alpha) = \frac{2\alpha+2}{z^2} \cdot z^{2\alpha+3} \frac{\Gamma(\alpha+2)\Gamma(\alpha+2)}{\Gamma(2\alpha+4)} = \frac{\alpha+1}{2} z^{2\alpha+3} \frac{\Gamma^2(\alpha+2)}{\Gamma(2\alpha+4)}$$

$$\mu_1 = \sqrt{\frac{1}{h_1(\alpha)}} = \sqrt{\frac{4\Gamma(2\alpha+4)}{(2\alpha+2)2^{2\alpha+3}\Gamma^2(\alpha+2)}} = \sqrt{\frac{4(2\alpha+3)\Gamma(2\alpha+3)}{(2\alpha+2)2^{2\alpha+3}\Gamma^2(\alpha+2)}} = \sqrt{\frac{(2\alpha+3)\Gamma(2\alpha+2)}{2^{2\alpha+1}\Gamma^2(\alpha+2)}}$$

As a result, we obtain its orthonormal Jacobian polynomial. that is

$$\bar{P}_1(x; \alpha) = \mu_1 P_1(x; \alpha) = \sqrt{\frac{(2\alpha+3)\Gamma(2\alpha+2)}{2^{2\alpha+1}\Gamma^2(\alpha+2)}} \cdot (\alpha+1)x$$

Now let's examine the mean normal polynomials

$\bar{P}_2(x, \alpha)$

$$P_2(x, \alpha) = \frac{1}{2 \cdot 2^2} (1-x^2)^{-\alpha} \frac{d^2(1-x^2)^{\alpha+2}}{dx^2}$$

If we use Leibniz's formula

$$\frac{d^2(1-x^2)^{\alpha+2}}{dx^2} = -2(\alpha+2)(1-x^2)^{\alpha+1} + 4x^2(\alpha+2)(\alpha+1)(1-x^2)^\alpha$$

As a result

$$P_2(x, \alpha) = \frac{1}{2 \cdot 2^2} (1-x^2)^{-\alpha} [-2(\alpha+2)(1-x^2)^{\alpha+1} + 4x^2(\alpha+2)(\alpha+1)(1-x^2)^\alpha]$$

$$\bar{P}_2(x, \alpha) = \frac{1}{2 \cdot 2^2} [(4\alpha^2 + 14\alpha + 12)x^2 + (-2\alpha - 4)]$$

$$A = 4\alpha^2 + 14\alpha + 12 \quad B = -2\alpha - 4$$

$$P_2(x, \alpha) = Ax^2 + B$$

If we define the norm then

$$I_2 = \int_{-1}^1 (1-x^2)^\alpha \cdot P_2(x; \alpha) dx$$

If we examine the analogous rule, then

$$i_2 = \frac{(2\alpha + 4)(2\alpha + 3)}{2^5} \int_{-1}^1 (1 - x^2)^{\alpha+2} dx$$

$x = 2t - 1$ If we replace, as a result

$$\int_{-1}^1 (1 - x^2)^{\alpha+2} dx = 2^{2\alpha+5} \cdot \frac{\Gamma^2(\alpha + 3)}{\Gamma(2\alpha + 6)}$$

Then,

$$h_2(\alpha) = \frac{(2\alpha + 4)(2\alpha + 3)}{2^5} \cdot 2^{2\alpha+5} \cdot \frac{\Gamma^2(\alpha + 3)}{\Gamma(2\alpha + 6)}$$

As a result,

$$\mu_2 = \sqrt{\frac{1}{h_2(\alpha)}} = \sqrt{\frac{2^5 \Gamma(2\alpha + 6)}{\Gamma^2(\alpha + 3) 2^{2\alpha+5} (2\alpha + 4)(2\alpha + 3)}}$$

$$\mu_2 = \sqrt{\frac{2^5 \Gamma(2\alpha + 5) \Gamma(2\alpha + 3)}{\Gamma^2(\alpha + 3) 2^{2\alpha+5}}}$$

So,

$$\bar{P}_2(x, \alpha) = \mu_2 P_2(x; \alpha) = \mu_2 \sqrt{\frac{2\Gamma(2\alpha + 5) \Gamma(2\alpha + 3)}{\Gamma^2(\alpha + 3) 2^{2\alpha+1}}}$$

$$\bar{P}_2(x, \alpha) = \sqrt{\frac{2\Gamma(2\alpha + 5) \Gamma(2\alpha + 3)}{\Gamma^2(\alpha + 3) 2^{2\alpha+1}}} \cdot [(4\alpha^2 + 14\alpha + 12)x^2 + (-2\alpha - 4)]$$

By an analogous rule, $\bar{P}_3(x, \alpha), \bar{P}_4(x, \alpha), \dots$ can be defined.

Literature

1. S.Aliyev, E.Agayev "Conditions for the existence and uniqueness of a system of orthonormal polynomials with respect to the Jacki function". Scientific works, Nakhchivan, NDU-2017 No. 4
2. S.Aliyev, E.Agayev, S.Aliyev " Construction of a system of Chebyshev polynomials of the first kind." Scientific works, Nakhchivan, NDU-2019 №4, (101)
3. S. Aliyev, Constructing a System of First Kind Chebysh, Operators in General Morrey-Type Spaces and Applications (OMTSA 2019), Kutahya Dumlupinar University, Kutahya, TURKEY, July 16-20, 2019

Medical sciences

UDC: 616.441-006.6

THYROID CANCER: CONTEMPORARY STATE OF THE PROBLEM

Arman Khozhayev

*Professor of the S.N. Nugmanov Department of Oncology,
Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan*

Aina Uaissova

*Head of the Polyclinic of the Oncology Center,
oncologist-chemotherapist,
Multidisciplinary Regional Hospital,
Oncology Center, Petropavlovsk, Kazakhstan*

Diana Forsh

*Oncologist-chemotherapist,
Multidisciplinary Regional Hospital,
Oncology Center, Petropavlovsk, Kazakhstan*

Madina Mardenova

*Oncologist-chemotherapist,
Multidisciplinary Regional Hospital,
Oncology Center, Petropavlovsk, Kazakhstan*

Adiya Arkeyeva

*Oncologist,
Kostanay City Oncology
Multidisciplinary Hospital, Kostanay, Kazakhstan*

Xeniya Dissayenko

*Head of the Polyclinic,
Kostanay City Oncology
Multidisciplinary Hospital, Kostanay, Kazakhstan*

Serik Baizakov

*Surgeon,
Kostanay City Oncology
Multidisciplinary Hospital, Kostanay, Kazakhstan*

Abstract

This scientific and analytical work presents modern world and local-regional data on incidence, mortality, lethality and five-year survival rate of such a common oncological pathology as thyroid cancer. The issues of etiology and pathogenesis, modern approaches and principles of complex diagnostics, prospects for improving treatment results, as well as the prognosis are covered in detail. The epidemiological characteristics of this pathology in our republic are given in the context of the regions of the country.

Keywords: *oncology, thyroid cancer, biomarkers, RNA, ultrasound examination, epidemiology, incidence, mortality, lethality, five-year survival rate, prognosis.*

Thyroid cancer (TC) is a malignant tumor that develops from thyroid tissue. The following diagnostic criteria for TC are distinguished. Complaints about: enlargement of the gland; appearance of a tumor on the anterior and lateral surface of the neck; change in voice (with tumor growth into the recurrent nerve); rapid tumor growth; shortness of breath, feeling of lack of air (with tumor growth into the recurrent nerve, upper respiratory tract). Anamnesis: thyroid disease (hypothyroidism, euthyroidism, hyperthyroidism, thyroiditis); long-term use of antithyroid drugs; ionizing radiation; history of radiation therapy to the head and neck. Physical examination: 1) upon examination, neck deformity (uniform swelling on the anterior surface of the neck, asymmetry due to an increase in any part of the thyroid gland, an increase in regional lymph nodes); 2) palpation examination of the thyroid gland - the presence of a nodular formation in the thickness of the thyroid gland, dense consistency; 3) palpation examination of regional

lymph nodes - dense consistency, painful, mobile, immobile, partially mobile.

Laboratory tests: cytological examination; histological examination. Immunohistochemical examination: TTF-1, determination of calcitonin, fine-needle aspiration biopsy. All patients diagnosed with medullary TC or a family history of medullary TC or multiple endocrine neoplasia syndrome type 2 are recommended to undergo genetic testing to determine the germline mutation rearranged during transfection (RET) in order to determine the prognosis of the disease.

Instrumental studies: 1) ultrasound examination of the thyroid gland (determines the structure of the gland and tumor, the presence of a nodular formation, cystic cavities, size, echogenicity); the protocol for ultrasound examination of the thyroid gland includes determining the size, localization, ultrasound characteristics of the tumor; suspicious signs are (assessed only in solid nodes or in solid areas of the nodes) hypoechoic solid structure; uneven, fuzzy or polycyclic contour; point hyperechoic inclusions (microcalcifications); predominance of the anteroposterior size of the node over the width ("higher/than/wider"); 2) ultrasound examination of the cervical, submandibular, supraclavicular, subclavian lymph nodes (the presence of enlarged lymph nodes, structure, echogenicity, size); The protocol for ultrasound examination of the thyroid gland and regional lymph nodes should include assessment of the following parameters: size (it is necessary to assess the diameter or anteroposterior size, and not the length; for all cervical lymph nodes, except for level II - the fascial cellular space of the neck (submandibular zone), the largest size is no more than 0.6 cm, for level II - no more than 0.8 cm); the ratio of the long and short axes; the presence / absence of the gate; cystic changes; point hyperechoic inclusions (microcalcifications); the nature of vascularization (gate or the entire lymph node); increased echogenicity of the lymph node (similarity to normal thyroid tissue); the most specific signs that allow us to suspect metastatic lesions of the lymph node are microcalcifications, a cystic component, peripheral vascularization, and similarity of the lymph node tissue to the thyroid gland; less specific signs are an increase in size, rounded contours, and the absence of a hilum; 3) computed tomography and/or magnetic resonance imaging of the soft tissues of the neck and mediastinum (with contrast - in the presence of invasion into the main vessels, with a retrosternal location), fine-needle aspiration biopsy from the tumor (allows us to determine tumor and non-tumor processes, the benign and malignant nature of the tumor); 4) skeletal scintigraphy (prescribed if bone metastases are suspected); 5) positron emission tomography, positron emission tomography/computed tomography of the whole body (performed to diagnose the prevalence of the tumor process or the progression of the disease, or to assess the dynamics of the effectiveness of specialized treatment) [1].

The thyroid or glandula thyroidea is an endocrine gland located in the neck below the larynx in front of the trachea in mammals. In humans, it has the shape of a butterfly. It consists of two lobes connected by a narrow bridge called the isthmus. Thyroid carcinoma or TC is a malignant tumor of the thyroid gland. It is the most common malignancy of the endocrine (hormonal) system, but is very rare, accounting for about 1% of all malignant tumors, however, it has been increasing in frequency in recent years. TC is a malignant tumor of the glandular tissue of the thyroid gland. There are different types of TC that arise from different cells in the thyroid gland. TC comprises several categories: (1) differentiated TC (DTC), including papillary (PTC), follicular (FTC), and Huerthle cell tumours, (2) medullary TC (MTC) and (3) anaplastic TC. The long-term survival rate of patients with differentiated TC is about 90%, whereas patients with poorly differentiated TC types show a long-term survival rate of below 10% due to their resistance to standard treatment options [2]. The latest Global Cancer Observatory survey from 2020 reports that TC is responsible for 586,000 cancer cases worldwide [3].

Horgan D. et al. in their work they say that TC is the most common malignancy of the endocrine system that affects the thyroid gland. It is usually treatable and, in most cases, curable. The central issues are how to improve knowledge on TC, to accurately identify cases at an early stage that can benefit from effective intervention, optimise therapy, and reduce the risk of overdiagnosis and unnecessary treatment. Our colleagues focus on the fact that the approach to TC needs a rethink to early and correct identification of patients and improve their patient journey and treatment outcomes, including improved quality of life. All patients should be referred to comprehensive cancer centres. Such an approach would instate an optimal patient management mitigating overdiagnosis and overtreatment and would improve access to biomarker testing, clinical trials, and appropriate systemic therapies for patients with advanced forms of TC. It would also help establish focused national expertise on rare TC cases, promote research, training, awareness, and facilitate international collaboration [4].

Treatment and molecular testing guidelines should be regularly updated at regional and national levels to facilitate the reimbursement and availability for the most effective diagnostics and therapies. In the most recent update of the clinical practice guidelines, ESMO highlights for the first time the need

to test for actionable cancer alterations in TC. It is essential that national guidelines are coordinated with the European and international ones [5].

Quality comprehensive genomic testing should be incorporated in clinical practice (tissue or liquid samples) for all TC patients that can benefit from targeted therapies. In order to facilitate correct diagnosis, pathology practice, data collection and analysis, as well as communication with the treating physicians should be improved, with the provision of registers based on pathology. National cancer registries should distinguish specific diseases with standardised, quality-controlled systems, including details of case management and including long-term survival data. National and international data bases are needed not only for refractory TC, but for all types of TC. Thyroid gland examination practices in the asymptomatic general population need updating. With the rapid growth of big data analytics in genomics, imaging, and clinical outcomes, health systems should make it possible to generate a personalised, data-driven risk profile to customise therapy for individual patients, aiming for both long-term tumour control and manageable adverse effects [4].

Silva S.N. [6] notes that TC is not just a common type of cancer, it is the most frequently diagnosed endocrine malignancy worldwide. The etiology of TC is essentially multifactorial and radiation is the best documented risk factor related to the disease. However, many questions are still open and seeking clarification, especially regarding the genetic aspects of this pathology, with clear implications not only on a scientific basis of the disease, but foremost in clinical oncology. Thyroid gland tumours are a heterogeneous group of neoplasms that may arise from virtually any of the different cell types that are present in the thyroid gland. Although the malignant tumours are most frequently identified in thyroid follicular cells, it is clear that the molecular-genetic characterization is crucial and should be further explored to emphasize differences in tumour biological behaviours, aggressiveness, and disease prognostics. PTC and FTC represent 85-90% and 5-10% of TC cases, respectively, arising from thyroid follicular cells. These tumour histotypes retain their morphologic features and are often referred to as DTC. However, the etiology of DTC is still unknown. Considerable progress has been made in the understanding of thyroid carcinogenesis, in part based on retrospective and prospective studies published worldwide in recent decades, but also in the development of high-throughput approaches and the availability of improved diagnostic methodologies that lead to early diagnosis. In fact, over the last few decades, the research in TC has highlighted the mutational landscape leading to better understanding of the molecular pathogenesis of DTC.

The hallmarks of cancer have been identified with several potential targets involved in gene expression deregulation, leading to the promotion of genetic instability and cancer development. The identification of genetic variants related to TC has been a long way, though it is crucial to identify possible potential biomarkers of susceptibility. Some genetic variants have been identified in specific subtypes, which are related to the increased risk to develop this malignancy, such as the BRAF V600E mutation in PTC patients with a more aggressive phenotype if telomerase reverse transcriptase gene promoter mutation coexists [7].

However, mutations in RET and Retrovirus Associated DNA Sequences genes have also been identified as biomarkers in TC patients.

Alongside with genetic variants, epigenetic events and alterations in the expression of microRNA (miRNA) and long noncoding RNA (lncRNA) may also, through modulation of gene expression, drive the aberrant activation of oncogenic signalling pathways and the downregulation of thyroid-specific genes, thus contributing to the development, progression, and dedifferentiation of TC [8].

Connected to this, the genetic instability inflicted in this malignancy, involving genetic and epigenetic alterations, might also compromise the treatment response. The standard treatment for TC patients consists of surgical resection accompanied by post-thyroidectomy radioiodine (RAI) adjuvant therapy. The radioiodine therapy relies on the ability of ^{131}I to be preferentially taken up in normal or neoplastic thyroid follicular cells. Its accumulation induces high DNA damage, which leads to cytotoxicity. However, the ionizing radiation does not only affect tumour cells, but the lesions may also impair normal cells. The most common lesions induced by radiation are double-strand breaks, which are processed by enzymes involved in DNA repair pathways. The presence of genetic variants in these enzymes might impair the repair efficiency but also could influence the cytotoxic potential of RAI therapy, hence its efficacy in DTC treatment. The development of induced DNA damage approaches can help in the evaluation of the efficacy of therapeutics as it has been shown to be an important tool for establishing biomarkers of susceptibility. Although the most frequent variants identified in TC contribute to sporadic disease, about 5 to 15% of all diagnosed cases are familial (first degree relatives) in nonMTC, increasing to 25% in MTC cases. This adds to the clear existence of genetic predisposition factors related to this pathology

Advances in molecular genetics and several candidate gene studies developed worldwide have linked the occurrence of this malignancy to some hereditary syndromes, some of which are related to germline mutations in RET genes [6].

Macvanin M.T. et al. [9] in their study note that after the metabolic syndrome and its components, thyroid disorders represent the most common endocrine disorders, with increasing prevalence in the last two decades. Thyroid dysfunctions are distinguished by hyperthyroidism, hypothyroidism, or inflammation (thyroiditis) of the thyroid gland, in addition to the presence of thyroid nodules that can be benign or malignant. TC is typically detected via an ultrasound fine-needle aspiration biopsy, cytological examination of the specimen and measurements of traditional biochemical markers, such as TSH, FT4, Tg, TgAb, and TPOAB. Novel RNA-based markers of thyroid neoplasms are identified by expression profiling of the thyroid gland tissue and/or blood samples of patients using high-throughput platforms for RNA analysis and identification, such as next-generation sequencing. Other emerging biomarkers of thyroid neoplasms are identified using flow cytometry, enzyme-linked immunosorbent assays, genetic tests, and immunohistological analyses. Due to the rapid advancement of high-throughput molecular biology techniques, it is now possible to identify new biomarkers for thyroid neoplasms that can supplement traditional imaging modalities in postoperative surveillance and aid in the preoperative cytology examination of indeterminate or follicular lesions. In conclusion, the authors draw attention to the fact that due to the rapid advancement of high-throughput molecular biology techniques, it is now possible to identify novel biomarkers for thyroid neoplasms that can supplement or replace existing biomarkers. Current circulating biomarkers, such as Tg or TgAb, are routinely used in postoperative monitoring; however, at the preoperative stage, they cannot distinguish between benign and malignant neoplasms or between low- and high-risk malignant lesions. Several new targets are emerging as potentially useful prognostic circulating biomarkers for TC. Evidence for miRNA, lncRNA and circular RNA (circRNA) dysregulation in several thyroid neoplasms and their potential use as sensitive diagnostic and prognostic biomarkers is particularly interesting. However, the data currently available in the literature is derived from small-scale clinical studies in specific patient cohorts. Thus, further validation is required to demonstrate their potential for clinical application. Large-scale studies are needed to confirm and validate novel biomarkers in the diagnosis, prognosis, and surveillance of thyroid neoplasms, such as miRNAs, lncRNAs, and circRNAs.

As they note in their work Saenko V., Mitsutake N. [10], radiation is an environmental factor that elevates the risk of developing TC. Actual and possible scenarios of exposures to external and internal radiation are multiple and diverse. In this case: 1) radiation is a risk factor for TC; the risk steadily increases up to the dose of 10 Gy, levels off in the 10- to 30-Gy interval, and asymptotically declines at higher doses but remains elevated; once exposed, the risk persists for many decades; 2) risks from the external and internal irradiation are comparable; 3) there is no evidence of dose-response departure from linearity at low doses (<0.1 Gy) and of the existence of a "safe" threshold dose; 4) the magnitude of radiation risk for TC is highest if exposure takes place at a young age; 5) after the Chornobyl nuclear reactor accident, due to internal exposure to radioactive iodine, a dramatic increase in the incidence of childhood TCs was observed, especially among children less than 5 years old at the time of the accident; 6) although many TCs were found by the thyroid-screening program after the Fukushima nuclear power plant accident, comparisons of exposures and characteristics of TC diagnosed after the Chornobyl and Fukushima nuclear accidents do not support a causative role of radiation in the latter; 7) reduction of the risk for TC may be achieved by following the As Low As Reasonably Achievable principle, and iodine thyroid blockage may be performed to protect from anticipated internal exposure. A substantial progress in understanding of radiation-related TC has been achieved since the discovery of this phenomenon about 60 years ago. Irradiation of the head, neck, and chest areas has been learned to increase the risk for developing thyroid malignancy during the lifespan. This stimulated numerous investigations in medical, industrial, and military settings whenever radiation exposure was relevant. Radiation risks have been quantified and found to be comparable for the external and internal radiation. According to this knowledge, certain groups at elevated risk could be determined, including those with medical, occupational, or emergency exposures. Now, the focus of radiation risk studies is shifting toward low-dose exposures in view of growing number of various radiological procedures, especially in pediatric patients. The markers of radiation-related TC have not been found so far. Overlaps in the histological types, oncogenic driver spectrums, and corresponding gene expression profiles between radiation-related and sporadic tumors suggest that these parameters were unlikely to serve as a marker. Clinical studies have demonstrated that TCs diagnosed in irradiated patients are of the same histological types as in nonirradiated patients and that disease prognosis is determined by tumor characteristics regardless of etiology. This is rather good news for clinicians to know that standard treatment and follow-up approaches could

be used for radiation-exposed patients, but it is necessary to keep in mind that TC phenotype is changing with patient age and latency period.

Lukasiewicz M. et al. [11] emphasize that the etiology of TC is complex, and a variety of factors contribute to its development. Among these factors, disorders of lipid metabolism have emerged as a notable area of interest. Lipids, including fatty acids (FA), play a fundamental role in cell structure and function. Consequently, disturbances in lipid metabolism can have profound effects on various cellular processes, potentially favoring the development and progression of TC. Understanding the intricate relationship between lipid metabolism disorders and TC is of paramount importance as it may provide new insights into the prevention and treatment of this malignancy. TC is a neoplasm with an increasing incidence worldwide. Its etiology is complex and based on a multi-layered interplay of factors. Among these, disorders of lipid metabolism have emerged as an important area of investigation. Cancer cells are metabolically reprogrammed to promote their rapid growth, proliferation, and survival. This reprogramming is associated with significant changes at the level of lipids, mainly FA, as they play a critical role in maintaining cell structure, facilitating signaling pathways, and providing energy. These lipid-related changes help cancer cells meet the increased demands of continued growth and division while adapting to the tumor microenvironment. Recent scientific efforts have revealed disturbances in lipid homeostasis that are specific to TC, opening up potential avenues for early detection and targeted therapeutic interventions. Understanding the intricate metabolic pathways involved in FA metabolism may provide insights into potential interventions to prevent cancer progression and mitigate its effects on surrounding tissues.

Luzón-Toro B. et al. [12] emphasize in their publication that TC, a cancerous tumor or growth located within the thyroid gland, is the most common endocrine cancer. It is one of the few cancers whereby incidence rates have increased in recent years. It occurs in all age groups, from children through to seniors. Most studies are focused on dissecting its genetic basis, since our current knowledge of the genetic background of the different forms of TC is far from complete, which poses a challenge for diagnosis and prognosis of the disease. TC is the most common endocrine cancer, with an increasing overall incidence in recent decades of about two fold in the last 25 years and accounting for 2% of all cancers. TC is the sixth most common cancer in women, who are three times more likely to have TC than men. About 2% of cases occur in children and teens. Overall, the 5-year survival rate of TC is 98%. However, survival rates depend on many factors, such as the specific type of TC and stage of disease. TC is a disease induced by progressive genetic and epigenetic molecular abnormalities. Most studies describe several classical aberrations involved in the tumorigenesis and progression of this tumor, such as point mutations, gene copy number variations, and aberrant gene methylation. The genetic landscape of TC is growing rapidly. Therapies that are targeted at genetic mutations related to this tumor are being used in patient care and clinical trials. In comparison with traditional disease-specific trials, molecular allocation studies ("basket studies") are testing targeted therapies in patients whose tumors carry particular mutations, in spite of the tumor type or origin. These studies are more informative on anticancer therapies because they include a greater number of patients. The correlation of molecular profile (obtained by new sequencing technologies) with clinicopathological characteristics will lead to the development of novel precision therapies, reducing incidence and mortality in TC patients. In this sense, differential response to a mitogen-activated protein kinase inhibitor was found to be related to the thyroid cancer genotype. Molecular testing of mutation hotspots, rearrangements, and gene expression is now an effective diagnostic tool to better select patients for potential thyroid surgery. The authors note that the diagnosis and treatment of TC is nowadays influenced by the molecular characterization of TC types. The improvement of such techniques would help to reduce the amount of TC treatment needed and improve outcomes in patients with clinically aggressive forms of cancer.

Chen D.W. et al. [13] emphasize in their work that the past 5-10 years have brought in a new era in the care of patients with TC, with the introduction of transformative diagnostic and management options. Several international ultrasound-based thyroid nodule risk stratification systems have been developed with the goal of reducing unnecessary biopsies. Less invasive alternatives to surgery for low-risk TC, such as active surveillance and minimally invasive interventions, are being explored. New systemic therapies are now available for patients with advanced TC. However, in the setting of these advances, disparities exist in the diagnosis and management of TC. As new management options are becoming available for TC, it is essential to support population-based studies and randomised clinical trials that will inform evidence-based clinical practice guidelines on the management of TC, and to include diverse patient populations in research to better understand and subsequently address existing barriers to equitable TC care.

Now, regarding this pathology in our country at the republican level. The incidence of TC in the

Republic of Kazakhstan in 2023 was 5.4 per 100 thousand population (4.8 in 2022) with a growth rate of 13.1% compared to the previous year, taking 3rd place together with connective and soft tissue tumors, second only to prostate cancer (16.7%) and laryngeal cancer (15.5%), and amounting to 1084 people in absolute numbers (939 cases a year earlier). The proportion of cases diagnosed for the first time in life, recorded by oncology organizations, was 2.9% (2.7% in 2022). In this case, 167 men fell ill (the proportion is 1.0%), women - 917 (the proportion is 4.4%) [14].

The TC rate above the national average was established in 9 regions of the country: North Kazakhstan - 12.6 (the maximum rate); East Kazakhstan - 10.6; Pavlodar - 8.5; the city of Astana - 8.2; the city of Almaty - 7.9; Kyzylorda - 7.6; Karaganda - 7.0; Akmola - 6.5; Abay - 5.9. This indicator is below the national average in 11 regions: Turkestan - 1.7 (the lowest rate); the city of Shymkent - 2.4; Atyrau - 2.6; Almaty - 3.0; West Kazakhstan - 3.8; Aktobe - 4.0; Zhambyl and Kostanay - 4.1; Ulytau - 4.5; Mangistau - 4.9; Zhetysu - 5.0 regions per 100 thousand population. Mortality from this pathology was 0.3 per 100 thousand population with an increase rate of 19.1% compared to the previous year, second only to non-melanoma skin cancer (26.0%).

The regions where the TC mortality rate is higher than the national average (0.3 per 100 thousand population) include: Abay - 1.0 (maximum level); Aktobe - 0.7; East Kazakhstan and Pavlodar - 0.5; Zhambyl, Karaganda, North Kazakhstan and the city of Almaty - 0.4. Zhetysu region and the city of Shymkent are on par with the national average. The lowest rates are noted in Atyrau and Ulytau - 0.0; Akmola, West Kazakhstan, Kostanay, Mangistau and Turkestan - 0.1; Almaty, Kyzylorda regions and the city of Astana - 0.2 per 100 thousand population [14].

One-year lethality was 2.3% (2.4% in 2022). At the same time, the ratio between one-year lethality and neglect (stage IV) was, as in 2022, 0.5, and this is the best indicator among all nosological forms of malignant tumors after prostate cancer (0.3). At the same time, we recall that the farthest from "1" is the worst ratio between one-year lethality and neglect.

Now, regarding preventive examinations. It should be noted that during large-scale preventive examinations of the population in 2023, significantly more patients with malignant neoplasms were actively identified than in 2022. This is 25,193 patients versus 23,623 patients identified in 2022, i.e. +6.6%. This is due to the further abatement of the epidemiological situation with coronavirus and the increased availability of preventive care for the population. The proportion of patients identified during routine examinations increased from 62.0% to 62.4% of the total number of patients identified over the year.

Of course, when analyzing the epidemiological situation, early diagnosis indicators are very important issues.

As for TC, the early detection of this pathology during routine examinations increased from 78.6% to 83.7%. The absolute number of TC patients identified during routine examinations was 900 people (732 a year earlier). At the same time, 849 are patients with early stages (in 2022 - 683 patients) [14].

In general, according to the amount of detected cases of cancer of all localizations, in 2023 the proportion of forms detected at early stages (0, I-II stages) increased from 66.3% to 67.9%. At the same time, detection at 0, I-II stages in TC increased from 93.3% to 94.3%. The regions where the proportion of patients with early stage I of the pathology in question is above the national average (71.5% and 2nd rank place among the best indicators after non-melanoma skin cancer) include the following regions: Kyzylorda - 85.9% (the best indicator); the city of Almaty - 84.8%; the city of Astana - 83.3%; North Kazakhstan - 80.0%; West Kazakhstan - 76.9%; Karaganda - 73.4%; Zhambyl - 72.0%; Almaty - 71.7%.

The lowest rates of early diagnosis were recorded in: East Kazakhstan - 50.6% (the worst rate); Atyrau and Turkestan - 55.6%; Mangistau - 56.8%; Zhetysu - 57.1%; Akmola - 58.8%; Aktobe - 59.5%; Ulytau - 60.0%; Kostanay - 60.6%; Abay - 65.7%; Pavlodar - 69.8% regions and in the city of Shymkent - 71.4%.

TC is in the top three in early diagnosis (stages I-II) - 92.4%. First place goes to non-melanoma skin cancer (98.4%), third - to lip cancer (90.7%). The regions where the proportion of patients with TC detected at stages I-II is above the national average (92.4% - 2nd rank place) include the following regions. The leaders are our two megacities - the city of Astana (98.2%) and the city of Almaty (97.1%). Next come: Kyzylorda - 96.9%; Zhambyl - 96.0%; Karaganda - 94.9%; Aktobe - 94.6%; Atyrau and Turkestan - 94.4%; East Kazakhstan - 93.5% regions and the city of Shymkent (92.9%). Low rates of early diagnosis were recorded in Ulytau - 70.0% (the worst result in the country); Kostanay - 72.7%; Abay - 80.0%; Akmola - 80.4%; Zhetysu - 82.9%; North Kazakhstan - 90.8%; Almaty - 91.3%; Mangistau - 91.9%; Pavlodar - 92.1%; West Kazakhstan - 92.3% regions [14].

As is clearly seen from the above data, there is a very large spread in early diagnostic rates across

the country, from very good to thought-provoking. Of course, it is necessary to take into account migration processes and other factors affecting early diagnostic rates, but nevertheless, the results obtained give reason not to stop there, both for oncologists and endocrinologists, ultrasound diagnostic doctors, otolaryngologists, and general practitioners, since improving early diagnostic rates of malignant tumors has remained one of the main postulates and one of the main tasks of medicine in general, and continues to be relevant today.

The proportion of stage IV TC among all nosological forms of malignant neoplasms was 3.9%, and this is the 4th rank place after tumors of the central nervous system (2.5%), lip cancer (0.9%) and non-melanoma skin cancer (0.4%). In general, in 2023, the share of stage IV malignant neoplasms in the republic for the sum of all nosologies decreased from 12.58 to 11.7% (from 4790 to 4735 patients). As for the average republican indicator of the share of stage IV (3.9%), Aktobe, Atyrau, West Kazakhstan regions and the city of Astana stand out against this background - 0.0%. Then come: the city of Almaty (0.6%); East Kazakhstan (1.3%); Turkestan (2.8%); Kyzylorda (3.1%) regions. Akmola region is on par with the average republican indicator. Lower indicators are in: Kostanay region, where every fifth patient with this visually accessible localization was detected in the terminal stage of the disease (21.2%). Next in line were: Abay - 14.3%, Ulytau - 10.0%, Zhetysu - 8.6%, the city of Shymkent - 7.1%; North Kazakhstan - 6.2%, Mangistau - 5.4%, Karaganda - 5.1%, Pavlodar - 4.8%, Almaty - 4.3% and Zhambyl - 4.0% regions.

The morphological verification rate of the disease in the country was 97.0%. In 13 regions out of 20 this figure is 100% (Abay, Aktobe, Almaty, Atyrau, East Kazakhstan, Zhambyl, West Kazakhstan, Karaganda, Mangistau, Pavlodar and Ulytau regions, as well as the cities of Astana and Shymkent). The lowest figure is in Kyzylorda region (68.8%). Further down the list are Zhetysu (88.6%), Kostanay (93.9%), Akmola (96.1%), Turkestan (97.2%), North Kazakhstan (98.5%) and the city of Almaty (98.8%) [14].

The total number of patients with malignant neoplasms registered with specialized oncology organizations of the republic continued to grow and by the end of 2023 amounted to 218,186 people, with an increase of 6.0% compared to the level of the previous year (2022 - 205,822, +5.8%). The overall incidence rate of malignant neoplasms increased by 3.9%, from 1055.3 to 1096.4 per 100 thousand people. The growth of this indicator is due to both the increase in the incidence and detection of pathology, and the increase in the survival rate of cancer patients. In addition, statistical data on patients diagnosed with malignant neoplasms, who have been under observation for 5 years or more, and continue to be observed in 2023, showed that the number of patients under observation by oncological organizations of Kazakhstan for over five years continued to grow and at the end of the reporting year amounted to 117,616 people, with an increase of 6.2% (2022 - 110,790 people, + 6.6%) (form No. 7).

One cannot ignore such an important clinical aspect as the coverage in the Republic of Kazakhstan of special treatment for patients diagnosed with TC for the first time in their lives. In 2023, the number of hospitalizations for all nosological forms of malignant tumors in oncological organizations of the country amounted to 108,252 cases (2022 - 101,095), with an increase of 7.1% compared to the previous year, which is associated with a constant increase in the number of cancer patients, improvement of the standardization of oncological care, and the development of palliative and restorative services. At the end of 2023, the absolute number of TC patients who completed specialized treatment amounted to 560 people, continuing treatment - 414 patients. In percentage terms, the following results were obtained by methods and types of treatment. The overwhelming majority - 90.4% of patients received surgical treatment only, complex - 3.8%, combined - 2.1%, only radiation - 0.4%, only drug - 0.2%.

Further, regarding the five-year survival rate of patients. As for TC, at the end of 2023, 9901 people or 49.8 per 100 thousand of the population were registered at the dispensary (at the end of 2022 - 9121 patients or 46.8 per 100 thousand of the population, respectively); and this is a high 7th rank place among all nosological forms of malignant neoplasms.

At the same time, the mortality rate of the observed contingents in 2023 was 0.6%, as in the previous year.

The five-year survival rate of patients with TC was 63.8% in 2023, while in 2022 it was 64.6% [14].

Summarizing the above, we can conclude that with TC, despite the fact that this localization is visually accessible, despite the increased effectiveness of preventive examinations and fairly high rates of early diagnosis, a high number of people with this pathology is noted annually, and the five-year survival rate does not reach 65%. The scarcity, variability and veiled nature of symptoms, their similarity with various non-core processes, leads to the neglect and progression of the disease, even during dispensary observation. All this requires both oncologists and, first of all, primary health care workers and, of course, endocrinologists, ultrasound diagnosticians, otolaryngologists to increase the level of oncological alertness, inform the population about early symptoms that may indicate this pathology or the onset of

proliferative changes and conduct high-tech diagnostic measures, including for the purpose of differential diagnosis and, as a result, timely treatment. People from the risk group are recommended to visit specialized specialists annually and, if necessary, undergo an examination. An epidemiological assessment of the situation with TC in our country suggests that there are sometimes significant differences in the regions not only in incidence rates, but also in the parameters of early diagnosis and mortality from this pathology. In connection with the above, this pathology continues to be a serious problem of modern clinical oncology.

References

1. Klinicheskij protokol diagnostiki i lechenija "Zlokachestvennyye novoobrazovanija shhitovidnoj zhelezy» - Odobren Ob#edinennoj komissiej po kachestvu medicinskih uslug Ministerstva zdravooohranenija Respubliki Kazahstan ot 08 sentjabrja 2023 goda. – Protokol №189. – 22 s (In Russ.).
2. Grimm D. Recent Advances in Thyroid Cancer Research. *Int J Mol Sci.* 2022 Apr 22;23(9):4631. doi: 10.3390/ijms23094631.
3. Sung H., Ferlay J., Siegel R.L., Laversanne M., Soerjomataram I., Jemal A., Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J. Clin.* 2021;71:209–249. doi: 10.3322/caac.21660.
4. Horgan D., Führer-Sakel D., Soares P., Alvarez C.V., Fugazzola L., Netea-Maier R.T., Jarzab B., Kozaric M., Bartes B., Schuster-Bruce J., Dal Maso L., Schlumberger M., Pacini F. Tackling Thyroid Cancer in Europe-The Challenges and Opportunities. *Healthcare (Basel).* 2022 Aug 25;10(9):1621. doi: 10.3390/healthcare10091621.
5. Filetti S., Durante C., Hartl D., Leboulleux S., Locati L., Newbold K., Papotti M., Berruti A. ESMO Clinical Practice Guideline update on the use of systemic therapy in advanced thyroid cancer. *Ann. Oncol.* 2022;33:674-684. doi: 10.1016/j.annonc.2022.04.009.
6. Silva S.N. Special Issue: Genetic Perspectives in Thyroid Cancer. *Genes (Basel).* 2021 Jan 20;12(2):126. doi: 10.3390/genes12020126.
7. Luzon-Toro B., Fernandez R.M., Villalba-Benito L., Torroglosa A., Antinolo G., Borrego S. Influencers on Thyroid Cancer Onset: Molecular Genetic Basis. *Genes.* 2019;10:913. doi: 10.3390/genes10110913.
8. Iacobas D.A. Biomarkers, Master Regulators and Genomic Fabric Remodeling in a Case of Papillary Thyroid Carcinoma. *Genes.* 2020;11:1030. doi: 10.3390/genes11091030.
9. Macvanin M.T., Gluvic Z.M., Zaric B.L., Essack M., Gao X., Isenovic E.R. New biomarkers: prospect for diagnosis and monitoring of thyroid disease. *Front Endocrinol (Lausanne).* 2023 Jul 21;14:1218320. doi: 10.3389/fendo.2023.1218320.
10. Saenko V., Mitsutake N. Radiation-Related Thyroid Cancer. *Endocr Rev.* 2024 Jan 4;45(1):1-29. doi: 10.1210/edrv/bnad022.
11. Lukasiewicz M., Zwara A., Kowalski J., Mika A., Hellmann A. The Role of Lipid Metabolism Disorders in the Development of Thyroid Cancer. *Int J Mol Sci.* 2024 Jun 28;25(13):7129. doi: 10.3390/ijms25137129.
12. Luzón-Toro B., Fernández R.M., Villalba-Benito L., Torroglosa A., Antiñolo G., Borrego S. Influencers on Thyroid Cancer Onset: Molecular Genetic Basis. *Genes (Basel).* 2019 Nov 8;10(11):913. doi: 10.3390/genes10110913.
13. Chen D.W., Lang B.H.H., McLeod D.S.A., Newbold K., Haymart M.R. Thyroid cancer. *Lancet.* 2023 May 6;401(10387):1531-1544. doi: 10.1016/S0140-6736(23)00020-X.
14. Kaidarova D.R., Shatkovskaya O.V., Ongarbayev B.T., Zhylkaidarova A.Zh., Seisenbayeva G.T., Lavrentyeva I.K., Sagi M.S. Indicators of the oncology service of the Republic of Kazakhstan, 2023: statistical and analytical materials – Almaty: KIOR JSC, 2024. – 410 p.

CLASSIFICATION OF NORMAL AND PATHOLOGICAL ECG SIGNALS BASED ON DEEP LEARNING

Spartak Sirakanyan

National Polytechnic University of Armenia

Applied Mathematics and Informatics

Masters Degree Student

Abstract

The automatic classification of electrocardiogram (ECG) signals plays a crucial role in the early detection of heart diseases, particularly arrhythmias. In this study, we propose a method for classifying normal and pathological ECG rhythms using deep learning techniques, specifically Convolutional Neural Networks (CNN). We utilized the MIT-BIH Arrhythmia Database, focusing on recordings from patients with IDs ranging from 100 to 109. The ECG signals were preprocessed by segmenting them around annotated events, such as normal beats and arrhythmias. Each segment, consisting of 200 data points, was classified as normal (0) or pathological (1) using a simple feed-forward neural network. The model achieved an accuracy of 91% and an AUC-ROC score of 0.94 on the test set, demonstrating its ability to accurately distinguish between normal and abnormal heart rhythms. The results highlight the effectiveness of CNN-based approaches in ECG classification and emphasize the importance of segmenting ECG signals based on annotations for improved model performance. This approach offers potential for real-time, automated ECG analysis, which could assist healthcare providers in the early diagnosis and management of heart diseases.

Keywords: ECG, Deep Learning, Arrhythmia, CNN, Classification, MIT-BIH.

I. INTRODUCTION

Cardiovascular diseases are one of the leading causes of death in the world. ECG (electrocardiography) is the main method for diagnosing heart diseases, providing valuable information about the state of the cardiovascular system. However, ECG signal analysis requires highly qualified specialists, which makes the diagnostic process labor-intensive. With the development of deep learning and artificial intelligence technologies, new opportunities have emerged for automating the diagnosis of heart diseases using ECG. One of the most promising methods for classifying ECG signals is the use of convolutional neural networks (CNN). Unlike traditional signal processing methods, such as feature analysis using classical machine learning algorithms (e.g., SVM, KNN), convolutional neural networks can automatically extract the most important signal features, which significantly improves the accuracy and efficiency of classification. Scientific works have shown the effectiveness of using convolutional neural networks for classifying ECG signals, including [1], where a model for recognizing various types of arrhythmia was proposed based on the MIT-BIH database. This study demonstrated the high accuracy and reliability of deep learning models in the field of medical data analysis. The use of convolutional neural networks in ECG signal diagnostics has been demonstrated in [2],[3], where improvements in classification accuracy and speed compared to traditional methods were also demonstrated. However, despite the successes, there is still room for further improvement of the models and the need for adaptation to large data sets. In this study, a method for classification of normal and pathological ECG signals based on convolutional neural networks is proposed and tested on the MIT-BIH dataset, including patients with ID 110-119. We explore the application of this approach to improve the diagnosis of cardiac diseases and analyze the performance of the model.

II. METHODOLOGY

The aim of the study is to create a neural network based on annotated, labeled data that will predict whether a patient has cardiovascular problems or not. To solve the problem, the MIT-BIH Arrhythmia database was used, which includes ECG recordings with annotations denoting different types of heart rhythms. Each recording consists of the time and amplitude of the electrical activity of the heart, and the annotations contain information about events, such as normal rhythm and different types of arrhythmia. In this work, records of patients with IDs from 100 to 109 were used. An important point is that each annotation in the database indicates important moments in the ECG signal, such as the onset of a normal or pathological rhythm. These labels allow the signal to be divided into segments, which are then used to train the model. The following steps were performed to prepare the data:

1) *Data loading*: For each patient, the ECG trace and annotation were loaded, which indicates the locations where important events occur. These events can be either normal (e.g. normal rhythm) or pathological (e.g. arrhythmia).

2) *Segment formation*: For each annotated event (e.g. normal rhythm or arrhythmia), a fragment of the ECG signal was selected that includes 100 samples before and 100 samples after the event. Thus, each segment of 200 samples was used for further classification.

3) *Labels for classification*: Each segment was labeled as normal (label 0) or pathological (label 1) based on the annotation.

A neural network was built to classify the ECG segments. The model was a simple architecture with fully connected layers (Dense):

1) Input layer that accepts a segment of 200 samples.

2) Two hidden layers with ReLU activation functions.

3) An output layer with one neural cell that uses the sigmoid activation function for binary classification (normal or pathological).

The model was trained using the Adam optimization algorithm and the binary cross-entropy loss function.

III. RESEARCH RESULT

The model was trained on a sample of ECG segments obtained for patients with ID from 100 to 109. During training, high accuracy was achieved on the test sample, which confirms the ability of the model to distinguish between normal and pathological rhythms. Over 10 training epochs, the model achieved the following results:

1) Accuracy: 91%

2) AUC-ROC: 0.94

After training, the model was tested on data for patients with ID from 110 to 119 (Table 1). For each patient, the

percentage of pathologies among all segments was calculated. Based on this, the diagnosis for the patient (normal or pathological) was calculated.

Table 1

Percentage of pathologies according to ECG records (ID 110-119)

Record-ID	Status	Percentage of pathologies (%)
110	Norm	0.1
111	Norm	0.4
112	Pathology	95.4
113	Norm	0.3
114	Pathology	93.7
115	Norm	6.5
116	Norm	27.7
117	Pathology	99.9
118	Norm	4.4
119	Pathology	99.8

IV. CONCLUSION

This paper demonstrated successful classification of ECG signals using neural networks. The model showed high results in recognizing normal and pathological rhythms, which is confirmed by good accuracy and AUC-ROC labels. Dividing signals into segments and using annotations for classification allows for the effective use of machine learning methods in medical diagnostics, increasing the accuracy and speed of diagnosing heart diseases.

References

1. **Rajpurkar, P., et al.** (2017). "Cardiologist-level arrhythmia detection with convolutional neural networks." *JAMA Cardiology*, 2(11), 1-7.
2. **Zhang, Z., et al.** (2018). "ECG classification using deep neural networks." *IEEE Transactions on Biomedical Engineering*, 65(4), 773-779.
3. **Xie, L., et al.** (2020). "A review on the application of deep learning in ECG classification." *Journal of Healthcare Engineering*, 2020, 1-14.

Pedagogical sciences

ARTIFICIAL INTELLIGENCE CAPABILITIES: STRATEGIES FOR IMPROVING THE QUALITY OF CHEMICAL EDUCATION

¹Abdrasilova A.M.

¹ 2nd year Master's degree student of Zhetisu University named after Ilyas Zhansugirov

² Sydykbayeva S.A.

² Candidate of Pedagogical Sciences of Zhetisu University named after Ilyas Zhansugirov

Abstract

This article explores key strategies for using artificial intelligence technologies to enhance chemical education. It discusses the importance of integrated teaching methods, teacher retraining, and the automation of educational content. Recommendations are provided on the effectiveness of AI in teaching chemistry and future research directions.

Keywords: chemical education, artificial intelligence, integrated teaching, content automation, teacher retraining.

Introduction

Chemistry is a science that explains the main phenomena of nature and plays an important role in the development of modern technologies. In-depth mastery of this subject contributes to the development of students' scientific thinking and success in their future professions. However, the complex concepts and theoretical aspects of chemistry present many difficulties in teaching it. Therefore, there is an increasing need to introduce new, innovative methods of improving the quality of Education. In this context, artificial intelligence technologies are considered as an effective tool for modernizing the learning process. Artificial intelligence makes it possible to improve the education system by personalizing the educational process, adapting teaching methods and providing educational materials in accordance with the needs of students. Analyzing a large amount of data, he identifies the weaknesses of students, plans the educational trajectory and optimizes the content of Education. In addition, AI technologies contribute to increasing students' interest in the subject through the use of interactive tools.

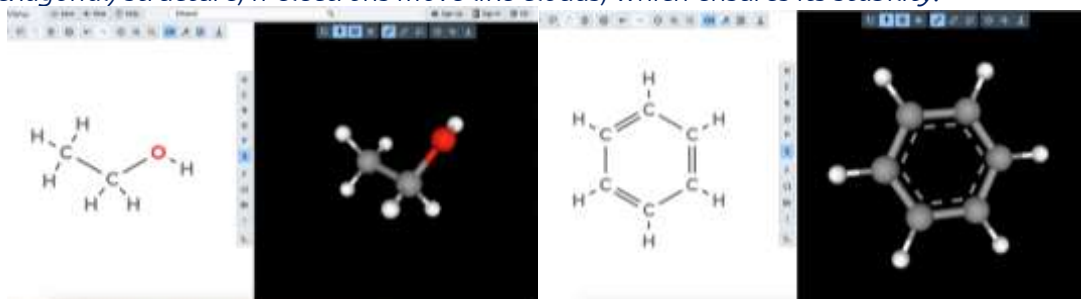
Main body.

Artificial intelligence creates personalized curricula, analyzing the pace and level of learning of students. This method makes the learning process of each student as efficient as possible. Tasks and exercises aimed at the individual needs of students allow you to better assimilate the material and correct weaknesses. Virtual laboratories allow chemical experiments to be carried out in a safe and comfortable environment. These tools help students develop practical skills and better understand laboratory work through visualization. In addition, virtual laboratories contribute to the saving of chemicals and the Prevention of dangerous reactions. 3D modeling of complex chemical processes with the help of artificial intelligence creates conditions for students to easily master the material. The process of interpretation is facilitated by Interactive representation of the dynamics of chemical reactions or the structure of molecules. Such visualization techniques increase students' interest in the subject and help them understand the practical essence of chemistry. MolView allows you to easily create and analyze molecular models in 3D modeling. Chatbots adapted for Chemistry help to promptly answer students' questions, provide the necessary information and consolidate educational materials. They facilitate the learning process by providing interactive exercises, tests and additional data on the interpretation of chemical concepts. Chatbots strengthen communication between teachers and students and contribute to the effective organization of the independent learning process. To improve chemical education, there is a need to combine artificial intelligence (AI) technologies with traditional methods. Integrated learning methods help students understand the material more deeply and simplify the learning process. This approach adapts to different learning styles of students and provides an easy and accessible interpretation of complex chemical concepts. In addition, teacher retraining is an important step for the effective use of AI technologies. Special courses and trainings for teachers allow them to master new technologies and actively use them in the learning process. Automation of educational content is another important strategy for improving the quality of Chemical Education. Automated systems analyze the level of knowledge of

students, providing them with adapted educational materials, and give them tasks accordingly. In addition, content automation increases the interactivity and accessibility of educational materials, which strengthens students' interest in the subject.

Practical work

"3D modeling of complex chemical processes with the help of artificial intelligence creates conditions for students to easily learn the material..." Study of form in space Ethanol: has an angular structure, due to the hydroxyl (-OH) group, the molecule can form hydrogen bonds. Benzene: has a smooth, hexagonal (hexagonal) structure, π -electrons move like clouds, which ensures its stability.



Using a 3D model, you can see the geometry of the molecule, the angles of contact and the position of the atoms. For complex molecules, 3D visualization allows you to better understand the mechanism of chemical reactions, interactions between molecules, and spatial isomerism. The use of the MolView platform helps to delve into the nature of chemical bonds and consider molecular structures from a spatial point of view. "AI technologies allow students to learn chemistry independently, which is especially useful for solving complex problems..."

Topic of the lesson: "Substance size and stoichiometric calculations. Solving chemical problems using artificial intelligence"

The purpose of the lesson: master the use of stoichiometric calculations of the amount of matter (moles), molar mass and mass. Chemical reports are generated using artificial intelligence (chatbot) and compared with the traditional method. Defines the efficiency and limitations of digital tools. Generating a report through a chatbot and comparing it with the traditional method.

Report: "How many moles of sulfuric acid are in 10 g of sulfuric acid (H_2SO_4) solution?"

Step 1: Solving the problem by the formula in the traditional way.

Step 2: Enter the report in the chatbot and analyze its response. **Step 3:** compare the chatbot response to the manually generated report. **Step 4:** if there is an error, identify it and fix it.

Цифрлық бағалау критерийлері:

№	Бағалау критерийлері	Дескрипторлар	Ұнай
1	Формуланы дұрыс қолдану	Зат мөлшерін анықтау формуласын дұрыс пайдаланады	1
2	Молярлық массаны есептеу	H_2SO_4 молярлық массасын дұрыс есептейді	1
3	Дұрыс есептеу	Қорытынды нәтижені дұрыс шығарады	1
4	Чат-боттың жауабын талдау	Чат-боттың шешімін дәстүрлі әдіспен салыстырып, қателерді анықтайды	1
5	Қорытынды жасау	Чат-боттың көмегі мен шектеулерін талдайды	1

Total score: 5

Students master the calculation of the amount of a substance, the determination of molar mass and the solution of chemical problems. Using a chatbot, they compare traditional and digital methods and evaluate the capabilities of artificial intelligence. Learning to use AI only as an auxiliary tool, he develops the skill of independent analysis. Conclusion The effectiveness of artificial intelligence technologies in chemistry is high. They help increase learning outcomes by personalizing the learning process, introducing interactive tools, and improving the quality of Education. AI allows you to simplify complex concepts in teaching chemistry, increase the interest of students and develop their practical skills. Future research should be aimed at further integration of AI technologies into the education system. These studies make it possible to develop new tools, improve methodologies for teachers and students, and improve the efficiency of the learning process. A deeper study of the possibilities of AI and the discovery of new ways to use them will contribute to further improving the quality of Chemical Education.

THE BENEFITS OF DEVELOPING SOCIO-CULTURAL COMPETENCE IN ENGLISH LESSONS

Faizulla B.A.

Supervisor: Kudaibergenova M.R.

PhD Candidate in Pedagogical Sciences, Associate Professor

Abstract

The importance of sociocultural competence in English language instruction is examined in this essay, with a focus on how it improves students' communication abilities, cultural sensitivity, and preparedness for the global community. Understanding cultural norms, beliefs, and behaviours goes beyond vocabulary and grammar to help learners interact correctly in a variety of situations. Through exercises like literature analysis, role-playing, and cultural exchanges, incorporating this competency into English classes promotes critical thinking, intercultural understanding, and student involvement. In keeping with the objectives of global citizenship education, it also prepares students for social, professional, and academic contexts. The development of socio-cultural competency can be successfully supported by creative teaching methods and inclusive classroom settings, even in the face of obstacles like restricted access to resources. In the end, adding cultural considerations to language instruction equips students to become skilled communicators and compassionate world citizens.

Keywords: socio-cultural competence, English language education, intercultural communication, cultural awareness, global citizenship inclusive education.

In the context of English language education, socio-cultural competence—the ability to navigate and appreciate diverse social and cultural contexts—has emerged as a crucial skill. This competence goes beyond grammar and vocabulary to include understanding cultural norms, values, and behaviors, enabling students to communicate effectively and appropriately in various contexts (Byram, 1997). Developing socio-cultural competence enhances students' linguistic abilities by aligning their communication with the cultural expectations of English-speaking communities. For instance, understanding idiomatic expressions and non-verbal cues such as gestures and tone can prevent misunderstandings and foster smoother interactions (Kramsch, 1993). Additionally, socio-cultural competence helps students grasp the pragmatic functions of language, such as politeness strategies and discourse conventions, which vary significantly across cultures.

One of the significant benefits of integrating socio-cultural competence in English lessons is the promotion of intercultural understanding. Exposure to diverse traditions, values, and societal norms through language lessons helps students appreciate different perspectives and challenge stereotypes (Hinkel, 1999). This not only broadens their worldview but also fosters empathy and inclusivity, essential traits in an increasingly globalized world. Activities such as role-playing, discussions on global issues, and exploring cultural artifacts like literature and films make lessons engaging and culturally enriching (Tomalin & Stempleski, 2013). For example, analyzing characters in English literature, such as Shakespearean plays or modern novels, can reveal cultural attitudes and historical contexts that influence language use and societal norms. By participating in such activities, students are encouraged to view culture as dynamic and multifaceted, rather than static or monolithic.

Socio-cultural competence also prepares students for real-world applications of the English language, such as in academic, professional, and social settings. Proficiency in English combined with cultural awareness equips learners to participate in international collaborations and adapt to multicultural workplaces (Canagarajah, 2013). For instance, students aiming to study abroad benefit from understanding cultural expectations in academic settings, such as classroom etiquette, citation practices, and communication with professors. Moreover, it aligns with the goals of global citizenship education by enabling students to engage in meaningful cross-cultural dialogues and contribute positively to international communities (Council of Europe, 2020). In professional environments, socio-cultural competence ensures that employees can navigate diverse team dynamics and communicate effectively with clients or colleagues from different cultural backgrounds, enhancing both personal and organizational success.

Another benefit of developing socio-cultural competence is its role in enhancing critical thinking and self-awareness. Comparing and contrasting cultural practices encourages students to reflect on their own beliefs and assumptions, fostering open-mindedness and analytical skills (Hofstede, 2001). For example, analyzing how different cultures approach social norms or ethical dilemmas can provide students with a nuanced understanding of global issues and improve their problem-solving abilities (Peterson & Coltrane, 2003). This reflective process also helps students recognize implicit biases and develop a more balanced perspective when encountering unfamiliar cultural practices. English lessons that incorporate debates, case studies, and intercultural simulations further promote these skills by challenging students to consider multiple viewpoints and justify their reasoning.

Finally, incorporating socio-cultural elements in English lessons increases students' motivation and engagement. Authentic materials like films, songs, and real-life stories make lessons dynamic and relatable, showing the practical relevance of language skills (Seidlhofer, 2011). For instance, watching English-language films with subtitles allows students to observe authentic conversational patterns, humor, and cultural references, which might not be evident in textbooks. Additionally, cultural exchange programs and virtual collaborations with peers from other countries offer experiential learning opportunities that reinforce socio-cultural competence and make language learning a transformative experience (Norton, 2013). Students who engage in such interactive activities often develop a sense of accomplishment and curiosity, motivating them to further explore the English language and its cultural dimensions.

To address the challenges of integrating socio-cultural competence into English lessons, educators need to adopt innovative teaching strategies and seek professional development opportunities. While some schools may lack access to authentic materials or cultural exchange opportunities, the internet provides a wealth of resources, such as virtual museum tours, online discussion forums, and international pen-pal programs. Teachers can also collaborate with colleagues in other countries to design joint projects that promote cross-cultural understanding. Moreover, fostering an inclusive classroom environment where students feel comfortable sharing their own cultural experiences and perspectives can enrich the learning process for all participants. Addressing these challenges ensures that socio-cultural competence becomes an integral part of English education, benefiting students both linguistically and personally.

By integrating socio-cultural competence into English education, students not only become proficient communicators but also empathetic and informed global citizens. This dual focus on language and culture prepares learners for the complexities of a globalized world, equipping them with the skills to navigate diverse contexts, build meaningful relationships, and contribute to intercultural dialogue. As educators continue to emphasize the importance of socio-cultural competence, they play a pivotal role in shaping a more connected and understanding global community.

Bibliography

1. Byram, M. (1997). *Teaching and Assessing Intercultural Communicative Competence. Multilingual Matters.*
2. Canagarajah, S. (2013). *Translingual Practice: Global Englishes and Cosmopolitan Relations.* Routledge.
3. Council of Europe. (2020). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Companion Volume with New Descriptors.* Cambridge University Press.
4. Kramsch, C. (1993). *Context and Culture in Language Teaching.* Oxford University Press.
5. Tomalin, B., & Stempleski, S. (2013). *Cultural Awareness.* Oxford University Press.
6. Hinkel, E. (1999). *Culture in Second Language Teaching and Learning.* Cambridge University Press.
7. Hofstede, G. (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations.* Sage Publications.
8. Norton, B. (2013). *Identity and Language Learning: Extending the Conversation.* Multilingual Matters.
9. Peterson, E., & Coltrane, B. (2003). *Culture in Second Language Teaching.* ERIC Digest.
10. Seidlhofer, B. (2011). *Understanding English as a Lingua Franca.* Oxford University Press.

MODERN APPROACHES TO EVALUATING THE EFFECTIVENESS OF FIELD TRAINING: THE POTENTIAL OF QUALIMETRY

Eshimbetova G.S.

PhD Student, Kazakh National Women's Teacher Training University
(Republic of Kazakhstan, Almaty, 050000, Aiteke Bi street, 99)

ORCID: <https://orcid.org/0009-0004-4341-3142>

Scientific advisor: **Baitasheva G.U.**

Kazakh National Women's Teacher Training University,
Institute of Natural Sciences, Department of Biology,
Almaty, Kazakhstan

ORCID: <https://orcid.org/0000-0002-1299-4896>

Abstract

This article explores modern methods for evaluating the effectiveness of field-based learning practices. Using qualimetric approaches, it examines the development of educational materials and the effectiveness of measuring field practice outcomes. The characteristics of the methodology, its advantages, and its role in improving the educational process are discussed. Additionally, the integration of qualimetry with modern educational technologies is considered.

Keywords: qualimetry, piloting, assessment.

Introduction

In the educational system, field-based practice represents a crucial stage that enables students to connect their theoretical knowledge with practical application. To accurately and objectively assess the effectiveness of this process, new methodological tools and approaches are required. In this context, qualimetry – a discipline offering scientifically grounded methods for measuring quality – holds particular significance.

Relevance of the Study

Modern educational standards are focused on shaping students' professional competencies. Tools for assessing the quality of field-based practice must enable comprehensive measurement of students' knowledge and skills. The instruments of qualimetry provide the means to address these tasks effectively.

Aim and Objectives of the Study

This study aims to explore the development and application of qualimetric methods for evaluating the effectiveness of field-based practice. The objectives include:

- Investigating the theoretical foundations of qualimetry.*
- Identifying the qualimetric methods used in field-based practice.*
- Analyzing the methods for developing and testing educational materials.*
- Practically testing the methodology.*

The modern educational system is a complex and multifaceted field that demands continuous improvement and innovation. Globalization processes, increasing digitalization, the rapid development of information technologies, and changing labor market demands require students to acquire not only theoretical knowledge but also practical skills and professional competencies. In this regard, field-based practice holds a special place in the professional development and formation of students at higher education institutions (Jusipova, 2020).

Field-based practice allows students to apply their theoretical knowledge in real working conditions. It is a process that deepens students' understanding of their chosen profession, helps develop professional values and skills, and facilitates adaptation to the future work environment. However, the question of how to evaluate the quality and effectiveness of this practical stage in a precise and objective manner remains a subject of constant concern for education professionals. This is because it is difficult to speak about the effectiveness of any practice without proper assessment or evaluation (Akmetova, 2021).

One effective solution to this issue is the application of qualimetric methods. Qualimetry is a science focused on measuring quality through quantitative and qualitative indicators. Although originally used in production and technical fields (Gavrilova, 1984), its methodological foundations are now being

widely applied in education. Educational qualimetry is a new scientific and practical direction that allows for assessing the effectiveness of teaching, the level of students' preparation, and the quality of the educational process.

For example, in pedagogical disciplines, during field-based practice, students' teaching skills, ability to work with a class, planning of the educational process, and level of reflection are assessed using a system of qualimetric indicators. Specially designed evaluation charts and scoring systems allow for a precise and systematic assessment of each action of the student. The effectiveness of this approach was proven in pilot studies conducted at Al-Farabi Kazakh National University, where students' pedagogical practices were evaluated based on 10 key criteria, each measured on a 5-point scale (Nurmanova, 2022).

Qualimetric evaluation can serve as the basis for decisions aimed at renewing the content of field-based practice, improving its organization and implementation methods, systematically evaluating the work of practice supervisors, and enhancing the quality of the entire educational process. Another advantage of this approach is that it allows for feedback on the educational process through the qualitative analysis of the evaluation results, thus providing opportunities to improve educational programs.

Furthermore, qualimetric methods open the door for developing innovative approaches aimed at fostering students' professional competencies. For example, tools such as the "Analytical Matrix of Evaluation" or the "Multicriteria Analysis Method" not only assess students' actions during their practice but also identify opportunities for their holistic development (Seitikulova, 2023).

In general, the use of qualimetry to assess field-based practice is a modern, scientifically grounded approach that responds to the new quality-based requirements of the educational system. The relevance of this research lies in the fact that measuring the effectiveness of a stage that bridges theory and practice contributes to improving the quality of education – a demand of our time. Therefore, introducing qualimetric methods to evaluate field-based practice is one of the innovative steps directed towards the future of education.

Main Section

Qualimetry is the science of measuring quality quantitatively [1, p. 115]. It encompasses methods used to assess and measure quality in various fields [3, p. 45]. In the educational sector, qualimetry provides tools for the comprehensive evaluation of teaching quality. Its foundation enables objective analysis and effective management of the educational process.

The main feature of qualimetry is that it measures quality through quantitative indicators. This method reduces the subjectivity of quality assessment and allows for more precise results.

Field-based practice is aimed at developing students' professional competencies. It links theoretical knowledge with practical skills, ensuring that students are well-prepared for real work environments.

Traditional methods used to assess effectiveness are often subjective, which negatively impacts the accuracy and reliability of evaluation results. Therefore, objective tools and methods are necessary.

The use of qualimetric methods can enhance the processes of developing educational materials for field-based practice. Indicators are defined that enable precise measurement of educational objectives.

Qualimetry ensures accuracy and precision in measurement [2, p. 89]. Such precision is achieved through the application of modern technologies [4, p. 78]. To achieve this, a system of evaluation criteria is created, with each criterion being described by specific quantitative indicators.

Qualimetric methodology allows for the assessment of students' knowledge and skills gained during field-based practice. Results have shown that this methodology enhances the level of objectivity.

The methodology enabled practice supervisors to assess students' achievements accurately and precisely, contributing to the improvement of the quality of education.

One of the advantages of qualimetric approaches is that they organize the evaluation process in a clear, systematic, and objective manner. This method allows for the comprehensive analysis of various aspects of teaching, such as content, methods, results, and the individual and professional development of students (Seitikulova, 2023).

For example, when assessing students' results in pedagogical practice, the following criteria are used in qualimetric measurements:

- Ability to apply theoretical knowledge in practice;
- Effective lesson planning;
- Organization of classroom management;
- Establishing feedback with students;
- Professional self-assessment and reflection levels.

1. Qualimetric Methods Used in Field-Based Practice

During field-based practice, several qualimetric methods and tools are used to evaluate students' achievements. These include:

- Evaluation Sheets (Checklists) – each action of the student is rated on a scoring system (e.g., 0 – not performed, 1 – partially performed, 2 – fully performed).
- Multicriteria Expert Evaluation Method – a comprehensive evaluation is carried out based on multiple criteria simultaneously.
- Coefficient-Based Evaluation Method – the importance weight (coefficient) of each criterion is taken into account to calculate the final score.

This translation maintains the academic and professional tone suitable for a scientific article.

Criterion	Weight Coefficient	Student's Score	Result	Criterion
Lesson planning	0.2	4	0.8	Lesson planning
Explanation skills	0.3	3	0.9	Explanation skills
Interaction with class	0.25	4	1.0	Interaction with class
Reflection	0.25	2	0.5	Reflection

In the example provided above, the overall result of the student is 3.2 on a 4-point scale. This method of evaluation provides fair, accurate, and comparable indicators.

As a practical example, during qualimetric studies conducted at the Girls' Pedagogical University, it was found that 90% of third-year students demonstrated their theoretical knowledge at an intermediate or higher level during practice. This evaluation scale consisted of 10 key criteria, and each criterion was assessed on a 5-point scale (Akmetova, 2021).

2. Trial Implementation and Effectiveness Validation of Qualimetric Methods

During the study, the qualimetric evaluation methods applied in field-based practice were tested across several student groups. This trial implementation aimed to:

- Determine the effectiveness of the evaluation forms;
- Develop students' critical self-reflection skills;
- Optimize the evaluation actions of teachers and practice supervisors.

The results showed that among the students evaluated based on qualimetry, professional confidence increased by 18%, and reflective thinking skills improved by 22%. Additionally, the clarity of the evaluation results greatly contributed to enhancing the feedback between the student and mentor, leading to an improvement in the quality of teaching.

The systematic implementation of qualimetry in field-based practice has a significant positive impact on the educational process. In particular, the interaction format between the student and teacher, as well as between the student and the mentor at the practice base, undergoes a fundamental transformation. Through qualimetric approaches, it is possible to accurately measure the dynamics of a student's development. For example, comparing the student's initial level of preparation before the practice and the outcomes at the end of the practice shows the effectiveness of the teaching results. After the introduction of qualimetry, teachers no longer limit themselves to giving an overall grade but can indicate the specific skills in which the student has succeeded and the areas that require further work. To achieve this, specialized electronic evaluation charts, interactive feedback forms, and portfolio-based monitoring methods can be used.

Example: After the practice, a feedback table for the student:

Criterion	Achievement	Area for Improvement	Recommendation
Lesson Structure	Well-organized	Ineffective use of time	Time-management exercises
Language Culture	Content-rich, clear	Voice stability	Articulation exercises
Feedback	Active with students	Low openness to critical feedback	Maintain a reflection diary

Conclusion

The use of qualimetric methods to evaluate field-based practice is a promising direction for improving the quality of education [5, p. 120]. The advantages of these methods contribute to the modernization of the educational process [3, p. 150]. The key benefits of these methods are objectivity, accuracy, and the ability to measure results quantitatively. In the future, there is a need to further develop and widely implement the qualimetric methodology in the education system. The results of the study show that qualimetric methods have great potential in assessing the effectiveness of field-based practice. These methods can serve as an effective tool for systematically evaluating the practice process, accurately determining students' professional competence levels, and improving teaching quality.

Qualimetric evaluation:

- Allows for objective assessment of students' knowledge;
- Analyzes the work of practice supervisors;

Improves the content of educational programs;

Facilitates the formation of a learning process focused on personal reflection and professional development.

Additionally, this method serves as a foundation for introducing a results-oriented management model in educational institutions. The quantitative and qualitative data obtained during the research will help educational institutions make scientifically grounded decisions to improve the system of training future pedagogical specialists.

Overall, field-based practice is a critical stage in the formation of a student's professional identity. Qualimetric methods, on the other hand, are reliable, evidence-based, and modern tools for evaluating this process.

References

1. Akhmetova, G. (2021). *Methodological foundations for evaluating students' professional practice*. Astana: Bilim Publishing.
2. Gavrilova, T. A. (1984). *Qualimetry in education: Theory and practice*. Moscow: Prosveshchenie.
3. Jusupova, A. (2020). *The role of practical training in the higher education system*. Almaty: Kazakh University.
4. Nurmanova, A. (2022). *The effectiveness of qualimetric assessment in field practice*. *Kazakh Education Journal*, (3), 45–49.
5. Seitkulova, D. M. (2023). *The importance of qualimetric methods in evaluating education quality*. Taraz: Pedagogika Publishing.

WAYS OF DEVELOPING THE INFORMATION AND COMMUNICATION COMPETENCE OF STUDENTS THROUGH THE USE OF INTERACTIVE METHODS IN TEACHING ORGANIC CHEMISTRY

¹ **Nurmatkyzy Zhasmin**

¹ 2nd year Master's degree student of Kazakh National Pedagogical University Abay, Almaty, Kazakhstan

² **R.K.Rahmetullaeva**

² Candidate of Chemical Sciences, associate professor of Kazakh National Pedagogical University Abay, Almaty, Kazakhstan

Abstract

The development of students' information and communication competence is increasingly recognized as essential in modern science education. In the context of teaching organic chemistry, interactive methods offer powerful tools to enhance student engagement, understanding, and skill development. This paper explores various interactive teaching strategies—such as problem-based learning, flipped classrooms, virtual labs, collaborative concept mapping, and peer teaching—that foster both subject mastery and the ability to effectively access, process, and communicate scientific information. By integrating technology and student-centered approaches, educators can create dynamic learning environments that promote critical thinking, collaboration, and digital literacy. The application of these methods not only enriches the study of organic chemistry but also prepares students for the demands of the information-rich, communication-driven world of modern science and industry.

Keywords: critical thinking, collaboration, digital literacy, problem-based learning, flipped classrooms, virtual labs, collaborative concept mapping

Introduction. Developing the information and communication competence of students through interactive methods in teaching organic chemistry is essential in fostering not only academic understanding but also essential skills for the 21st century. Here are several ways to achieve this:

Interactive group activities encourage students to share ideas and discuss organic chemistry concepts. This can include small group discussions or debates on specific topics like reaction mechanisms or the properties of organic compounds.

- **Peer Teaching:** Students can be assigned to explain particular topics to their peers, reinforcing their understanding while developing their communication skills.
- **Case Studies:** Present students with real-life applications of organic chemistry and ask them to work in groups to solve related problems or present solutions.

Use of Digital Tools and Educational Software

Incorporating technology can enhance interactive learning in organic chemistry by engaging students with multimedia resources and virtual laboratories.

- **Molecular Visualization Tools:** Software like ChemSketch, ChemDraw, or Avogadro allows students to visualize molecular structures, reaction mechanisms, and 3D models. This helps students better understand abstract chemical concepts.
- **Simulation Software:** Programs like PhET Interactive Simulations enable students to conduct virtual experiments, observe reactions, and manipulate variables in an organic chemistry lab setting.
- **Interactive Lectures and Gamification:** Incorporating gamification techniques into organic chemistry can make learning more engaging while improving students' information processing and communication skills.
- **Quizzes and Polls:** Tools like Kahoot or Quizizz can be used for instant feedback on students' understanding, making lectures more interactive and fun.
- **Competitive Team Games:** Organize friendly competitions or trivia games on organic chemistry concepts, fostering teamwork and problem-solving skills.

Moreover, the reduced volume of water has caused the formation of shallow water areas and seasonal wetlands, which further disrupt the habitats of numerous species. The ecological balance of the region is increasingly at risk, with potential long-term consequences for both wildlife and human populations.

Several local and international initiatives have been launched to address the ecological challenges facing the Syrdarya River in the Shieli region[4, p.23].

Water Management Reforms: There has been a growing push for better water management practices, including the modernization of irrigation techniques to reduce water loss. The introduction of more efficient irrigation systems, such as drip irrigation, has been identified as a solution to curb excessive water consumption and minimize the impact on the river's flow.

Pollution Control Measures: Governments and environmental organizations have started to focus on reducing industrial pollution through stricter regulations and better waste treatment systems. Increased monitoring of water quality and efforts to reduce pesticide and fertilizer use in agriculture are also part of the broader strategy to protect the river's health.

Conservation Projects: Several conservation efforts aim to protect and restore the river's ecosystems. For instance, wetland restoration projects have been initiated to improve habitats for migratory birds and aquatic life. Furthermore, there are ongoing research and conservation initiatives focused on the preservation of native fish species and the improvement of biodiversity along the riverbanks[5, p.78].

Wetland rehabilitation: Restoring wetlands along the Syrdarya River can help improve water filtration, stabilize the riverbanks, and provide habitats for migratory birds and fish species. Planting native vegetation along riverbanks can also help reduce erosion and increase biodiversity. Establishing buffer zones along the river, consisting of native plants and trees, can filter out pollutants, stabilize the soil, and provide wildlife habitats. These buffer zones can be implemented through both government and community-based programs.

Given that the Syrdarya flows through multiple countries, regional cooperation is essential for sustainable water management. Countries in the basin need to collaborate on setting water allocation agreements, managing transboundary water resources, and tackling pollution collectively[6]. Implementing joint monitoring programs to assess water quality and quantity across the Syrdarya basin can help identify trends and enforce regulations. Shared data on pollution levels, water flow, and biodiversity can inform policy decisions at both the local and regional levels.

Encouraging the adoption of less water-intensive crops, such as drought-resistant grains and legumes, could reduce the dependency on irrigation from the Syrdarya. This would allow more water to remain in the river and help restore its ecological balance[7, p.110].

Soil conservation practices like mulching, crop rotation, and cover cropping can reduce soil degradation and salinization, as well as improve overall soil health, which in turn would minimize runoff into the river.

Conclusion

The ecological state of the Syrdarya River in the Shieli region presents a complex and urgent challenge that requires coordinated efforts from governments, local communities, and international organizations. While there are promising signs of progress in addressing issues like water management and pollution control, much remains to be done to restore the river to a healthier state. Sustainable practices, improved water quality, and the protection of biodiversity are critical steps toward ensuring that the Syrdarya River continues to provide for future generations.

References

1. Akhmetov, A., & Kurmangaliyev, R. (2018). The impact of water use on the ecological state of the Syrdarya River. *Central Asian Environmental Journal*, 10(4), 223-240.
2. Aliev, M. S. (2017). Environmental challenges in the Aral Sea Basin: The case of the Syrdarya River. *Journal of Central Asian Ecology*, 22(2), 134-148.
3. Khan, A. H., & Zhumabekov, K. (2019). Pollution and its effects on water quality in Central Asia's rivers: A focus on the Syrdarya. *Environmental Research*, 27(1), 45-61.
4. Uzbekistan Ministry of Water Resources. (2021). *Integrated water resources management in the Syrdarya River Basin*. UNDP Report.
5. UNEP (United Nations Environment Programme). (2020). *Water quality in Central Asia: Current status and future prospects*. Environmental Policy Series. United Nations Publications.
6. World Bank. (2018). *Water resource management and sustainability in the Syrdarya River Basin*. World Bank Regional Reports.
7. Mukhambetov, B., & Rakhmatulina, L. (2020). Sustainable irrigation practices in Kazakhstan: Impacts on the Syrdarya River's flow and ecosystem. *Agricultural Water Management Journal*, 58(3), pp.109-110.

HISTOLOGICAL EXAMINATION OF THE NEUROBIOLOGICAL FOUNDATIONS OF SUICIDAL BEHAVIOR

¹Tolegenov Erasyl Zhandosulu

¹ 2nd year Master's degree student of L.Gumilyov Eurasian University

²Tataeva Roza Kabdygalievna

² Doctor of Medical Sciences, L.Gumilyov Eurasian University

Abstract

Suicidal behavior represents a complex and multifactorial phenomenon influenced by psychological, environmental, and biological factors. Among the biological determinants, histological examination of brain tissue has provided critical insights into the neurobiological underpinnings of suicide. This review synthesizes current findings from postmortem studies, focusing on structural, cellular, and molecular changes observed in individuals who died by suicide. Key brain regions implicated include the prefrontal cortex, anterior cingulate cortex, hippocampus, and amygdala—areas integral to emotion regulation, impulse control, and decision-making. Histological analyses reveal decreased neuronal and glial density, reduced expression of neurotrophic factors such as brain-derived neurotrophic factor (BDNF), and increased markers of neuroinflammation, including activated microglia and elevated cytokines. Alterations in neurotransmitter systems, particularly serotonergic, dopaminergic, and glutamatergic signaling, further underscore the neurochemical disruptions associated with suicidal behavior. Additionally, emerging evidence points to epigenetic modifications and altered gene expression profiles as contributors to suicide risk.

Keywords: neuroinflammation, hippocampus, serotonergic, dopaminergic, and glutamatergic signaling, epigenetic modifications, altered gene expression

Introduction

Brain regions implicated. Histological studies often focus on certain brain areas known to regulate emotion, impulse control, and decision-making: Prefrontal Cortex (PFC): Especially the ventromedial and dorsolateral PFC, which are involved in emotional regulation, social behavior, and planning. Suicidal individuals often show: Reduced glial cell density, altered dendritic spine morphology, decreased gray matter volume. Anterior Cingulate Cortex (ACC): Important for emotional processing. Histology may reveal: Reduced neuronal size and density; altered neurotransmitter receptor distribution

Amygdala and Hippocampus: These are involved in memory and emotion. Findings include:

Increased neuronal apoptosis in the hippocampus

Reduced volume and neuron density

Changes in synaptic connectivity

Astrocyte and microglia abnormalities have been observed in suicide victims.

Decreased GFAP (glial fibrillary acidic protein) expression suggests astrocytic dysfunction.

Neuroinflammation:

Increased levels of **pro-inflammatory cytokines** (e.g., IL-6, TNF- α) are noted.

Microglial activation is a hallmark of neuroinflammatory processes associated with suicide.

Neurotrophic Factors:

BDNF (Brain-Derived Neurotrophic Factor) is often decreased in suicide victims, especially in the hippocampus and PFC.

Altered TrkB (BDNF receptor) expression is also reported.

Neurotransmitter Systems

Histological and biochemical approaches often examine key neurotransmitter systems:

Serotonergic System:

Reduced serotonin (5-HT) receptor (particularly **5-HT1A**, **5-HT2A**) and transporter density in the PFC and brainstem.

Fewer serotonergic neurons in the **dorsal raphe nucleus**.

Dopaminergic and Noradrenergic Systems:

Altered expression of dopamine and norepinephrine transporters and receptors in limbic structures.

GABA and Glutamate:

GABAergic dysfunction, including decreased GABA receptor subunit expression.

Dysregulation of glutamatergic NMDA receptors, possibly linked to impulsivity and mood dysregulation.

Epigenetic Modifications and Gene Expression

Postmortem brain studies have found:

DNA methylation changes in suicide victims, especially in genes related to stress response (e.g., **NR3C1**, the glucocorticoid receptor gene).

Altered expression of microRNAs (miRNAs) that regulate gene translation.

Histological Markers in Suicide

Some commonly studied histological markers in suicide research:

Table 1

Commonly studied histological markers

NeuN (neuronal nuclei):	For neuronal density
GFAP:	For astrocyte integrity
Iba1:	For microglial activation
TUNEL assay:	To detect apoptotic cell death
BDNF/TrkB:	For neuronal plasticity
5-HT receptors:	For serotonergic signaling

Synthesizing results across several imaging studies, recent meta-analytical data reveal at least two, if not three, functional subdivisions within vmPFC: two anterior pregenual regions related to value/decision making and social cognition, respectively, and a posterior post-(sub)genual (or subcallosal) region related to emotion regulation and generation. A database-driven analysis of the subcallosal region by Palomero-Gallagher and colleagues including areas 25, subgenual area 24 and subgenual area 32 highlighted differences between these regions both in functional connectivity and behavioural domains. (In this analysis, both subgenual 24 and subgenual area 32 were associated with cognitive and emotional domains – however, whilst subgenual area 24 was associated with sadness (and taste), subgenual area 32 was associated with fear. Only area 25 did not appear to be associated with a behavioural domain although its functional connectivity co-activated selectively with an autonomic afferent processing network. Consideration should be given, though, to the positioning of this entire region above the orbits and the sinuses, making it prone to imaging artifacts and making localization of function within this region using neuroimaging particularly challenging.

Causal studies in animals, in which selective interventions of specific regions within vmPFC are investigated, should provide insight into these proposed functional subdivisions and their relationship to symptoms of MDD. But so far, progress has been hampered, in part by difficulties in determining cross-species anatomical and functional equivalence. This review sets out to consider some of the issues that are currently confounding the effectiveness of translational studies in the vmPFC. It first considers cross-species anatomical similarities and discrepancies within this region. It then focuses on one aspect of emotion regulation – the extinction of conditioned threat responses – that has been directly compared across studies of the vmPFC in humans, the common marmoset and rodents. Discrepancies arising from these comparisons are highlighted and discussed. A series of studies in the marmoset monkey are then summarized that further our understanding of this important region in relation to anhedonic and comorbid anxiety symptoms of MDD. We complete the review by highlighting lessons learnt that will facilitate the future of translational studies within vmPFC.

Conclusion

Key brain regions implicated include the prefrontal cortex, anterior cingulate cortex, hippocampus, and amygdala—areas integral to emotion regulation, impulse control, and decision-making. Histological analyses reveal decreased neuronal and glial density, reduced expression of neurotrophic factors such as brain-derived neurotrophic factor (BDNF), and increased markers of neuroinflammation, including activated microglia and elevated cytokines. Alterations in neurotransmitter systems, particularly serotonergic, dopaminergic, and glutamatergic signaling, further underscore the neurochemical disruptions associated with suicidal behavior. Additionally, emerging evidence points to epigenetic modifications and altered gene expression profiles as contributors to suicide risk. Collectively, these histological findings support a model in which suicidal behavior is rooted in disrupted neuroplasticity, impaired stress response, and neuroinflammatory processes. Understanding these cellular and molecular abnormalities may offer novel targets for prevention and therapeutic intervention.

References

1. De Müller-Ribeiro FC, F., Zaretsky, D. V., Zaretskaia, M. V., Santos, R. A. S., DiMicco, J. A., & Fontes, M. A. P. (2012). Contribution of infralimbic cortex in the cardiovascular response to acute stress. *American Journal of Physiology*, 303, R639–R650.
2. Murphy, F. C., Michael, A., Robbins, T. W., & Sahakian, B. J. (2003). Neuropsychological impairment in patients with major depressive disorder: The effects of feedback on task performance. *Psychological Medicine*, 33(3), 455–467.
3. Myers-Schulz, B., & Koenigs, M. (2012). Functional anatomy of ventromedial prefrontal cortex: Implications for mood and anxiety disorders. *Molecular Psychiatry*, 17(2), 132–141.
4. , W. C., & Price, J. L. (1998). Glial reduction in the subgenual prefrontal cortex in mood disorders. *Proceedings National Academy of Sciences, USA*, 95(22), 13290–13295.
5. Ongür, D., Ferry, A. T., & Price, J. L. (2003). Architectonic subdivision of the human orbital and medial prefrontal cortex. *Journal of Comparative Neurology*, 460(3), 425–449.

Philological sciences

SPECIFIC FEATURES OF TRANSLATING PHRASEOLOGICAL UNITS IN THE TV SERIES GOOD OMENS

Kruhliakova Kateryna

*Student of Odesa I. I. Mechnykov National University,
Odesa, Ukraine*

Grynko Olga

*PhD, Associate Professor, Faculty of Romance and Germanic Philology,
Odesa I. I. Mechnykov National University
Odesa, Ukraine*

ОСОБЛИВОСТІ ПЕРЕКЛАДУ ФРАЗЕОЛОГІЧНИХ ОДИНИЦЬ В СЕРІАЛІ "GOOD OMENS"

Круглякова Катерина Олегівна

*Студентка Одеського національного університету імені І.І.Мечникова
Одеса, Україна*

Гринько Ольга Сергіївна

*кандидат філологічних наук, доцент
Одеського національного університету імені І.І.Мечникова
Одеса, Україна*

Abstract

Phraseology, as a significant branch of linguistic science, examines fixed expressions with complex semantics that cannot be deduced from the literal meanings of individual words. Idioms and phraseological units play an essential role in language by performing various functions, such as stylistic, expressive, figurative, and cultural. The relevance of this research is determined by the increasing influence of audiovisual content—particularly TV series—on modern language acquisition and the spread of idiomatic expressions.

This article investigates the translation of phraseological units in the TV series Good Omens, based on the novel by Terry Pratchett and Neil Gaiman. The paper explores theoretical aspects of phraseology, including the classification of idioms according to structural and semantic features, as well as their functions in fictional texts. Special attention is given to the challenges of translating idioms from English into Ukrainian, taking into account their metaphorical and culturally loaded nature, which often resists literal translation.

The material for analysis includes 106 idiomatic expressions selected through continuous sampling from the series' script, which spans 12 episodes. The study employs a set of linguistic methods, such as contextual analysis, comparative analysis of source and target texts, descriptive method, and idiom identification techniques. As a result, several translation strategies are identified, including full equivalence, partial equivalence, descriptive translation, and various types of transformations.

The article consists of an introduction, two chapters (theoretical and practical), conclusions, and a bibliography. The practical value of this work lies in its potential application as a model for linguistic analysis of phraseological material in audiovisual discourse.

Анотація

Фразеологія як важлива складова лінгвістичної науки досліджує сталі словосполучення, що мають цілісне значення, не зумовлене прямими значеннями окремих слів. Фразеологізми виконують низку функцій у мові, зокрема стилістичну, експресивну, образну та культурно-маркерну. Актуальність теми цієї статті зумовлена зростаючим інтересом до аудіовізуального контенту, зокрема серіалів, як джерела сучасної розмовної мови та фразеологічного матеріалу. Об'єктом дослідження є фразеологічні одиниці, уживані в сценарії серіалу "Добрі передвісники" ("Good Omens"), а предметом – особливості їх перекладу українською мовою.

У роботі здійснено теоретичний огляд основних положень фразеології, розглянуто класифікації фразеологізмів за структурними та семантичними ознаками, а також

проаналізовано функції фразеологічних одиниць у контексті художнього твору. Значна увага приділяється викликам, які постають перед перекладачем під час передачі фразеологізмів, адже багато з них мають культурно специфічне забарвлення, метафоричність та емоційність, які важко зберегти при перекладі дослівно.

Матеріалом дослідження стали 106 фразеологічних одиниць, відібраних методом суцільної вибірки зі сценарію серіалу, що складається з 12 серій. У роботі застосовано комплекс методів: контекстуальний аналіз, порівняльний аналіз оригіналу та перекладу, описовий метод, метод фразеологічної ідентифікації. В результаті дослідження виявлено типові стратегії перекладу фразеологізмів, серед яких: повний еквівалент, частковий еквівалент, описовий переклад, трансформації та ін.

Стаття складається зі вступу, двох розділів (теоретичного та практичного), висновків і списку використаних джерел. Практична цінність роботи полягає в тому, що вона може бути використана як приклад лінгвістичного аналізу фразеологічного матеріалу в межах аудіовізуального дискурсу.

Keywords: phraseological units, translation, phraseological fusions, phraseological units, phraseological combinations, classification.

Ключові слова: фразеологічні одиниці, переклад, фразеологічні зрощення, фразеологічні єдності, фразеологічні сполучення, класифікація.

РОЗДІЛ 1 ОСНОВНІ ПОЛОЖЕННЯ ПРО ФРАЗЕОЛОГІЗМИ

1.1. ПОНЯТТЯ ФРАЗЕОЛОГІЇ ЯК ДИСЦИПЛІНИ

Вперше термін "phraseologie" (від грец. phraseos – вираз і logos – слово, вчення) використав Шарль Баллі. Вчений розглядав фразеологію не як окрему дисципліну, а лише як складову частину стилістики [4, с. 34]. Як самостійна лінгвістична дисципліна фразеологія виникла у 40-х роках ХХ ст. Основи теорії цієї науки заклав у тому числі й український мовознавець О.О. Потебня.

Тлумачний словник української мови дає таке визначення фразеології:

1) "Сукупність зворотів і висловів (словосполучень, речень), фразеологізмів, властивих тій чи іншій мові.

2) Розділ мовознавства, що вивчає усталені звороти мови, фразеологізми" [31].

Згідно Коптілову, фразеологія також досліджує особливості знакової функції фразеологізмів, їх значення, структурно-семантичну специфіку, що проявляється в основних ознаках фразеологічності. Вона вивчає природу лексичних компонентів фразеологізмів, їх синтаксичну та морфологічну структуру, характер синтаксичних зв'язків з іншими мовними одиницями, а також форми реалізації та модифікації, можливі для вільних аналогів фразеологізмів. [16, с. 78].

Фразеологізм - усталений зворот, стійке поєднання слів, що виступає в мові як єдиний, неподільний і цілісний за значенням вислів [31].

Гамзюк дає таке визначення фразеологізмам: "Фразеологізми – стійкі словосполучення, з повним або частковим переосмисленням значенням" [9, с. 34].

Кочерган підкреслює, що це готові сполучення слів, які не створюються в мовленні, як вільні словосполучення, а відтворюються: якщо мовець потребує вживання фразеологізму, він вилучає його, як і слово, у готовому вигляді зі свого фразеологічного запасу, а не будує його заново [18, с. 241].

Існує характеристика фразеологізмів як стійких відтворюваних поєднань слів різних структурних типів з одичною сполучуваністю компонентів, значення яких виникає при семантичному перетворенні компонентного складу [28, с. 355]. Фразеологізми виконують також і культурні функції, а не тільки мовну; фразеологічні одиниці за допомогою образів і метафор передають інформацію про навколишній світ і водночас передають культурні особливості країни [8, с. 13]. Більшість фразеологічних одиниць англійської мови - це фрази, автори яких втрачені для історії [26, с. 23].

Найбільш основними та універсальними ознаками фразеологізмів, за Коваленко, вважаються:

1) семантична транспозиція (значення складових частин фразеологізму не відповідає змісту всього виразу),

2) транспонування лексико-граматичного складу (граматичні та семантичні відносини між складовими частинами вільного, або навіть сталого словосполучення відрізняються від співвідношень між складовими частинами фразеологізму, які не створені за тією ж моделлю),

3) повторюваність (структура фразеологізму залишається незмінною незалежно від кількості використання; це неподільна одиниця з особливостями лексеми; можливі незначні зміни в структурі, хоча вони вважаються фразеологічними варіантами та структурними синонімами) [15, с. 161].

Детально експресивний потенціал фразеологізмів описаний у роботах О.І. Федорова, який пов'язував його з їхньою "конотативною сутністю" і стверджував, що фразеологізми створюються не для назви якогось нового явища, а для конкретизації та образно-емоційної оцінки предметів, явищ, якостей вже названих у мові [27, с. 14].

1.2. ФРАЗЕОЛОГІЧНА ОДИНИЦЯ ЯК ОБ'ЄКТ ВИВЧЕННЯ ФРАЗЕОЛОГІЇ

У мовознавстві існує багато визначень фразеологічної одиниці (ФО), хоча, незважаючи на велику кількість досліджень у сфері ФО, загальноприйнятого визначення і класифікації ФО не існує. Як справедливо зазначає Б. Ажнюк, ФО у реченні виступають одним членом, бо, на відміну від вільного словосполучення, у ФО лексичне значення мають не окремі слова, а все словосполучення в цілому [2, с. 47].

Складність і неоднозначність підходу до визначення терміна "фразеологізм" пояснюється тим, що фразеологія ґрунтується на образній когнітивній складовій мислення і залежить від контексту дискурсу [4, с. 13].

Стилістичне використання фразеологічних одиниць є природним способом відображення образного мислення. Необхідність вивчення вживаних фразеологізмів є очевидною, оскільки вони зберігають багатовіковий досвід народу та розвиток його культури. Образи, закладені у ФО, служать відображенням самобутності народу, тому фразеологізми зазвичай мають яскраво національний характер. Світогляд людини формується також на основі концептуального образу фразеологічних одиниць. Характерною ознакою фразеологічного концепту є те, що значення фразеологічної одиниці закодовано. Культурна цінність чітко простежується через фразеологічну репрезентацію, яка зумовлена прагненням чітко й образно відобразити певну думку та дати емоційну оцінку будь-якому явищу [20, с. 251].

Згідно Карпенко, існують три основні ознаки фразеологічних одиниць:

1) складеність (фразеологізми зазвичай багатослівні вирази; кількість компонентів може варіюватися від двоскладного словосполучення до речення у прислів'ях та приказках),

2) інституціоналізація (фразеологізми є умовними виразами),

3) семантична неясність або нерегулярність (значення фразеологізму не є сукупністю значень його складових) [14, с. 94].

До найзагальніших ознак фразеологічних одиниць відносять мовну стійкість, семантичну цілісність і роздільнооформленість [13, с. 21].

Г. Гак виділяє три групи фразеологічних одиниць:

1) фразеологічні одиниці класифікуючого характеру, що позначають приватні, видові категорії понять у співвідношенні з іменниками поза фразеологічною одиницею. Прикметники в таких фразеологічних одиницях несуть на собі ознаку класифікуючого значення, підкреслюють ознаки понять, які відрізняють їх від схожих, наприклад: "hard money" – "металеві гроші", "little finger" – "мізинець";

2) фразеологічні зрощення, наприклад: "fiery temper" – "неспримний норов", "brown study" – "глибока задумка";

3) фразеологічні єдності, наприклад: "blind alley" – "безвихідне становище", "narrow in the shoulders" – "який знає жарти" [2, с. 84].

Більшістю дослідників прийнятий розподіл фразеологічних одиниць на три типи: фразеологічні зрощення, фразеологічні єдності та фразеологічні сполучення [1, с. 368]. Розглянемо їх визначення:

Фразеологічні зрощення – неподільні стійкі семантичні одиниці, чиї значення не пов'язані з прямим і конкретним значенням їхніх компонентів. Зазвичай це словосполучення, що мають архаїзми, або вирази, чия метафоричність переважає первинне значення окремих слів у складі фразеологізму, тому в таких фразеологізмах неможливо вивести значення цілого із значення його компонентів. Реструктуризація або уточнення в таких фразеологізмах також неможлива. (Наприклад: "a fishy story" – "видумка") [18, с. 242].

Багато мовознавців, у їх числі Девід Пінто, відносять ідіоми до складу фразеологічних зрощень через їхню втрату внутрішньої форми і метафоричність [36].

Фразеологічні єдності – семантично неподільні і цілісні за значенням одиниці, які сприймаються мовцями асоціативно. Іншими словами, знаючи значення компонентів виразу, можна здогадатися про його загальний сенс. Синтаксично такі вислови не є вільними. (Наприклад: "to beat about the bush" – "ходити навколо"). Хоча фразеологічні єдності можуть бути замінені синонімічними фразеологізмами або словами, їхня неподільність не дозволяє змінити один компонент без втрати сенсу всієї одиниці.

Фразеологічні сполучення – сталі мовні звороти, які не є "безумовними семантичними одиницями", оскільки їх складові частини зберігають певну самостійність [2, с. 48]. Тобто, незважаючи на те, що кожне окреме слово має своє значення, одне із слів є основою, яка активує значення, яке утворюється тільки в цьому словосполученні. (Наприклад: "to go through fire and water" – "пройти крізь вогонь та воду")

Деякі мовознавці також виділяють четвертий тип фразеологізмів – **фразеологічні вислови**. Фразеологічні вислови – це сталі мовні звороти, які не піддаються семантичному поділу і складаються зі слів з вільним значенням, але у мовленні відтворюються як незмінні мовні одиниці. Вони належать до комунікативного типу, тобто є реченнями. Стійкі фрази різних структурних типів, що виконують різні семантичні функції, поділяються на такі види, як прислів'я, приказки, крилаті вислови тощо [29, с. 45].

У відчизняній інтерпретації, прислів'я – це народний вислів повчального характеру, який містить певне правило, здобуте на основі багатовікового досвіду [33, с. 30]. Приказки – короткі влучні образні вислови, у яких на висновок тільки натякається. Приказки відрізняються від прислів'їв тим, що знаходять своє остаточне вираження тільки у контексті. В англomовному ж трактуванні ці поняття дуже розмиті і навіть взаємозамінні (saying/proverb використовують як для прислів'їв, так і для приказок). Крилаті вислови – сталі словосполучення, часто вживані у мовленні, а також влучні вислови видатних осіб [33, с. 31].

У будь-якій мові питання класифікації ФО є актуальною лінгвістичною проблемою. У науковому дискурсі існує кілька типів класифікацій ФО, в основі яких лежить та чи інша головна класифікаційна ознака: структурна, семантична, історична, стилістична та ін. Лінгвісти класифікують фразеологізми за їх складом, походженням, видовою залежністю, фразеологічною аплікацією та іншими ознаками. Я. Баран розрізняє дві основні групи фразеологічних висловів: фразеологічні одиниці та ідіоми. За структурою він поділяє їх на одновершинні, двовершинні та багатoverшинні фразеологізми залежно від кількості знаменних слів [3, с. 82].

Отже, фразеологічні одиниці мають стійку структуру, семантичну цілісність і роздільнооформленість. Серед їх основних ознак виділяють семантичну транспозицію, транспонування лексико-граматичного складу та повторюваність. Різні вчені класифікують ФО за різними ознаками, але більшість виділяє три групи: фразеологічні єдності, фразеологічні сполучення і фразеологічні зрощення; деякі додають до цієї класифікації ще фразеологічні вислови.

РОЗДІЛ 2 ОСОБЛИВОСТІ ПЕРЕКЛАДУ ФРАЗЕОЛОГІЧНИХ ОДИНИЦЬ

2.1. ФРАЗЕОЛОГІЧНІ ОДИНИЦІ В СЕРІАЛІ "ДОБРІ ПЕРЕДВІСНИКИ"

Фразеологічні одиниці відіграють важливу роль у серіалі "Добрі передвісники", допомагаючи створювати яскраві і різноманітні образи персонажів, посилюючи гумористичний ефект або емоційне забарвлення сцен, створюючи атмосферу, відображаючи культурні контексти. Їхнє використання робить діалоги живими, цікавими і такими, що надовго залишаються у пам'яті глядачів.

Наприклад, назва кав'ярні героїні Ніни "Give me coffee or give me death" ("Кава або смерть") є відсиланнями на відомий патріотичний вислів політика та оратора часів Війни за незалежність США Патріка Генрі "Give me liberty or give me death" ("Свобода або смерть"), але підміна понять "liberty" та "coffee" надає йому зовсім іншого, гумористичного контексту. Вислови "between the devil and the deep blue sea" і "see you in Hell" у цьому фентезійному всесвіті, де Пекло і диявол – зовсім не міф і не вигадка, є не одними лише засобами створення магічної атмосфери: іноді вони вживаються як в переносному, так і в прямому значенні. Автори серіалу прикрашають мовлення своїх персонажів різноманітними англійськими ідіом і крилатих виразів, відображуючи багатий культурний контекст та одночасно наближуючи персонажів до глядачів. Таким чином вони будують ланку між вигаданим світом серіалу та реальністю, де ці фразеологічні одиниці використовуються в повсякденному житті. Нерідко поведінка персонажів піддається оцінці їхніх

друзів, ворогів чи просто пересічних громадян, і тоді сценаристи вкладають в уста героїв найрізноманітніші фразеологічні одиниці, аби передати їхнє ставлення, надати комусь характеристику або додати емоційного забарвлення сцені або діалогу. Наприклад, вислів Шакс "Roog Furfur really **flew off the handle**" додає драматизму сцені і підкреслює нервозність характеру демона Фурфура, а фраза Ніни "You're a **dark horse**, Mr. Fell" доводить, що янгол Азирафаїл здається дивним для його людського оточення.

Як було зазначено у теоретичному розділі, більшість вчених виділяє три типи фразеологізмів: фразеологічні зрощення, фразеологічні єдності та фразеологічні сполучення.

Загалом у дослідженні розглянули 106 фразеологічних одиниць, що є 100% загальної виборки, з них 9 є фразеологічними зрощеннями, що є 8.5% від виборки, 41 – фразеологічними сполученнями, що становлять 38.7% від загальної виборки і 56 – фразеологічними єдностями, що є 52.8% від виборки.

Табл 2.1

Типи фразеологічних одиниць в досліджуваному тексті

Типи фразеологічних одиниць	Кількість	%
Фразеологічні єдності	56	52.8%
Фразеологічні сполучення	41	38.7%
Фразеологічні зрощення	9	8.5%
Всього	106	100%

Проаналізувавши надану статистику, можна зробити кілька висновків щодо фразеологічних одиниць у досліджуваному сценарії. Перш за все, **фразеологічні єдності** виявилися найпоширенішим типом, становлячи 52.8% від загальної кількості прикладів. Це свідчить про те, що сценаристи надають перевагу використанню усталених виразів, значення яких можна зрозуміти з контексту і які мають певну асоціативність. Другий за поширеністю тип – **фразеологічні сполучення**, що становлять 38.7% від усіх прикладів. Це вказує на значну кількість виразів, де значення окремих слів частково зберігається, але одне зі слів є домінуючим у творенні значення. З найменшою кількістю прикладів (8.5%) у дослідженні є такий тип як **фразеологічні зрощення**, що підкреслює рідкісність використання неподільних стійких семантичних одиниць, значення яких не пов'язане з прямим і конкретним значенням їхніх компонентів.

Можемо навести приклади із досліджуваного тексту. У сценарії "Добрих передвісників" наявні такі фразеологічні єдності, як:

"On your head be it. I mean, I have warned you" (39). В серіалі фраза "on your head be it" використовується продавцем зброї, щоб підкреслити повноту відповідальності, яка лежить на Азирафаїлі.

"I'll be with you in two shakes of a lamb's tail" (39). Вураз "two shakes of a lamb's tail" означає дуже короткий проміжок часу.

"Well, you are a Whickber Street trader, Mrs. Sandwich. And a pillar of the community" (39). Вислів "a pillar of the community" підкреслює важливість людини для спільноти, частиною якої вона є. В контексті серіала, це сатиричний вислів, бо Азирафаїл неправильно розуміє професію місис Сендвич.

"It's time to remind our old friend that he's been fighting old battles for too long" (39). ФО "to fight old battles" означає "брати участь у вирішених конфліктах або даремно боротися за щось неактуальне" і підкреслює безглуздість дій демона Фурфура.

"What you did to the M25 was a stroke of demonic genius, darling" (38). Фраза "stroke of a genius" означає блискучу та інноваційну ідею, в контексті серіала це сатира на дуже незручну автомагістраль у Лондоні.

"Forget my own head next!" (38). Тут ФО "forget one's head" підкреслює обуреність Азирафаїла своєю забудькуватістю.

"You're dead meat, Crowley" (38). Використання фрази "dead meat" є ствердженням погрози Хастура і свідчить про небезпеку, заготовану для Кроулі.

Можна дійти висновку, що значення вищезазначених ФО зрозумілі в цілому, а не безпосередньо з окремих компонентів.

Прикладами фразеологічних сполучень є:

"It's the only thing that makes sense" (39). ФО "to make sense" використовується для зауваження, що щось є логічним, послідовним

"I'm in here and you're all acting... And I'm losing my fucking mind" (39). За допомогою ФО "to lose (one's) mind" Ніна виражає розгубленість і збентеженість дивною ситуацією.

"He's far too **pure of heart** to be anybody's bit on the side" (39). Використовуючи ФО "pure of heart" Кроулі підкреслює чистосердечність Азирафаїла.

"I'm going home and gonna **drink myself senseless** and **have a good cry** in an empty flat" (39). Автори серіалу використовують фразеологічні одиниці "to drink oneself senseless" та "to have a good cry" аби передати розчарований настрій Ніни.

"The one who **went native**" (39). Вислів "to go native" використовується, щоб підкреслити, що Азирафаїл повністю адаптувався до нового (земного) середовища.

"It's probably best if I start off **doing all the talking**" (39). Фраза "to do the talking" вживана Кроулі аби зауважити, що говорити першим повинен саме він.

Значення вказаних ФО можна вивести і зрозуміти з окремих слів.

Найменше у досліджуваному тексті **фразеологічних зрощень**:

"I trust we'll **tread a measure** together before tonight's Shopkeepers Association meeting is over" (39). Вислів "to tread a measure" використовує містер Браун із наміром запросити Ніну потанцювати з ним.

"Higher authorities **bend over backwards** in order to **maintain the status quo**" (39). Фрази "to bend over backwards" та "to maintain the status quo." використовує Шакс щоб довести до Кроулі, що керівництво Пекла докладє великих зусиль аби не допустити нового конфлікту у їхньому становищі.

"Those were the Ladies of Camelot, they're **the bees knees**" (39). Висловом "the bees knees" Азирафаїл високо оцінює таланти представниць танцювального гурту.

"Ooh, **the devil take it!**" (39). Вислів "the devil take it" підкреслює обурення Кроулі, але частково він також є і засобом передачі атмосфери, бо диявол у всесвіті серіалу – реальна особа.

В цих випадках значення неможливо вивести з окремих слів, і вирази є семантично неподільними.

2.2. СПЕЦИФІКА ПЕРЕКЛАДУ ФРАЗЕОЛОГІЧНИХ ОДИНИЦЬ

Переклад фразеологізмів – досить складне завдання. Оскільки фразеологія багата на образність, лаконічність, оригінальність та виразність, переклад вимагає багато часу. Фразеологічні одиниці мають велике значення для ораторської, художньої та публіцистичної мови. При відтворенні англійських фразеологізмів мовою перекладу перед перекладачем стоїть головне завдання: передати зміст та образ тексту. Якщо у мові перекладу немає аналога фразеологічної одиниці, перекладач намагається знайти приблизну відповідність [11, с. 62].

Розглянемо види перекладу більш детально. Відповідно до способів перекладу фразеологічних одиниць, існує розподіл на еквівалентний та безеквівалентний переклад. Еквівалентний переклад включає у себе повний або частковий еквівалент, а безеквівалентний переклад включає в себе описовий переклад та кальку [37, с. 100].

Фразеологічний еквівалент – це вид перекладу, який дозволяє повністю передати значення фразеологізму мовою перекладу. Якщо в мові перекладу є фразеологізм, який відповідає фразеологізму оригіналу своїми денотативними та конотативними значеннями, процес перекладу значно полегшується. Між відповідними фразеологізмами немає семантичних відмінностей, вони рівні стилістично, метафорично та мають однакове емоційно-експресивне забарвлення. Крім того, вони мають майже однаковий компонентний склад, лексико-граматичні показники, такі як сполучуваність, приналежність до однієї граматичної категорії та зв'язок з контекстними словами.

Квесилевич [17, с. 32] виділяє два типи фразеологічних еквівалентів:

1. Повні еквіваленти. Постійні рівнозначні відповідники, які є єдиним можливим варіантом перекладу, незалежно від контексту і які повністю збігаються за компонентним складом, значенням, образністю і граматичною структурою [35, с. 45].

Часто такі фразеологічні одиниці є інтернаціональними виразами, які походять від спільного джерела – міфів, біблії тощо.

Наприклад: "The apple of discord." – "Яблуко розбрату"

"The Holy of Holies." – "Свята святих"

"Blue blood". – "Блакитна кров" [10, с. 295].

2. Часткові еквіваленти, які мають незначні лексичні або граматичні відмінності та аналоги, адекватні за значенням, проте не ідентичні за компонентами [5, с. 209].

Часткові фразеологічні еквіваленти можна розділити на три групи:

До першої групи належать фразеологізми, які співпадають за значенням, стилістичним забарвленням та близькі за образністю, але різняться за лексичним складом:

"to scoop up water with a sieve" – "носити воду решетою";

"like water off duck's back" – "як з гусака (з гуски) вода";

"to turn on the waterworks" – "розплакатися, заплакати; проливати сльози".

До другої групи належать ФО, які співпадають за значенням, образністю, лексичним складом та стилістичному забарвленню, та різняться числом та порядком слів:

"a lot of water has flowed under the bridge since" – "чимало води уплигло";

"to water on one's mill-wheel" – "лити воду на млин";

"to plough the water" – "носити воду решетою".

До третьої групи належать фразеологізми, які співпадають за всіма ознаками, окрім образності.

"get into deep water" – "потрапити в халепу" [24 с. 156].

Фразеологічний аналог. На відміну від фразеологічного еквівалента, при доборі фразеологічного аналога в мові перекладу необхідно знайти фразеологізм, який має таке ж переносне значення, але базується на іншому образі [37, с. 98]. Під час перекладу, через відсутність еквівалента, вкрай важливо зберегти стилістичну та емоційну складову фразеологічної одиниці.

Приклади фразеологічних аналогів:

"To vanish into the air." – "Провалитися крізь землю."

"To kill two birds with one stone." – "Вбити двох зайців."

"Black sheep." – "Біла ворона" [10, с. 295].

Описовий переклад – це вид перекладу, при якому фразеологічна одиниця відтворюється за допомогою вільного словосполучення. Через ризик втрати характерних особливостей фразеологізмів, таких як метафоричність, експресивність, конотація та образність, перекладачі рідко застосовують цей метод. Він використовується лише тоді, коли в мові перекладу немає відповідних фразеологічних еквівалентів або аналогів [21, с. 65].

Приклади описового перекладу:

"To cross the floor of the House." – "Перейти з однієї політичної партії до іншої"

"White elephants." – "Тягар (марна власність, яку обтяжливо утримувати і від якої важко позбутися)" [12, с. 216].

"One man's meat is another man's poison." – "Про смаки не сперечаються" [25].

За академічним тлумачним словником, калькування – процес творення слів і словосполучень шляхом копіювання за зразком інших мов [30]. Він застосовується лише тоді, коли інші види перекладу не дозволяють точно передати семантико-стилістичне значення, образ або експресивно-емоційне забарвлення фразеологізму [22, с. 204].

Приклади калькування:

"To put the cart before the horse." – "Ставити воза попереду коня" [10, с. 124].

"One swallow does not make a summer" – "Одна ластівка не робить літа" [25].

"Do the business" – "Робити діло".

Існує також антонімічний переклад – вид перекладу при якому передається протилежне значення фразеологічної одиниці (негативне значення фразеологізму перетворюється на позитивну конструкцію) [32, с. 56]. Цей вид перекладу використовується коли в мові перекладу відсутнє слово, лексично тотожне слову оригіналу.

Приклад: "The woman at the other end asked him to hang on." – "Жінка на другому кінці проводу попросила його не класти трубку" [10, с. 295].

Комбінований переклад (або змішаний) – вид перекладу, в якому поєднуються транскрипція й транслітерація, транскрипція й описовий переклад, транслітерація і описовий спосіб та інше [7, с. 280]. Цей вид використовується тільки тоді, коли у мові перекладу неможливо в повній мірі передати значення фразеологізму мови оригіналу [7, с. 281].

Контекстуальний переклад (або контекстуальна заміна) є доцільним у тому випадку, коли перекладач не може знайти повний відповідник у мові перекладу. Тоді перекладачу необхідно підібрати такий український фразеологізм, який не є повним еквівалентом англійського фразеологізму, але влучно передає зміст у конкретному контексті [19, с. 48].

На відміну від калькування, буквализм – це переклад, який спотворює значення фразеологізму або копіює лексичну або граматичну структуру, тому перекладачі не застосовують даний вид перекладу [10, с. 295].

2. 3. СПОСОБИ ПЕРЕКЛАДУ ФРАЗЕОЛОГІЧНИХ ОДИНИЦЬ У СЕРІАЛІ.

Як було зазначено, за І. Корунцем існує 5 способів перекладу ФО: фразеологічний еквівалент, фразеологічний аналог, калькування, описовий переклад, контекстуальна заміна [17, с. 32].

Способами перекладу фразеологічних одиниць у серіалі "Добрі передвісники" є фразеологічний еквівалент (повний та частковий), фразеологічний аналог, та описовий переклад. Такі способи як калькування та контекстуальна заміна не були використані перекладачами.

Загалом у дослідженні розглянули 106 прикладів перекладу, що є 100% загальної виборки, з них 24 є частковими еквівалентами, що є 22,7% від виборки, 11 – повними еквівалентами, що становлять 10,4% від загальної виборки, 48 – фразеологічними аналогами, що є 45,2% від виборки, і 23 (21,7% від загальної виборки) відносяться до описового перекладу.

Табл 2.3.

Способи перекладу у досліджуваному тексті

Способи перекладу	Кількість	%
Часткові еквіваленти	24	22,7%
Повні еквіваленти	11	10,4%
Фразеологічні аналоги	48	45,2%
Описовий переклад	23	21,7%
Всього	106	100%

Аналізуючи надану статистику, можна зробити кілька висновків щодо способів перекладу у досліджуваному сценарії. Перш за все, **фразеологічні аналоги** виявилися найпоширенішим типом, становлячи 45,2% від загальної кількості прикладів. Вибір перекладачами цього способу пов'язаний із прагненням зберегти оригінальну стилістику, притаманну вихідним фразеологічним одиницям, за допомогою аналогічних українських ФО, знайомих відчизняному глядачу. Ці одиниці мають подібне значення, але можуть відрізнятися за формою. Другий за поширеністю тип – **часткові еквіваленти**, що становлять 22,7% від усіх прикладів. Вибір цього способу перекладачами пояснюється тим, що в українській мові не завжди є ідентичні за всіма компонентами відповідники для вихідних фразеологізмів. **Описовий переклад** також має значну кількість прикладів (21,7%). Це свідчить про великий відсоток у тексті оригіналу складних фразеологічних одиниць, значення яких не можна передати одним українським стійким виразом. З найменшою кількістю прикладів (10,4%) у дослідженні є **повні еквіваленти**, оскільки в англійській і українській мовах не так багато стійких виразів з однаковим компонентним складом, значенням, образністю і граматичною структурою.

Розглянемо приклади із досліджуваного тексту. Перекладачі "Добрих передвісників" використовували такі **фразеологічні аналоги**, як:

"An Archangel on the lam could have a wonderful time **in the back of beyond** and never be seen again" (39).

"Архангел може чудово собі розважатися там, **куди і ворон кісток не занесе і ніколи не бути знайденим**" (39).

Тут перекладачі замінили англійський ФО "in the back of beyond" на український аналог "куди і ворон кісток не занесе", який який має таке ж переносне значення "дуже далеко", але базується на іншому образі.

"I had a customer yesterday...such a **misery guts**" (39).

"Був у мене вчора один клієнт...ну просто як **чорна хмара**" (39). Перекладачі обрали фразеологізм "як чорна хмара" аби передати значення "похмура, невдоволена людина" із англійського ФО "misery guts".

"Oh... It's you. **Dear me**. Haven't seen you since... the flood?" (38).

"А, це ти. **Отакої**. Ми не бачилися із часів Потопу?" (38).

Перекладачі замінили фразу "Dear me" на український вигук "отакої", що також виражає подив і здивування.

"**Hugs and kisses, God**" (39). "**Цьомки-бомки, Бог**" (39).

В цьому випадку перекладачі використали український фразеологізм "цьомки-бомки", який передає аналогічне значення "hugs and kisses" у жартівливій формі.

В тексті зустрічаються такі **часткові еквіваленти**, як:

"**That's the spirit!**" (38). "**Оце так настрії!**" (38).

Ці фрази різняться кількістю слів, але збігаються за значенням, образністю та стилістичним забарвленням. Вони обидві використовуються для вираження схвалення або підтримки ентузіазму.

"See you in Hell" (39).

"До зустрічі в Пеклі" (39).

Ці вислови є однаковими за значенням, образністю та стилістичним забарвленням, але мають різну кількість слів.

"As you please" (38).

"Як бажаєте" (38).

Тут ФО різняться кількістю слів, але співпадають за значенням, образністю та лексичним складом. Вони обидві позначають згоду із будь-яким вибором іншої особи.

"It's for your own good" (39).

"Це для вашого блага" (39).

Ці ФО також різняться кількістю слів, але співпадають за значенням, образністю та лексичним складом. Вони використовуються у тому значенні, що щось робиться на користь іншої особи.

Ці приклади демонструють, як часткові еквіваленти дозволяють зберегти значення, образність та лексичний склад оригінальних виразів, навіть якщо вони відрізняються кількістю слів у перекладі.

Прикладами **описового перекладу** у досліджуваному тексті є:

"I didn't have another bit" (38). "Я більше нічого не придумав" (38).

Тут перекладачі передали зміст оригінальної фрази за допомогою вільного словосполучення, зберігаючи сенс, але не використовуючи фразеологічний відповідник.

"The one who went native" (39).

"Який цілковито адаптувався в середовищі" (39).

В цьому випадку перекладачі замінили ФО *"to go native"* на його дослівне значення, що означає *"адаптуватися в середовищі"*, у цьому випадку фраза набуває змісту, зрозумілого для українських глядачів.

"I know we ought to be talking about... It's probably best if I start off doing all the talking, you do all the listening" (39).

"Ми мусимо про це поговорити... Краще, якщо я почну, а ти слухай" (39).

Тут переклад виконано описово, передаючи загальний зміст і контекст фрази, але без збереження метафоричності, експресивності та образності.

Найменше у досліджуваному тексті **повних еквівалентів**. Їхніми прикладами є:

"Let there be light" (39).

"Нехай буде світло" (39).

Тут перекладачі замінили англійський ФО на його повний відповідник, який існує в українській мові. Обидва цих ФО походять із Біблії, де вони використовуються у контексті створення світу.

"You're still persona non grata" (39). "Ти досі персона нон грата" (39).

В даному випадку перекладачі використовували латинський вислів, який має однакове значення і в англійській, і в українській мовах - позначення небажаної особи.

"You're a dark horse, Mr. Fell" (39).

"Ви темна конячка, пане Фелле" (39).

Вираз *"темна конячка"* є повним відповідником англійського *"dark horse"*. Обидва фразеологізми використовуються для опису людини, яка щось приховує.

Значення цих виразів збігається в обох мовах, що дозволяє використовувати їх без змін у перекладі.

ВИСНОВКИ

Фразеологічні одиниці, виявлені в серіалі і досліджувані нами у цій статті, як і в цілому всі фразеологічні одиниці мови, є складними за своєю природою, мають стійку структуру, семантичну цілісність і роздільнооформленість. Враховуючи складність ФО, їхнє вивчення вимагає комплексного підходу. Фразеологізми є невід'ємною частиною будь-якої мови, відображаючи культурні, історичні та соціальні аспекти життя народу. Вони зберігають багатовіковий досвід і знання, які передаються з покоління в покоління. Завдяки фразеологізмам можна краще зрозуміти світогляд, цінності та традиції тієї чи іншої нації.

У серіалі *"Добрі передвісники"* фразеологічні одиниці відіграють важливу роль у створенні яскравих та різноманітних образів персонажів, посиленні гумористичного ефекту та емоційного забарвлення сцен. Вони роблять діалоги яскравими, а персонажів – живими та неповторними. В результаті дослідження тексту серіалу на основі зазначеної у теоретичній частині класифікації нами були виявлені всі представлені в ній типи фразеологічних одиниць. Найпоширенішими виявилися фразеологічні єдності (52.8% від загальної кількості). На нашу думку, це свідчить про те, що сценаристи надають перевагу використанню усталених виразів, які мають певну асоціативність. Найменш поширеними - (8.5%) виявилися фразеологічні зрощення, що підкреслює

рідкісність використання неподільних стійких семантичних одиниць, значення яких не пов'язане з прямим і конкретним значенням їхніх компонентів.

Переклад фразеологізмів є складним завданням через їхню образність, лаконічність та оригінальність. Виділяють п'ять основних способів перекладу ФО: фразеологічний еквівалент, фразеологічний аналог, калькування, описовий переклад і контекстуальна заміна.

Внаслідок проведеного нами дослідження було виявлено, що при перекладі фразеологічних одиниць серіалу "Добрі передвісники" використовувалися фразеологічні еквіваленти (повні та часткові), фразеологічні аналоги та описовий переклад. Найпоширенішим типом перекладу виявилися фразеологічні аналоги (45.2% від загальної кількості прикладів), що свідчить про те, що перекладачі прагнули зберегти оригінальну стилістику за допомогою використання аналогічних українських ФО, які несуть у собі образність та лексичний склад оригінальних виразів, навіть якщо відрізняються за формою. Найменшу кількість прикладів (10,4%) у дослідженні мають **повні еквіваленти**, оскільки в англійській і українській мовах не так багато стійких виразів, які є однаково вими за компонентним складом, значенням, образністю і граматичною структурою.

Таким чином, дослідження фразеологічних одиниць у серіалі "Добрі передвісники" демонструє важливість фразеології у створенні культурного контексту та емоційного забарвлення тексту, а також складність та багатогранність перекладу фразеологізмів з англійської мови на українську.

References

1. Ababilova N. M. *Classification of Phraseological Units in Domestic and Foreign Linguistic Studies. Scientific Notes of the National University "Ostroh Academy". Series "Philological": Collection of Scientific Papers / compilers: I. V. Kovalchuk, L. M. Kotsiuk, S. V. Novoseletska. Ostroh: Publishing House of the National University "Ostroh Academy", 2014. Issue 44. 368 p.*
2. Azhniuk B. M. *English Phraseology in Cultural and Ethnic Perspective / B. M. Azhniuk. – Kyiv: Naukova Dumka, 1989. pp. 47–84.*
3. Baran Ya. A. *Phraseology in the System of Language [Text]: Abstract of doctoral thesis in Philological Sciences: 10.02.15 / Ya. A. Baran. – Kyiv, 1998. p. 82.*
4. Baran Ya. A., Bilous O. M., Zymomria I. M. *Phraseology: Significant Values: Textbook for Students of Foreign Languages Faculties. Vinnytsia: Nova Knyha, 2008. pp. 13–34.*
5. Blashkiv O. V., Kovalchuk L. O. *Ways of Translating Phraseological Units from English into Ukrainian. Scientific Notes of Vinnytsia State Pedagogical University named after Mykhailo Kotsiubynsky. Series: Philology (Linguistics): Collection of Scientific Papers. Vinnytsia: LLC "Firm Planer", 2014. Issue 20. p. 209.*
6. *Dictionary of the Ukrainian Language. Academic Explanatory Dictionary (1970–1980). National Academy of Sciences of Ukraine; Webmezha. URL: <http://sum.in.ua/s/kaljkuwannja> – (accessed 28.04.2024).*
7. *Dictionary of the Ukrainian Language. Ukrainian Language and Culture Portal. Slovyk.UA. URL: <https://www.slovyk.ua/index.php> – (28.04.2024).*
8. Dubenko O. Yu. *Comparative Stylistics of English and Ukrainian: Textbook. Vinnytsia: Nova Knyha, 2005. p. 62.*
9. Forogh K. D. *Cross-cultural communication and translation. Translation journal. 2009. P. 45.*
10. *Fundamentals of Translation: Grammatical and Lexical Aspects: Textbook / ed. by V. K. Shpak. – Kyiv: Znannia, 2005. p. 156.*
11. Halynska O. M. *Linguocultural Information of English and Ukrainian Intertextual Phraseologisms: Monograph. Kropyvnytskyi, 2013. p. 13.*
12. Hamziuk M. V. *The Emotive Component of Meaning in the Process of Creating Phraseological Units (Based on German Material): Monograph. Kyiv: Publishing Center KDLU, 2000. p. 34.*
13. Hudmanyanyan M. P., Sitko A. V., Yenchewa H. H. *Introduction to Translation Studies: Textbook for Students of Philological Specialties of Higher Education Institutions. Vinnytsia: Publishing Center "Nova Knyha", 2017. pp. 124–295.*
14. Izhakevych H. P. *Stylistic Classification of Phraseologisms. Ukrainian Language and Literature at School. 1971. №10. p. 21.*
15. Karpenko O. V. *Comparative Lexicology of the Ukrainian and English Languages: Textbook for 3rd-Year Students of the Faculty "Translator-Referent" / National Ukrainian Academy, [Department of Germanic and Romance Philology]. Kharkiv: NUA Publishing House, 2018. p. 94.*

16. Kocherhan M. P. *Introduction to Linguistics: Textbook for Students of Philological Specialties of Higher Educational Institutions*. Kyiv: Akademiia Publishing Center, 2001. pp. 241–242.
17. Koptilov V. V. *Theory and Practice of Translation*. Kyiv, 1982. p. 78.
18. Korunets I. V. *Theory and Practice of Translation (Aspect-Based Translation): Textbook*. Vinnytsia: Nova Knyha, 2003. p. 32.
19. Kovalenko H. M. *Lexicology of the English Language: Textbook for Students of Higher Education Institutions*. Kyiv, 2011. pp. 159–161. Контілов В.В. *Теорія і практика перекладу*. Київ. 1982. с. 78.
20. *Main Ways of Translating Phraseological Units*. [Electronic resource] / Access mode: [<https://essuir.sumdu.edu.ua/bitstream/123456789/39226/1/Krevsun.pdf>].
21. *Modern Ukrainian Literary Language: Textbook for Students of Higher Educational Institutions* / S. O. Karaman, O. V. Karaman, M. Ya. Pliushch, et al. / ed. by S. O. Karaman. Kyiv: Litra LTD, 2011. pp. 30–31. Ch. Fernando On Idiom: Critical Views And Perspectives : [Exeter Linguistic Studies, 5 / Fernando Ch. Flavell R]. Exeter : University of Exeter, 1981. P. 21.
22. Nahorna M. *Main Ways of Translating Phraseologisms into Ukrainian*. Science. Education. Youth. Uman. p. 48.
23. Naumenko L. P. *Practical Course of Translation from English into Ukrainian: Textbook*. Vinnytsia: Nova Knyha, 2011. p. 65.
24. Novikova T. V. *Translation of Phraseologisms Through the Prism of Theoretical Research*. Scientific Notes of the National University "Ostroh Academy". Series: Philology, 2015. Issue 52. p. 204.
25. Oliinyk S. V. *Evaluative Phraseological Units in English and Ukrainian: A Linguocognitive Aspect: PhD thesis in Philological Sciences: 10.02.17* / S. V. Oliinyk. – Donetsk, 2008. pp. 72–89.
26. Pikhota I. S. *Genesis and Formation of English Phraseological Units*. Translation Innovations: Proceedings of the All-Ukrainian Student Scientific-Practical Conference. Sumy, November 25–27, 2010 / ed. board: S. O. Shvachko, I. K. Kobyakova, et al. Sumy: SumDU, 2010. p. 23.
27. Pinto David. *Identification of verbal phraseological units in Mexican news stories: Université Paris 13, Sorbonne Paris*, 2015.
28. *Scientific Bulletin of Uzhhorod University: Series Philology* / ed. board: H. Shumytska, N. Venzhynovych, et al. Uzhhorod: PP Danylo S. I., 2020. Issue 2 (44). p. 251.
29. Selivanova O. *Modern Linguistics: Terminological Encyclopedia*. Poltava: Dovkillia-K, 2006. p. 45.
30. Selivanova O. O. *Features of the Cognitive Projection of Syntactic Structures of Ukrainian Phraseologisms*. Bulletin of Lviv University. Lviv, 2004. Issue 34. Part I. p. 355.
31. Shchychlo L., Antipova A. *Structural-semantic Features and Translation Specifics of German Phraseological Units with a Colorative Component*. Philological Treatises, Vol. 12 (2). 2020. P. 103.
32. Sorokvashyna I., Yeriomenko S. V. *Features of Rendering Phraseologisms When Translating Literary Texts from Ukrainian into English*. Collection of Scientific Articles by Students and Teachers of the Translation Department. Odesa, 2019. p. 56.
33. Sveshnikova O. V. *Peculiarities of Translating English Phraseological Units into Ukrainian*. Applied Linguistics 2014: Problems and Solutions. Kyiv, 2014. pp. 11–14.
34. Venzhynovych N. *Space and Time in Ukrainian Phraseology: A Linguocultural Aspect*. Space and Time in Phraseology: Collective Monograph. Ljubljana: Znanstvena založba Filozofske fakultete, 2016. p. 165.
35. Volodina T. S., Rudkivskiy O. P. *General Theory of Translation for the First (Bachelor's) Level: Educational-Methodical Manual*. Kyiv: Publishing Center KNLU, 2017. pp. 280–281.
36. Zorivchak R. P. *Phraseological Unit as a Translation Category (Based on Translations of Ukrainian Literature into English) [Text]* / R. P. Zorivchak. – Lviv: Publishing House of Lviv University, 1989. p. 216.

Analysed sources:

1. (GO) Good Omens: Season 1. (2019). Amazon Prime Video:
https://www.primevideo.com/detail/0N4OPSBX6TV4Y1WU0O8ELH2D4T/ref=atv_dp_season_select_s1
2. (GO) Good Omens: Season 2. (2023). Amazon Prime Video
https://www.primevideo.com/detail/0Q7GFNBQ6IPO87MX4G4WD4GT4I/ref=atv_dp_season_select_s2

M. BULGAKOV'S NOVEL "THE MASTER AND MARGARITA" SEMANTIZATION OF COGNITIVES OF THE CONCEPT "DEPRIVATION".

Akhmetov Yersultan Abdrakhmanuly

Senior Lecturer

Ablayeva Raikhan Babaibekovna

Senior Lecturer

Bokhanova Aigul Serikbayevna

PhD of philology

International University of Tourism and Hospitality,
Turkistan, Kazakhstan

Abstract

Deprivative semantics basically contains a negative connotation, and the reader, perceiving the described event, introduces it into a certain social context, it seems necessary to study the perception of statements with deprivative semantics by the reading audience. This can contribute to the improvement of the used substantive and formal means, as well as the methods of presentation. At the same time, we believe that the identification of the semantics of deprivation and negation, as well as the interpretation of deprivative semantics in the context of opposition to the semantics of caritive, is unjustified. In addition, as a review of linguistic sources on this issue shows, in the works of scientists not only is there no clear distinction between the category of deprivation and semantically related categories, but its status in the paradigm of linguistic knowledge as a whole is not considered. The need for research, therefore, consists in affirming one of the views on the term "deprivation" within the discord of opinions, in other words, in bringing the term to uniformity.

Keywords: semantics, deprivation semantics, cognitive model, concept, verbal means, semantic category, deprivation, possessiveness, caritiveness.

Introduction. The modern cultural paradigm, defined as postmodern, is characterized by the leveling of the ambivalence of the boundaries of human existence: the boundaries between life and death, top and bottom, male and female, subject and object are erased, which inevitably leads to a model of a single-level reality and transforms postmodern human consciousness into a phenomenon of a single-level culture [1, p. 467]. Striving to abandon dual oppositions, postmodern consciousness primitively and even distortedly interprets the value system. In the context of this consciousness, evil is equated with good, which allows justifying a pragmatic approach to life based on evil. The idea of the fight against evil, which is the basis of the novel "The Master and Margarita", introduces dissonance into the designated cultural paradigm, and therefore is relevant for modern reality. The disease of the contemporary society, alien to the writer - the desire for material goods, for hoarding - is expressed as a fight against evil. It is led by the main character of the work, Woland, by depriving the money-hungry heroes of all benefits. Each separately described fragment of the text fits into the web of events and worlds organically united by the concept of "deprivation". The relevance of this study lies in the need to identify the cognitive structures that form this concept and determine their role in conveying the author's ideological intent. The obvious significance of this kind of analysis also lies in the possibility of rethinking the meaning of life in the modern era based on the text of the novel.

The purpose of this article is to identify verbal-semantic means representing the cognitive structures of the concept of "deprivation" and to substantiate the feasibility of their use.

Material and methods.

The factual material of the study was a complex of linguistic units conveying the semantic essences of cognitive structures as a basis for the formation of the concept of "deprivation". The sources of factual material were Mikhail Bulgakov's novel "The Master and Margarita". The novel is based on Bulgakov's understanding of the Catholic teaching on the imperfection of the original human nature, which requires active external influence to correct it [2]. This is exactly what Woland does, punishing guilty sinners by depriving them of everything they had illegally acquired, thereby eradicating evil as a social phenomenon.

To achieve this goal, the following scientific methods were used: a) the method of cognitive analysis was used to identify the cognitive structures that form the concept of "deprivation"; b) the method of semantic analysis - to identify linguistic units with deprivative semantics; c) the method of functional analysis - with its help, the functions of linguistic units in the text of the novel were determined; d) the philological method was used to identify the relationship between the degree of organicity of cognitive structures and the ideological concept of the novel.

The literature review was carried out in the cognitive and functional-semantic directions, taking into account the principles of analysis of a literary text. The ratio of the cognitive and semantic approaches to the word in their relationship is completely justified. In the scientific works of the last decade, in particular in the monograph of A.P. Babushkin and I.A. Sternin, this approach is interpreted as "new possibilities in the description of linguistic units" [3, p.3]. Cognitive and semantic analysis in their interaction in the interpretation of linguistic units is consistently adhered to in his studies by N.N. Boldyrev [4; 5]. The actualization of integrative processes in cognitive linguistics is evidenced by entire recent monographic studies, which present a spectrum of these processes in different aspects of their interpretation by scientists [6]. All this contributes to the development of a separate direction within cognitive linguistics, designated as cognitive semantics. According to the available data from scientific sources, at present it is successfully developing, including in foreign countries. In this context, the fact that, according to A.V. According to Khrenova, cognitive semantics includes, along with other theories, the theory of mental spaces, developed by J. Focanier, Ch. Colson, and others [7, p. 156].

The perception and comprehension of reality, its connection with language, its influence on language, on its speakers has been the object of research for many centuries by scientists whose works are devoted to linguaphilosophical research, the basis for which was laid by W. von Humboldt [8]. The knowledge accumulated on the basis of perception is formed into a picture of the world, and their comprehension forms cognitive models (cognitions), or structures of knowledge about the world. Of interest in this regard is the study of V.Z. Demyankov, who traces the language techniques of knowledge transformation [9].

The development of cognitive linguistics in recent decades has not, however, eliminated certain disagreements related to the types of cognitive models and their interpretation. Thus, the frame that dominates in the research of cognitive scientists has not yet received a uniform interpretation. A more optimal interpretation of this phenomenon seems to be O.N. Sanzharova, who, based on the classical studies of M. Minsky, considers it as a conceptual knowledge base [10]. In this study, we adhere to the established complex of cognitive models in cognitive science, which includes the following cognitions: frame, script, scenario, picture of thought and gestalt. These components form the framework for the formation of a conceptual picture of the world, represented by a set of concepts. The relationship between cognition and concept is realized in the process of linguistic-thinking activity, represented by the following levels: ontological, cognitive, mental, semantic, linguistic [11, pp. 37-38]. The product of the cognitive level are cognitive models (cognitions), and the product of the mental level are concepts. The above concept includes definitions of the concept, the most relevant of which are those of Yu.S. Stepanov [12, pp. 41-42], A.P. Babushkin and I.A. Sternin [3, pp. 7-10], M.V. Pimenova [13, p. 10] and others. Turning to the concept reflected in the language, researchers consider it as a particle of human consciousness and rightly emphasize that this phenomenon is formed outside of language. This idea is especially clearly conveyed in the formulation of E.S. Kubryakova: "A concept is an operational unit of memory of the mental lexicon, the conceptual system and language of the brain, the entire picture of the world, a quantum of knowledge" [14, pp. 90-92]. No less attention should be paid to the definition of the concept proposed by V.I. Karasik: "a multidimensional mental formation, which includes figurative-perceptual, conceptual and value aspects", "a fragment of a person's life experience", "experienced information", "a quantum of experienced knowledge" [15, p.71]. As follows from the above definition, priority is given to the formation of a concept based on subjective actions, knowledge and experience. This determines the identification of cognitive structures on which the concept of "deprivation" is based. The concept of "deprivation" contains deprivative semantics, which forms the category of deprivation. The problem of this category and related ones is outlined in the works of Vyach.Vs. Ivanov [16], N.N. Boldyrev [17], B.Ch. Bizhiov [18] and others. However, in the interpretation of these scientists, it is identified with caritive semantics, which is difficult to agree with. Deprivation, unlike caritivity, along with the semantics of non-possession, also conveys the semantics of causation of non-possession, that is, an indication of the reason for non-possession. In other words, causation acts as an obligatory feature of the category of deprivation: 'someone caused that someone else does not possess something' or

'something, some event caused that someone does not possess something'. We will schematically present the basic semantic structure of the category of deprivation as follows:

'x causes that y is deprived of and does not have z-a' [19].

The above provides the conceptual basis for this study, which is based on two main components: 1) the outlined interpretation of the concept and its cognitive structures; 2) the semantic interpretation of deprivative semantics.

Results and Discussion. The concept, as emphasized above, is formed in the human consciousness through a set of several cognitive structures. The deprivative semantics in Mikhail Bulgakov's novel is conveyed through the concept of "deprivation", which forms a set of individual worlds recreated by the writer, expressed through cognitive structures, or cognitions. In turn, these cognitions are semantized in the text of the novel through a semantic complex of linguistic and contextual means. Among the cognitions we have identified, the prevailing positions are occupied by: a) frame, b) script, c) scenario, d) picture of thought, e) gestalt.

a) *Frame*, according to N.N. Boldyrev, is a structure for presenting knowledge, a model of culturally conditioned knowledge that is common to most of society, that is, typified, recognizable by any member of society [17, p.31]. According to the collected material, this cognitive structure with the marker 'deprivation' is noted sporadically, which, in our opinion, is explained by the fragmentary presentation of the knowledge paradigm. Verbalization of the structure in question is carried out through the use of vocabulary in which deprivative semantics is traced in implicit form. Thus, addressing Ivan with a question about who the developer of the then Moscow was, the Master defines him with the word *crook*: Do you know what developers are? - ... This is a small group of crooks who somehow survived in Moscow. According to dictionaries, a *crook* is a thief, a petty swindler [20, p. 67]. Deprivative semantics in this case is expressed implicitly: defining developers with the word *crook*, the idea is embodied that by their actions they deprive people of comfortable housing.

The frame is most often used to state a specific fact. In the context of deprivative semantics, a typical example is the message that *Variety* is losing its administration: the entire head of the administration has disappeared. Other examples: (On the eve of Yeshua's execution) It seemed to Pilate that everything around had disappeared. The hated city was dead.

The factual nature of the frame limits its use in a fiction text, which is more characterized by an expanded character. This is embodied in the use of a set of frames that form a cognitive structure defined as a script.

b) *Script* is a cognitive structure formed by a set of frames and consisting of information accumulated through events experienced visually by real experience, through stereotypical information coming from childhood, or by carefully remembering the actions of other people [21, p. 20]. Since, like the frame, the script assumes the factuality of the presentation, then in the text of the novel the deprivative semantics is conveyed by verbs of the past tense in the aorist meaning, which function in a certain context: Berzoz was seized by an unreasonable, but such a strong fear, he wanted to run away immediately; Berzoz thought: "What is wrong with me? ... my heart is naughty ..., I'm overtired"; Berzoz's life developed in such a way that he was not accustomed to unusual phenomena; The Marquise, - muttered Koroviev, - poisoned her father, two brothers and two sisters because of the inheritance.

In the given illustrative material in the context of the marker 'deprivation', the last example is of interest, in which the reason for the subject's action is directly stated using the prepositional-case form with the causal preposition *because of*.

To present the aggregate information, the author also uses verbs of the present constant tense of the verb. The deprivative semantics is expressed by filling them with pejorative vocabulary, allowing them to express the vices inherent in the authorities, depriving them of their human appearance. It is interesting that in the novel, Woland's friend, addressing Styopa, uses verbs in the plural, thereby indicating their typical character: in general, they have been acting like pigs lately. They get drunk, have relationships with women, taking advantage of their position, do nothing, and can do nothing, because they do not understand anything about what they are entrusted with. They pull the wool over the eyes of the authorities. It is also necessary to pay attention to another very important function of verbs of the present constant tense of the verb: using them, the author points out the difficulty of eradicating the noted vices. In order to revive the events that happened in the past, the text uses the present descriptive tense of the verb. It naturally fits into the plot fragment when the ladies, deceived by Fagot, lose their outfits: they run out into the street in their underwear to the hooting of the crowd.

Meanwhile, causation as one of the categorical features inherent in deprivative semantics presupposes the development of cause-and-effect relationships in the text of the novel, which predetermines the cognitive structure most actively used in it in the form of a scenario.

c) Scenario is a cognitive structure of an event-based nature, containing a sequence of several events (episodes), consisting of development and movement, manifestations of the alternation of periods and events spreading in time and space [21, p. 20]. Since, like the frame, the script assumes the factuality of the presentation, then in the text of the novel the deprivative semantics is conveyed by verbs of the past tense in the aorist meaning, which function in a certain context: Berzhoz was seized by an unreasonable, but such a strong fear, he wanted to run away immediately; Berlioz thought: "What is wrong with me? ... my heart is naughty ..., I'm overtired"; Berlioz's life developed in such a way that he was not accustomed to unusual phenomena; The Marquise, - muttered Koroviev, - poisoned her father, two brothers and two sisters because of the inheritance.

In the given illustrative material in the context of the marker 'deprivation', the last example is of interest, in which the reason for the subject's action is directly stated using the prepositional-case form with the causal preposition because of.

To present the aggregate information, the author also uses verbs of the present constant tense of the verb. The deprivative semantics is expressed by filling them with pejorative vocabulary, allowing them to express the vices inherent in the authorities, depriving them of their human appearance. It is interesting that in the novel, Woland's friend, addressing Styopa, uses verbs in the plural, thereby indicating their typical character: in general, they have been acting like pigs lately. They get drunk, have relationships with women, taking advantage of their position, do nothing, and can do nothing, because they do not understand anything about what they are entrusted with. They pull the wool over the eyes of the authorities. It is also necessary to pay attention to another very important function of verbs of the present constant tense of the verb: using them, the author points out the difficulty of eradicating the noted vices. In order to revive the events that happened in the past, the text uses the present descriptive tense of the verb. It naturally fits into the plot fragment when the ladies, deceived by Fagot, are deprived of their outfits: they run out into the street in their underwear to the hooting of the crowd.

Meanwhile, causation as one of the categorical features inherent in deprivative semantics presupposes the development of cause-and-effect relationships in the text of the novel, which predetermines the cognitive structure most actively used in it in the form of a scenario.

c) Scenario is a cognitive structure of an event-based nature, containing a sequence of several events (episodes), consisting of development and movement, manifestations of the alternation of periods and events spreading in time and space [21, p. 20]. In the text of the work, the marker 'deprivation' is conveyed contextually, through statements of the event type: (Procurator Pontius Pilate to Yeshua): So it was you who incited the people to destroy the Yerusalem temple?; The tram covered Berlioz, and a dark object was thrown out onto the cobblestone slope under the grating of the Patriarch's Alley... It was the severed head of Berlioz; Several times he tried to run to the turnstile, but his legs did not obey him - something like paralysis happened to Bezdomny; (Ivan Bezdomny about himself) I went to swim in the Moscow River, well, they pulled my clothes back; (Women lose their clothes and buy French outfits) The last thing to disappear was a huge mountain of old dresses and shoes.

In addition, the scenario as a cognitive structure is embodied through the presentation of several interconnected fragments of the text. A striking example of this is the scene describing the arrival of the police to the house manager, who learned of the bribe. They take away the bribe he had received earlier and arrest him. Another example: (About a woman at Satan's ball who takes the life of her own child) when she was serving in a cafe, the owner somehow called her into the storeroom, and nine months later she gave birth to a boy, took him into the forest and put a handkerchief in his mouth, and then buried the boy in the ground.

In our opinion, we should especially highlight the event-based cognitive that has the marker 'deprivation', but does not contain a negative connotation. We are talking about the episode of the Master burning the manuscript of the novel, which is verbalized in the text by using verbs with the same 'deprivation': (The Master about himself) I took the heavy copies of the novel and draft notebooks out of the desk drawer and began to burn them. ... Familiar words flashed before me, the yellowness rose uncontrollably from the bottom up the pages, but the words still showed through it. They disappeared only when the paper turned black and I furiously finished them off with a poker. One cannot help but notice the imperfect meaning of the verbs used, which allows one to convey the duration and painfulness of the actions taken. It seems that this meaning plays the role of a positive beginning in relation to the possibility of depriving the novel of its existence. This correlates with the episode of Woland's appearance

with his famous phrase *Manuscripts do not burn*. This phrase contains the deepest ideological meaning of the novel: good always triumphs over evil. It also clearly shows the perspective of the meaning of life, for which purpose the text uses cognitive structures defined in cognitive science as a picture of thought.

d) A picture of thought is the most complex form of the concept formation operation. Thought stems from the artist's ability to fantasize, depict, and imitate [15, p. 21]. The presented definition indicates that the marker 'deprivation' in the cognitive structure under consideration should be conveyed using hypothetical semantics, verbalized in the future tense of the verb. As an example, we will cite the following dialogue: (Unknown to Berlioz) *They will cut off your head*. – Who exactly? Enemies? Interventionists? – Unknown: No, a Russian woman, a Komsomol member.

As we can see, the concept of 'deprivation' is conveyed in the first line by the verb *they will cut off* – the action of deprivation directed at object 1, which is Berlioz (object 2 – head). At the same time, the line is an indefinite personal sentence, and the subject of the action is revealed in the following lines: a Russian woman, a Komsomol member. Let us give a similar example: (Pontius Pilate to Yeshua) *And what did you say about the temple in the crowd at the market? – I, hegemon, said that the temple of the old faith will collapse and a new temple of truth will be created. Among other things, I said, ... that the time will come when there will be no power of either Caesars or any other power. Man will pass into the kingdom of truth and justice, where no power will be needed at all.*

In a number of cases, the perspective presented by the cognitive picture of thought is verbalized with the direct participation of the adjective extra, for example: (Woland to Styopa) *This is my retinue... And this retinue requires space, ... so that some of us are extra here in the apartment. And it seems to me that this extra is you!*

The semantization of the cognitive model under consideration with the marker 'deprivation' is also ensured by the participation of the prospective meaning. Thus, the reason for the supposed death of Berlioz, who because of this may lose his participation in the meeting of MOSSOLIT, is expressed by using the following constructions: the condition is revealed under which the supposed action will necessarily be realized in the future: *Annushka has already bought sunflower oil, and not only bought it, but even spilled it; (assumption about saving Yeshua from Matthew Levi) With great dexterity and very precise calculation, it was possible, bending over, to slip between two legionnaires, get to the cart and jump on it. Then Yeshua is saved from torment.*

The meaning of the assumption, leaving no doubt, is conveyed by contextual means, by describing the situation. In such cases, deprivative semantics is usually implicit: (Fagot during the performance of Woland's black magic) *This deck, dear citizens, is now in the seventh row of citizen Parchevsky, right between the three-ruble note and the summons to court in the case of paying alimony to citizen Zerkova. As follows from this example, the author, through his hero, sets out the negative action of the subject: the citizen is deprived of alimony, and the reason for this is Parchevsky, who evades paying them.*

The picture of thought as a cognitive structure is conveyed in the text by means directly correlating with its function, in particular, the phraseological combination was seized by the thought, and the meaning of the possibility of changing the situation from negative to positive - by the phraseological combination, including the verb *deprive*: *Here Margarita was seized by the thought that, in fact, she was in vain driving the brush so frantically. That she deprives herself of the opportunity to examine something properly, to revel in the flight properly.*

The marker 'deprivation' can be traced in statements containing verbs of desire such as *to wish, to want*, as well as verbs in the subjunctive or imperative mood, for example: (Levi) *wanted one thing, that Yeshua, who had never done the slightest harm to anyone in his life, would avoid torture; Follow me, reader! Who told you that there is no true, faithful love in the world? Let the liar's vile tongue be cut out!*

d) The semantization of the concept of 'deprivation' is also based on *gestalts* in the text of the novel. *Gestalt* is a cognitive structure that reflects a holistic multi-component image in the form of grouped sensory and rational elements [21, p. 21]. This image, as a rule, is built on existential semantics. Thus, the image of a part of Moscow is formed in the reader by describing the place where the action takes place. At the beginning of the novel, the description clearly paints a picture of unjustified deprivation: *Not only at the booth, but also along the entire alley parallel to Malaya Bronnaya Street, there was not a single person. At that hour, when it seemed there was no strength to breathe, when the sun, having heated up Moscow, was falling somewhere beyond the Garden Ring in a dry fog, no one sat on the bench, the alley was empty. Other examples: The pine forest on the opposite bank of the river, illuminated by the May sun an hour ago, became cloudy, smeared and dissolved. The water poured out of the window in a continuous veil. Of interest is also the gestalt in the form of the representation of the image of Jesus in Bezdomny's poem. As is known, Berlioz ordered an anti-religious poem from the poet Bezdomny, "but,*

unfortunately, did not satisfy the editor with it." Bezdomny outlined Jesus in black colors. However, Berlioz believes that the poem should be rewritten, because: the main thing is not what Christ was like, but that he did not exist as a person at all.

Particular attention should be paid to *gestalts* that predetermine other cognitive structures, primarily scenarios. The author outlines the image of the hero, allowing us to understand the motives of his negative actions in the future, aimed at depriving another person of something, for example: This twenty-year-old boy was distinguished by strange fantasies since childhood, a dreamer and an eccentric. One girl fell in love with him, and he went and sold her to a brothel.

Conclusion, findings.

The small number of linguistic studies on the problem of deprivation allows us to assert that the semantics of deprivation takes place in languages of both the inflectional and agglutinative types. In other words, it extends to different language systems, being embodied in them in linguistic units specific to them, organizing a functional-semantic field within their limits. This determines the fact that in this study the category of deprivation is defined as a semantic (conceptual) category.

The basis for its delimitation from related semantic categories is the categorical feature of causation. It is the causator that is the obligatory component of the basic semantic structure of this category. Therefore, despite its closeness in meaning to the categories of caritivity and non-possession (non-possession), it acquires an independent semantic status. At the same time, its interpretation as an oppositional component of the category of possessiveness is incorrect, since the latter, due to its semantic structure, is opposed primarily to the category of non-possession (non-possession). This determines the impossibility of describing the category of deprivation based on the principles inherent in the categories associated with it, and predetermines the methodology of our chosen study.

The description of individual linguistic units in the focus of theoretical calculations allows us to assert the fact that the semantic category of deprivation and the corresponding functional-semantic field have an independent status within the framework of functional grammar.

The concept as a phenomenon born and formed by human experience is preserved in the human mind and determines clearly formulated knowledge and information, playing an important role in the development of society. In this context, the role of the reproduction of the concept of "deprivation" in the novel "The Master and Margarita" is undeniable, since it conveys the ideological meaning of the work about the inevitable punishability of evil: Woland punishes, that is, deprives all sinners of what they have illegally acquired. The cognitive structures on which the concept of "deprivation" is based cover almost the entire spectrum of their potential. In the most optimal way, they form the deprivation semantics, conveying it through a complex of linguistic and contextual means, both implicitly and explicitly.

References

1. Khalina N.V. *Linguistics in the context of the postmodern paradigm: monograph*. - Barnaul: Publishing house of Altai. University, 2008. - 285 p.
2. Dunaev M.M. Analysis of M. Bulgakov's novel "The Master and Margarita" [bulgakov.lit-info.ru/kritika/dunaev-analiz-master-i-margarita.htm]
3. Babushkin A.P., Sternin I.A. *Cognitive linguistics and semasiology*. - Voronezh, 2018, 230 p.
4. Boldyrev N.N. *Cognitive semantics. Introduction to cognitive linguistics: lecture course*. - Tambov: TSU Publishing House, 2014. - 236 p.
5. Boldyrev N.N. *Cognitive approach in linguistics and related fields of knowledge // Issues of cognitive linguistics*. - 2020. - No. 2. - P. 5-25.
6. *Cognitive studies of language. Issue XXXVII. Integrative processes in modern linguistics*. - Moscow - Tambov - Nizhny Novgorod. - 2019.
7. Khrenova A.V. *Modern cognitive linguistics abroad. Main units of research // Bulletin of KemSU*. - 2014. - No. 1 (57), Vol. 1. - P. 156-161.
8. Humboldt W. von. *Selected works on linguistics*. - M.: Progress, 1984. - 398 p.
9. Dem'yankov V.Z. *On the linguistic techniques of "knowledge transfer" in the humanities // Issues of cognitive linguistics*. - 2015. - No. 4. - P. 5-15.
10. Sanzharova O.N. *Frame as a conceptual knowledge base and as a system of linguistic representation of knowledge // Bulletin of the St. Petersburg State University*. - 2015. - No. 91. - P. 12-16.
11. Zhumabekova A.K., Kilevaya L.T. *The structure of modern linguistics*. - Almaty: Ulakat, 2015. - 240 p.
12. Stepanov Yu.S. *Constants: Dictionary of Russian Culture*. - M: Languages of Russian Culture, 1997. - 824 p.

13. Pimenova M. *Introduction to cognitive linguistics. Issue 4.* – Kemerovo, 2004. – 208 p.
14. Kubryakova E.S. *On cognitive linguistics and the semantics of the word "cognitive" // VSU Bulletin, Series Linguistics and Intercultural Communication, 2001. Vol. 14.*
15. Karasik V.I. *Demonstratives in online discourse: interpretative aspect // Cognitive studies of language. Issue XXXVI.* – Tambov, 2019. – P. 214-222.
16. Ivanov Vyach.Vs. *Typology of deprivation (caritivity) // Ivanov Vyach.Vs., Maloshnaya T.N., Golovacheva A.V., Sveshnikova T.N. Studies in the typology of grammatical categories in Slavic and Balkan languages.* - M.: INDRIK, 1995. - P.5-59
17. Boldyrev N.N. *Conceptual space of cognitive linguistics // Issues of cognitive linguistics.* - 2004. - No. 1 (001). - P. 18-36.
18. Bizhoyev B.Ch., Khezeva M.R. *Semantics of zero quantity in the Kabardino-Circassian language: the main methods of representation // Philological sciences. Issues of theory and practice.* - 2023. Vol. 16. Issue. 10. - P. 3514-3521.
19. Bokhanova A.S. *The category of deprivation in economic discourse.* - Dissertation for the academic degree of Doctor of Humanities PhD. - Almaty, 2014. - 134 p.
20. Efremova T.F. *Modern explanatory dictionary of the Russian language.* - Moscow: Astrel, 2006.
21. Samekbaeva E. M. *Cognitive linguistics is an electronic tool.* - Semey: 2015.

Technical sciences

ELECTRONIC CADASTRE DATABASES AND CARTOGRAPHIC DATA IN THE CIS

Abdiyeva Meltem Tahir

*The College of Construction under the
Azerbaijan University of Architecture and Construction is a public legal entity
Baku city, I. Zulfalov street. 10*

Abstract

The scope of GIS includes the collection, accumulation, modeling, processing, and analysis of spatial data, as well as their visualization, usage, and delivery to users. It also involves the development of technical software, advancement of technologies for preparing electronic and digital maps, and the creation of relevant organizational structures. The establishment of specialized geographic information systems is essential for the provision of electronic services in the registration of property rights and the cadastre of real estate. The creation of such a system requires the establishment of a unified database, which is based on GIS.

Keywords: GIS, remote sensing, digital materials, attribute data, graphic models.

Cartographic data in GIS can be entered in both analog and digital formats.

- **Analog cartographic materials:** Created and displayed on a solid medium using various technical tools and devices.

- **Digital cartographic materials:** Transmit map data in the form of various numbers and codes. The general requirements for cartographic materials included in GIS are as follows:

- **Reliability:** Data must correspond to the current concept of reality.

- **Accuracy:** Requires the use of graphic material methods, along with selected projection types and coordinate systems.

- **Timeliness:** Data must be up-to-date.

Remote sensing (RS) data holds a special place among cartographic materials. Unlike standard cartographic materials, RS data have specific characteristics and requirements:

1. High operational efficiency in data acquisition (real-time capability).
2. Data redundancy.
3. The ability for automatic processing and recognition of images in RS materials.

Attribute (Semantic) Data

Attribute (semantic) data characterize the properties of an object with spatial connections. These properties can be described in several ways:

1. **Verbal (descriptive):** Data is conveyed in text form.

2. **Formal-logical:** These models are presented using mathematical formulas.

3. **Graphic objects or models:** Represented with attribute data, graphic models provide information characterizing the object. They can be presented in various forms, including statistical and dynamic formats (e.g., images, photos, videos).

4. **Audio indicators and sound data:** These are also utilized in GIS creation.

In terms of efficiency and effectiveness for inputting analog images, **tablet scanners** are preferred. These scanners minimize distortions in current analog cartographic data and offer extensive capabilities for processing raster images.

All modern GIS systems support direct loading from electronic and electro-optical devices. These data have reliability advantages compared to other maps.

Vector-shaped graphic objects are stored in coordinate systems or as formulas describing the positions of arcs and lines. The main stages of vector representation are as follows:

- **Point:** Represented using several coordinates. It is dimensionless.

- **Line:** Represented using two or more coordinates (based on the direction and length of the vector). It is one-dimensional.

- **Polygon:** Defined by coordinates and the angles of line breaks, with the first and last coordinate points being identical. It is two-dimensional.

Modeling the Environment in GIS

In GIS, modeling the reality of the environment is achieved by classifying real objects into layers.

In ArcView software, similar types of objects are connected to each other. During this process, descriptions are formed, and when these descriptions are interlinked, a project is created.

Databases and Data Banks

In volumetric GIS, there are at least two types of databases:

- **Cartographic databases**
- **Attribute databases**

Some meta-databases integrate projection systems, scales, coordinate systems, as well as textual, audio, and numerical data formats into a data bank. These meta-databases form the basis for making decisions about other data.

The database supports standard operations, such as data entry, editing, processing, storage, security, search, and presentation.

In general, relational models are used in all GIS systems. These models allow processing procedures to be carried out in the form of spatially-oriented data queries. The creation of a relational database based on GIS technology for cadastral tasks—such as data collection, systematization, and automated usage—leads to more effective results. Such a database enables the development of an automated system for collecting cadastral data and generating cadastral maps.

GIS Cartographic Features and Capabilities

The cartographic features and capabilities of GIS offer the following main advantages:

1. Easy-to-use interface.
2. Access to various types of data.
3. Tools for working with graphical data.
4. Extensive options for generating reports.
5. Broad capabilities for operational data updates.
6. Comprehensive data analysis using standard modules and algorithms, as well as creating and editing custom algorithms.
7. Ability to geocode data with address-based geographic coding.
8. Capability to establish close connections for all data formats.
9. Access to the database in client-server mode.
10. User-friendly tools for creating and editing graphical and textual data.
11. Customizable toolbar and an environment for creating user applications (Avenue).
12. Integrated data query systems.

The General Technological Scheme of Mapping in GIS (All Stages of Work for the Preparation of Electronic Maps)

1. **Map Design**-During the preparation of digital maps, the volume of work, labor time, and the resources required to achieve the final digital result (such as workforce, software lists, etc.) are initially assessed. The physical condition of the source material is determined, including the level of deformation, likelihood of folds or tears, information relevance, and the date of creation. Additionally, the parameters of the cartographic projection source are defined, and the source is detailed according to the intended purpose of the future map.

2. **Preparation of Tables and Layers**-The thematic layers of homogeneous objects are identified for the information stored in the maps. Attribute data stored in table format is then planned for each layer.

3. **Preparation of Map Legends**-After creating symbols, line thickness, and color shades are determined. While preparing the symbols, the program's existing symbols can be used, or new symbols can be designed.

4. **Digitization of Maps**-The sequence of digitizing map layers is determined, and digitization is carried out sequentially through vectorization using digitizers or scanners.

5. **Editing Digitized Maps**-Errors in graphic maps are identified and corrected.

6. **Conversion to Real Geographic Coordinates**-This stage involves converting the obtained digital maps into a real geographic coordinate system. Generally, software products include functions for transitioning from a spherical coordinate system to a rectangular coordinate system with various projections. To convert digitized maps into a real geographic coordinate system, it is essential to know the initial projection in which the map was created.

7. **Verification of Map Layers**-Geographic objects are stored by layers. As a result, errors may occur during repeated digitization of the same objects.

8. *Insertion of Attribute Data (Metadata)*-This step involves the preparation and description of maps (metadata such as projection parameters, sources, when and by whom they were created, etc.).

The result: Based on scientific literature and internet resources, the methods and models of GIS have been analyzed. The creation of a cadastral data database, as well as the creation and interconnection of tables within the database, has been examined.

Literature

1. Aliyev E.M. "The Current State and Development Trends of Conducting Real Estate Cadastre with the Application of Information Technologies." *Problems of the Information Society*, No. 2(6), 2012, pp. 75-84.

2. Aliyev E.M. "Issues of Drafting Cadastral Plans for Real Estate Objects Using Geographic Information Technologies and Automated Project Systems." *Problems of the Information Society*, No. 2(4), 2011, pp. 72-81.

3. Ismayilov A.I., Mehdiyev A., "Geographic Information Systems". Baku, 2011, 231 pages.

OPPORTUNITIES AND CHALLENGES OF DIGITALIZATION IN ENTERPRISES**Amirkhan Shakizan**Master's degree, Astana IT University
Astana, Kazakhstan**ВОЗМОЖНОСТИ И ПРОБЛЕМЫ ЦИФРОВИЗАЦИИ НА ПРЕДПРИЯТИЯХ****Амирхан Шакизан**Магистр, Астана ИТ Университет
Астана, Казахстан**Abstract**

This article discusses the problem of digitalization of work processes at manufacturing enterprises. It describes the key areas in which digital technologies have a positive impact on the efficiency of production activities: forecasting and analytics, logistics management, personnel control and remote equipment maintenance. Special attention is paid to the main obstacles to digital transformation, including employee resistance, high implementation costs, integration problems with legacy systems, cybersecurity threats and a shortage of skilled IT professionals. The text argues that digitalization is not simply a shift to electronic documents, but a profound business process redesign that requires strategic thinking and adaptation. The conclusion substantiates the need for a long-term digital strategy and continuous development as the basis for the competitiveness of enterprises in the modern economy.

Аннотация

В данной статье рассматривается проблема цифровизации рабочих процессов на производственных предприятиях. Описаны ключевые направления, в которых цифровые технологии оказывают положительное влияние на эффективность производственной деятельности: прогнозирование и аналитика, управление логистикой, контроль персонала и удалённое обслуживание оборудования. Особое внимание уделяется основным препятствиям на пути цифровой трансформации, включая сопротивление сотрудников, высокую стоимость внедрения, проблемы интеграции с устаревшими системами, угрозы кибербезопасности и дефицит квалифицированных ИТ-специалистов. Текст аргументирует то, что цифровизация — это не просто переход на электронные документы, а глубокая перестройка бизнес-процессов, требующая стратегического мышления и адаптации. В заключении обоснована необходимость долгосрочной цифровой стратегии и постоянного развития, как основы конкурентоспособности предприятий в современной экономике.

Keywords: digitalization, manufacturing enterprises, automation, personnel management, cybersecurity, digital transformation, integration of IT systems, resistance to change.

Ключевые слова: цифровизация, производственные предприятия, автоматизация, управление персоналом, кибербезопасность, цифровая трансформация, интеграция ИТ-систем, сопротивление изменениям.

Главной тенденцией всех бизнесов, услуг и предприятий является необходимость переводить многие внутренние рабочие процессы на цифровые платформы. Если раньше можно было полагаться исключительно на человеческий фактор и ручное управление, то сегодня конкурентоспособность определяется способностью предприятия эффективно внедрять современные технологии. В производственной сфере цифровизация особенно важна, так как позволяет значительно повысить контроль над каждым этапом работы и снизить расходы на простои и ошибки. Однако переход к цифровому формату имеет свои подводные камни и проблемы, о которых мы поговорим в данной статье.

Прежде всего, предприятиям важно понять, зачем вообще нужна цифровизация и что конкретно она может улучшить в их производственных процессах. Основной целью любого производства всегда остаётся минимизация затрат и увеличение эффективности.

Современные цифровые технологии предоставляют для этого мощные инструменты: от управления ресурсами и прогнозирования непредвиденных ситуаций до контроля над соблюдением техники безопасности. Если говорить простыми словами, цифровизация позволяет руководству видеть и контролировать всё предприятие буквально на одном экране, быстро реагировать на изменения и избегать возможных потерь. Далее, определим какие возможности цифровизации существует.

Первой и самой очевидной причиной внедрения цифровизации является прогнозирование и аналитика. Используя специализированное программное обеспечение и технологии больших данных (big data), предприятие способно не только анализировать текущие показатели, но и предсказывать возможные сценарии развития событий (Lee, Bagheri & Kao, 2015). Например, цифровые системы могут вовремя оповестить сотрудников о возможном отказе оборудования, сбоях поставок сырья или даже падении спроса на продукцию. Это значительно уменьшает риски и позволяет предприятию своевременно скорректировать свою деятельность, избежав больших финансовых потерь.

Второе важное направление цифровизации – это управление снабжением и логистикой. Внедрение цифровых систем позволяет автоматизировать планирование закупок, оптимизировать складские запасы и мониторить поставки в режиме реального времени (Christopher, 2016). Например, если система видит, что сырья осталось на несколько дней, она автоматически формирует заказ на пополнение запасов и даже выбирает поставщика с наилучшими условиями. В результате предприятие избегает лишних затрат и задержек производства, минимизируя влияние человеческих ошибок на цепочку снабжения. Простота в контроле, но важность в стабильности.

Третья область, которая сильно выигрывает от цифровых решений – это управление персоналом и обеспечение производственной безопасности. Современные системы контроля и управления способны фиксировать не только время прихода и ухода сотрудников, но и уровень их производительности, частоту нарушений правил безопасности и даже физическое состояние работников (Smith & Carayon, 2020). Конечно, на территории Республики Казахстан последнее является идеальной мечтой, но сейчас уже практикуется анализ сотрудников на нарушение через умные камеры. По правде говоря, это обычные камеры хорошего разрешения, подключенные к программному обеспечению на базе ИИ, которое распознает людей в рабочей зоне. Далее, при фиксации нарушения, создается файл с названием нарушения, именем сотрудника и таймкодами. (Это один из вариантов работы по контролю работ). Благодаря этому на заводе снижается общее количество нарушений и их игнорирование, также и оберегает сотрудника и работодателя от возможных последствий.

И, наконец, четвёртое перспективное направление – удалённый контроль и обслуживание оборудования. Это особенно актуально для предприятий, где установлены дорогостоящие и высокотехнологичные станки с числовым программным управлением (ЧПУ). Сегодня возможно осуществлять постоянный мониторинг состояния оборудования и своевременно выявлять неисправности на самых ранних стадиях (Jeschke et al., 2017). Более того, специалисты по ремонту и обслуживанию могут дистанционно диагностировать проблемы и, при необходимости, оперативно вмешиваться в работу оборудования. С данной возможностью можно запланировать ремонт и обслуживание оборудования в удобные сроки, вне рабочего времени. Таким образом, снижается время простоя и расходы на обслуживание.

Однако многие предприятия, начиная процесс цифровизации, сталкиваются с серьёзными проблемами, которые существенно усложняют этот переход. Главным заблуждением о цифровизации остаётся мнение, что это всего лишь замена бумажных документов электронными копиями. Надо понимать, что процесс цифровизации продолжителен и может быть осуществлен в любой форме рабочих и бизнес-процессов. На самом деле, это гораздо более глубокий процесс, требующий изменения всей внутренней структуры предприятия и подхода к ведению бизнеса. Далее мы поговорим о пяти ключевых проблемах, вызывающих наибольшие сложности при внедрении цифровизации.

Одной из главных и наиболее сложных проблем при внедрении цифровых технологий является сопротивление сотрудников к изменениям. На первый взгляд может казаться, что оцифровка рабочих процессов — это исключительно техническая задача, однако практика показывает, что именно человеческий фактор становится ключевым барьером в реализации таких проектов. Работники, особенно старшего поколения, долгое время выполняли свои задачи определённым образом, и любое изменение привычного порядка воспринимается ими негативно.

Это связано не только с привычкой, но и с чувством неуверенности в своих силах при работе с новыми, часто сложными системами и программами. По данным исследований McKinsey, около 70% всех проектов цифровой трансформации сталкиваются с активным или пассивным сопротивлением со стороны сотрудников, что может приводить к задержкам в реализации или даже полному провалу внедрения цифровых инициатив (McKinsey & Company, 2020). Кроме того, сопротивление вызвано опасениями работников потерять своё рабочее место или столкнуться с понижением в должности в связи с автоматизацией процессов. Эти страхи не беспочвенны: автоматизация действительно приводит к сокращению некоторых рабочих мест, особенно на рутинных операциях. Однако, как показывает практика, успешные предприятия стараются перепрофилировать сотрудников на новые роли и проводить дополнительные тренинги, чтобы адаптировать их к цифровой среде. Например, известный автомобильный концерн Volkswagen активно внедряет цифровые технологии в производственные процессы и при этом регулярно организует курсы переподготовки для персонала, чтобы минимизировать стресс и снизить сопротивление изменениям (Volkswagen Group, 2021). Руководству компаний важно понимать, что даже переходя на машинное производство, главное правило остается в силе «Бизнес - это люди».

Ещё одна важная и часто встречающаяся проблема цифровизации — высокая стоимость внедрения современных технологических решений. Особенно остро это чувствуется на крупных заводах и предприятиях, которые уже много лет работают с устаревшим оборудованием. Согласно отчету Boston Consulting Group, предприятия производственного сектора в среднем расходуют от 5% до 10% своего годового бюджета на цифровую трансформацию, при этом значительная часть этих инвестиций приходится на первоначальные затраты, связанные с заменой или модернизацией оборудования и инфраструктуры (BCG, 2022). Такие вложения могут быть критичными для финансовой подушки предприятия, особенно если они происходят в период экономической нестабильности или снижения спроса на продукцию. Однако высокая стоимость не должна становиться абсолютным препятствием на пути цифровой трансформации. Одним из решений этой проблемы является поэтапное внедрение цифровых технологий с постепенным распределением расходов на несколько лет. Также полезной практикой является использование облачных решений и моделей Software as a Service (SaaS), что позволяет существенно снизить начальные затраты. Например, компания Siemens предлагает промышленным предприятиям облачные платформы для сбора и анализа данных, которые не требуют значительных инвестиций в серверную инфраструктуру и оборудование (Siemens AG, 2021). Кроме того, компании должны чётко расставлять приоритеты и концентрировать инвестиции на тех процессах, где цифровизация принесёт наибольшую отдачу в кратчайшие сроки.

Третья значимая проблема — это интеграция новых цифровых систем с уже существующими решениями на предприятии. Существует множество примеров где предприятия уже давно используют программные комплексы и IT-системы, которые были разработаны несколько десятилетий назад. Попытки интегрировать в них современные цифровые решения часто приводят к техническим сбоям, простоям и даже потере данных, что значительно увеличивает стоимость и сложность проектов цифровизации. Согласно исследованию Deloitte, около 45% предприятий сталкиваются с существенными проблемами при интеграции новых цифровых платформ с устаревшими системами управления, что вынуждает их нести дополнительные расходы на перепрограммирование и адаптацию (Deloitte Insights, 2020). Чтобы избежать подобных проблем, предприятиям рекомендуется заранее проводить глубокий аудит своих текущих систем и выбирать только те цифровые решения, которые изначально имеют хорошую совместимость с существующими технологиями. Также важным моментом является наличие профессиональной технической команды, способной оперативно решать возникающие проблемы интеграции. Например, такие компании как Bosch и General Electric успешно проводят цифровизацию благодаря тщательному планированию интеграции и предварительным испытаниям новых решений в контролируемых условиях (General Electric Digital, 2020).

Существует также проблема кибербезопасности. С переходом на цифровые технологии предприятия становятся уязвимыми для кибератак, утечки данных и потери конфиденциальной информации. По данным компании IBM, в 2023 году средний ущерб от одной успешной кибератаки на промышленное предприятие составил более 4 миллионов долларов, что подчёркивает серьёзность угрозы (IBM Security, 2023). Чем глубже предприятие

интегрируется в цифровую среду, тем важнее становится обеспечение надёжной защиты данных и систем. Для минимизации рисков кибератак необходимо системно подходить к вопросу информационной безопасности: проводить регулярные проверки безопасности, своевременно обновлять программное обеспечение, использовать многоуровневую защиту и внедрять строгие политики безопасности для всех сотрудников предприятия. Последнее является наиболее проблематичным и имеет определение "Социальная инженерия", метод манипуляции сознанием человека для получения данных доступа. Это также приводит нас к последней проблеме - Некомпетентность сотрудников.

Недостаток квалифицированных специалистов, способных эффективно управлять процессами цифровой трансформации. Около 75% производственных предприятий испытывают острый дефицит IT-специалистов и аналитиков данных, что существенно тормозит процессы цифровизации (Gartner Report, 2021). Эта проблема особенно остро стоит в странах, где не развита система подготовки IT-кадров, или программы для повышения квалификации. Решением этого вопроса может стать создание собственных программ обучения специалистов, партнерства с университетами и инвестиции в повышение квалификации уже работающего персонала. В многих странах, и в Казахстане в том числе, практикуется обязательная стажировка при компаниях. Там студенты получают рабочий опыт и налаживают первые рабочие связи. Зачастую, после обучения, студент идет работать на то самое предприятие, в котором проходил практику только потому, что он/она уже знаком со всеми обязанностями и коллективом.

Если суммировать все выше перечисленное, становится ясно: цифровизация - это не установка новых программ или покупка «умного» оборудования. Это глубокая и комплексная трансформация, которая требует системного подхода, стратегического планирования и гибкости со стороны руководства. Каждая из обозначенных проблем способна в одиночку замедлить или полностью остановить процесс цифрового перехода. Только сочетание технологической грамотности, сильной команды и четкой стратегии может дать необходимый толчок для реальных изменений.

Всем компаниям без исключения нужно понимать, что цифровизация – это не просто модный тренд. Это новая реальность бизнеса, в которой успешными становятся те, кто вовремя понял важность внедрения современных технологий и сумел их эффективно применить. Непрерывное развитие и адаптация к цифровым изменениям – единственный способ для любого предприятия оставаться конкурентоспособным в долгосрочной перспективе. И хотя этот процесс неизбежно связан с определёнными сложностями и затратами, выгоды от него значительно превышают потенциальные риски.

Literature

1. ABB. (2022). Cyber security report 2022. <https://global.abb/group/en/technology/cyber-security>
2. Boston Consulting Group. (2022). The costs of digital transformation. <https://www.bcg.com/publications/2022/digital-transformation-costs-and-value>
3. Christopher, M. (2016). Logistics & supply chain management (5th ed.). Pearson UK.
4. Deloitte Insights. (2020). Integrating legacy systems during digital transformation. <https://www2.deloitte.com/us/en/insights/focus/industry-4-0/legacy-systems-digital-transformation.html>
5. Gartner. (2021). IT skills shortage in manufacturing: A growing concern. <https://www.gartner.com/en/newsroom/press-releases/2021-06-22-gartner-says-it-talent-shortage-poses-a-risk-to-innovation>
6. General Electric Digital. (2020). Digital integration in industry. <https://www.ge.com/digital/blog/digital-transformation-industrial-companies>
7. IBM Security. (2023). Cost of a data breach report 2023. <https://www.ibm.com/reports/data-breach>
8. Jeschke, S., Brecher, C., Meisen, T., Özdemir, D., & Eschert, T. (2017). Industrial internet of things and cyber manufacturing systems. In S. Jeschke, C. Brecher, H. Song, & D. B. Rawat (Eds.), Industrial internet of things (pp. 3–19). Springer. https://doi.org/10.1007/978-3-319-42559-7_1
9. Kotter, J. P., & Schlesinger, L. A. (2008). Choosing strategies for change. Harvard Business Review, 86(7/8), 130–139.

10. Lee, J., Bagheri, B., & Kao, H. A. (2015). A cyber-physical systems architecture for industry 4.0-based manufacturing systems. *Manufacturing Letters*, 3, 18–23. <https://doi.org/10.1016/j.mfglet.2014.12.001>
11. McKinsey & Company. (2020). *Digital transformation in manufacturing*. <https://www.mckinsey.com/business-functions/operations/our-insights/digital-manufacturing-the-revolution-will-be-virtualized>
12. Siemens AG. (2021). *Cloud solutions for industry*. <https://new.siemens.com/global/en/products/software/industry/cloud-solutions.html>
13. Smith, M. J., & Carayon, P. (2020). New technology, automation, and work organization: Stress problems and improved technology implementation strategies. *International Journal of Human Factors in Manufacturing*, 10(1), 99–116.
14. von Solms, R., & van Niekerk, J. (2013). From information security to cyber security. *Computers & Security*, 38, 97–102. <https://doi.org/10.1016/j.cose.2013.04.004>
15. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Press.



<https://sconferences.com>
info@sconferences.com

ISBN



9 789165 424166