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## Economic Sciences

# Women's labor and entrepreneurial activity in Georgia: Challenges and Opportunities

Ushangi Samadashvili

Doctor of Economic Sciences, Associate Professor, Iv. Javakhishvili Tbilisi State University

### Abstract

The paper argues that the basis of universal and differential well-being of the population of any country is inclusive economic growth, or universal involvement in the economy. In turn, one of the most important and crucial factors for the inclusive economic development of the country is the symmetrical development of labor and entrepreneurial activities in terms of gender. The aim of the present study is to utilize and strengthen their economic potential by promoting women's labor and entrepreneurial activity. On the way to the aim of the paper, the unfavorable situation of women in the country in terms of both employment and pay is characterized and measures are taken to improve them. The most important motives for starting and developing women's entrepreneurial activities are identified: the desire to own a business, the emergence of their own income and the proper provision of children. Factors limiting the start-up of entrepreneurial activity are identified: Insufficient access to finance, lack of business management knowledge and experience, difficulties in achieving a balance between business and family management (child care, household and family responsibilities), lack of access to business information and consulting. At the same time, based on international experience and their own visions, proposals and recommendations for their minimization-elimination have been developed. It has been shown that the restrictions imposed against the spread of the pandemic and the associated economic downturn have hurt women more than men and reopened the partially closed gaps.

**Keywords:** Inclusive Economic Growth, Women's Economic Empowerment, Women's Labor Activity, Women's Entrepreneurship, Women's Entrepreneurship Opportunities, Symmetrical Development of Women's Labor and Entrepreneurial Activities by Gender.

## Introduction

Relevance of the topic. The cherished goal of any sane state is to achieve the general and differentiated well-being of its own population, which evokes in every citizen a sense of legitimate pride and a patriotic attitude towards the country. This can be achieved through inclusive economic growth, i.e. general involvement in the economy. One of the most important and decisive factors of inclusive economic development is the economic empowerment of women, i.e. increasing labor and entrepreneurial activity.

The Economic and Social Council of the United Nations and other important organizations recognize that no real progress can be made unless women and men participate equally in economic processes. [1]. Because gender equality opens up huge economic opportunities for the economic development of any country. A government that seeks to achieve strong economic growth without fully exploiting women's potential is literally fighting as if one hand is tied behind its back. [2].

This is evidenced by the fact that restricting women's access to work is a big loss in the labor market for any country. For example, countries in the Asia-Pacific region (where 40% of the world's GDP is produced) lose \$42-47 billion of income annually due to women's limited access to employment [3 ].

In some developed companies, led by women make up 50-60% of GDP. For example, in Germany and the USSR, some companies make up 50-52% of GDP, in Japan - 55%, in Italy - 60%. According to some estimates, women still have 10% of the peace process. [4].

It should be noted that gender equality means equal rights, duties and opportunities for women and men, and not that women and men should become identical. Respectively, increasing the involvement of women in labor and entrepreneurial processes is relevant for all countries. It is especially important for developing countries, both in Georgia and abroad, to recognize the idea of gender equality, and in other words, in general knowledge, the fact that they are often included is a step in the right direction. In this case, the great intellectual potential of a woman does not use or does not use, and the economy has a solid share of its income. All of the above indicates the relevance of the chosen topic.

It should be noted that the main driving force behind the policy for the development of women's work and entrepreneurship in Georgia is the Law on Gender Equality adopted in 2010, the Gender Equality Action Plan approved in 2014, the Strategy for the Development of Small and Medium Enterprises of Georgia for 2016-2020 and 2021-2025, Support programs for state and non-governmental organizations.. Since the problems of equality are important for the economic empowerment of women, it is necessary to focus more on the labor and entrepreneurial potential of women in the economic growth of the country, which clearly indicates the relevance of the selected topic.

The level of processing of the research problem. Scientists-economists have written a lot about some aspects of economic opportunities and business activity of women both in the near



and far abroad, as well as in Georgia [5-15]. Although many foreign and Georgian scientists deal with gender issues, the labor and entrepreneurial activities of women have not been sufficiently studied. The present study is just one of the modest attempts to fill the existing gap.

Based on the foregoing, the purpose of the proposed study is a deep and systematic study of the unfavorable situation of women in Georgia in terms of labor and entrepreneurship, identifying the reasons for the expansion of women's economic opportunities, the facts of gender inequality and developing recommendations based on international experience and our own vision.

Research methods. To achieve this goal, systematic analysis, synthesis, comparison, observation, abstraction, induction, deduction, etc. are used. international organizations, government agencies supporting the development of women's entrepreneurship, non-governmental organizations, geostat data and expert opinions. The object of research is the economic empowerment of women. The subject of the research is female labor and entrepreneurial activity in modern Georgia.

### **Basic text**

On the way to the goal, first of all, it is necessary to find out what the situation is in Georgia with regard to women's labor and entrepreneurial activities. For example, today in Georgia, only 40.4 percent of women aged 15 to 64 are involved in economic activity, compared with about 62 percent of men. This indicates the misuse of human capital. [16]. The World Bank considers this situation as a lost resource of the labor market, due to which Georgia loses more than 11 percent of GDP per capita [17].

Gender inequality is also observed in the distribution of economically inactive populations. In particular, according to Geostat, in 2020, 64% of women and only 36% of men were economically inactive, ie left out of the labor force. The level of inactivity in women is almost twice as high as in men. However, more than a third of economically inactive women are housewives. This category has the potential to become an economically active force and to make a significant contribution through the realization of entrepreneurial opportunities, both in improving the well-being of their own family and in the development of the country.

In order to improve the economic activation of women, ie the employment rate, in our opinion, it is necessary for women to significantly increase their self-esteem and self-confidence; It is also necessary for them to first develop / increase their motivation to find a job, then to develop knowledge and skills relevant to the requirements of the labor market. In this regard, it is advisable to use: professional training; Qualification raising courses; Skills development-improvement trainings, etc.

Even more difficult are the challenges associated with overcoming stereotypes and vicious traditional attitudes. For example, according to traditional beliefs, "a woman should be a housewife." This is probably the most important barrier to increasing the role of women in the workplace and in society as a whole. Or, "If the mother works for money, then the children



will suffer." Clearly, governments, businesses, the media, and society at large need to work together to overcome such vicious traditions.

In this regard, it is also necessary to have a flexible work schedule and increase the availability of preschool educational institutions, especially in the regions. Any initiative related to the upbringing of children (kindergartens, various educational circles, Sunday schools, afterschools, etc.) will free women and give them the opportunity to be active in the labor market. It is also important to get help from other family members in unpaid family work.

It should be emphasized that gender inequality in Georgia is presented not only in general statistics, but also in the business sector. In almost all business sectors of Georgia, women are under-employed and their salaries are low. In particular, in 2020, the number of women and men working in the business sector was 292 thousand and 412 thousand, respectively, while the average salary of women was 67 percent of the average salary of men. The gender pay gap was 33 percent. This should be explained by the fact that most men hold managerial and consequently higher paid positions. However, with the prevailing socio-cultural dogmas, men are much more likely than women to be promoted on other equal terms. Existing statistics show that women have significant untapped labor and entrepreneurial potential, the assimilation of which is hampered by various cultural, social and economic factors.

Currently, women-created enterprises are one of the dynamic sectors of Georgian business, although overall, the business environment is still largely male-dominated. So for example, the number of men founding a business is almost twice as high as the number of women in the same category. If we look at the economic sectors, a relatively small number of women business owners are found in the mining industry, construction, transport and warehousing, and agriculture. On the other hand, the number of female owners is much higher than the number of male owners in areas of activity such as education, health and social services and other services. [18]

According to a survey conducted by the Economic Policy Research Center in Georgia, the most important motivation for women to start a business is the desire to own a business, to generate their own income and to provide for their children properly. The main obstacles to starting a business are insufficient finances for starting a business, lack of business knowledge and experience, and difficulty in combining business and family life [19]

Compassion, access to finance in Georgia associated with additional barriers for female entrepreneurs. Financial resources are limited to pre-employers, who do not have / or have "expired" credit history and have no additional guarantees. Most of these entrepreneurs in our country are women. They are in dire need of funding. On the other hand, women work hard to secure credit for their property, after all, without dismissing their husbands. This is related to the fact that they leave their property to their son - this is a Georgian tradition, founded on an idea, that family property should be obligatorily owned by a man, and the compensation of a woman - to a woman. At the same time, in the case of marriage, a woman becomes the "co-

owner" of the husband, who usually leaves the husband with the parents. As long as the "possession" has more rights to enjoy the property (living in the home, enjoyment already), and not the right to dispose of them, especially in the case of divorce. Such a problem is caused by the absence of self-sufficient and stable eastern incomes, resulting in the fact that for them the establishment of high percentage points in obtaining credit, in the last reduction of the possibility. Expansion of access to finance for female entrepreneurs will not be convenient and cost-effective for financial services, as they are also employed to attract their own clients and bring in new ones. Companies with which companies are placed in the process of raising financially, disproportionately high. Financial costs include business, manageable women, self-sufficient and risky patients. This is because financial institutions perceive women-run businesses as less viable and more risky.

Access to finance is an important precondition for starting and developing an entrepreneurial business, as it facilitates the entry of new companies into the market, creates a competitive business environment, demands for a new workforce, and reduces unemployment. Therefore, in Georgia, it is necessary to increase access to finance for women entrepreneurs. This can be achieved through various initiatives: investing (public finances or international grants) in commercial banks, which will allow them to issue larger and preferential loans to women entrepreneurs; Conduct research and obtain evidence to prove that the profitability and sustainability of financial institutions will increase through the acquisition of a segment of female entrepreneurs and the introduction of products tailored to their specific needs; Intensive work with female beneficiaries and capacity building in order to better understand the banking system and develop their own financial management skills to become a more attractive segment for financial institutions.

Gaining knowledge and experience in business management is essential to empower women in business. This will help women develop and improve their own business initiatives and further effective management. If a person has a good education but no work or entrepreneurial experience, of course, in order to succeed in business, he/she will definitely need to develop skills through training courses. Such training courses are mainly offered to women by the local and international non-governmental sector. Consequently, they cannot cover the entire country, especially the villages, and are not permanent.

That is why such training courses in the regions should be conducted by local governments, which will be able to adapt the courses directly to the business sectors and agricultural characteristics of their region.

It is necessary to increase the motivation of women and strengthen their belief in their own entrepreneurial opportunities. It is clear to them and to society in general that a woman can realize the full realization of economic and entrepreneurial opportunities. The media can play an irreplaceable role in this regard. Spreading the "success stories" of different women

entrepreneurs and sharing how they were able to start and develop their own businesses would be a good example and motivation for passive women.

It is also important to provide women with information and access to business consulting. There are many cases when they start an entrepreneurial business without any financial calculations of the viability of the business and as a result they get a "failed" case, which leads to a principled refusal to start another entrepreneurial activity. In this regard, the effect would be to conduct some field analysis and study relevant markets, which would advise potential women entrepreneurs in what direction it would be financially effective to start a business, what products and services are in high demand in the regions, and so on. Naturally, providing such information should be only one part of a comprehensive program for the development of women entrepreneurship. This initiative will be effective if women have increased access to finance; As well as opportunities for skills development and business consulting.

Finally, according to a UN study, the Covid 19 pandemic has exacerbated gender inequality in Georgia. A large proportion of respondents say that the restrictions imposed due to the corona-pandemic have increased unemployment in Georgia, reduced incomes, and put a large part of the population under severe psychological stress [20].

We note that the Covid 19 pandemic affected female employees and entrepreneurs more than the financial crisis of 2008-2009. The first reason for this is that relatively more men are working in sectors such as manufacturing and construction that have been severely affected by the "standard" recession.

This is when women's employment is concentrated in less cyclical sectors (such as healthcare and education); Second, the pandemic has had a major impact on professions (cook, waitress, cleaner, stylist) that are more difficult to implement remotely; And third, the pandemic and the resulting constraints have affected learning processes. Kindergartens and schools were closed and the need for home care and education for children was on the agenda, which is disproportionately distributed between women and men due to the current situation.

However, in pandemic conditions it is not recommended for grandparents to care for children due to the high mortality rate of the elderly; Considering social distance measures, caring for children with neighbors and friends was also very limited. Therefore, most families have no choice but to take care of their children themselves. Due to the distribution of childcare responsibilities in most families, mothers perform these tasks more often than fathers. Isolation measures have certainly had a greater impact on the families of nursing, young children, as caring for them requires more dedication than in the case of adults.

Single mothers, who are often in an economically disadvantaged situation, are more affected. The division of unpaid family labor has had the greatest impact on couples in which fathers have temporarily become the child's primary caregivers. This applied to couples in which both parents work and where the father is forced, or can work online from home during a crisis, while the mother continues to work in a traditional mode (e.g. in health care). Therefore, it is

expected that these changes will push social norms towards greater gender equality in the care of children and the performance of household chores.

### Conclusion

Based on the study, it can be concluded that the labor and entrepreneurial activities of women in Georgia and, accordingly, economic growth are hindered by such factors as lack of knowledge and experience in starting a business, insufficient professional qualifications of women, less access to finance to start, difficulties in combining housekeeping (childcare, household and family responsibilities) and business, outdated socio-cultural stereotypes, less access to information, business consulting and digital technologies.

Therefore, it is important for women to have a proper entrepreneurial education or intellectual and organizational skills, because with these skills an entrepreneur researches the market, develops a business idea, a plan to justify and implement its profitability. Hires staff to implement the plan, effectively organizes, motivates and controls their activities.

The rate of real estate ownership by women, including land, is significantly lower than that of men. Consequently, when it comes to access to finance, where commercial banks dominate, and in the case of bank credit, the issue of collateral is important, this significantly limits the access of women to financial resources. Therefore, female entrepreneurs are forced to rely heavily on personal finances. This problem is especially acute in the regions. That is why the state, in cooperation with banks, microfinance and international organizations, should develop special programs, grant projects that will significantly increase women's access to financial resources.

Women's knowledge of finance management is essential, improving access to finance and digital technologies, especially in the regions. Improving women's access to digital technologies can open many economic and social doors, including the door to funding.

Solving the problem of under-representation of women among business leaders and encouraging entrepreneurial activity requires the elimination of important traditional cultural barriers, such as: "A woman is a housewife" , "Caring for children is more important for a woman than a career" .

Unlike men, the main reason for women's economic inactivity and unemployment is the burden of childcare and unpaid family labor, which is mainly borne by women in Georgia. Gender equality requires a reasonable distribution of this unpaid family labor between a woman and her family members. It is also important to have access to convenient childcare services and to offer companies a flexible work schedule, especially in the regions.

It is necessary to provide business consulting to women entrepreneurs and increase access to relevant information, as well as active agitation-propaganda of successful, exemplary business models of women and the existence of sponsors.

In the process of developing state support programs, it is important to identify specific problems and peculiarities related to women entrepreneurship and to develop tailored tools. However, access to state support programs for women remains a problem due to both the above factors and the lack of sufficient digital skills. This is especially problematic for women living in the regions.

It is advisable to take legislative measures to ensure that all private and public services have the position of a gender relations specialist. The gender specialist should ensure the protection of women's rights and the detection of facts of discrimination;

It is also important to have the professional knowledge and skills relevant to the women's labor market, as unprofessional staff can not find a job, can not create a quality product, can not increase productivity and supply. In this regard, it is advisable to use: professional training; Qualification raising courses; Skills development-improvement trainings, etc.

One of the promising directions for the employment of women and the mobilization of additional income, the development of the country's economy is online business, e-commerce, where the proper mastery of digital technologies is crucial.

In our view, the implementation and effective implementation of the interrelated measures proposed above will have a strong impact on gender equality, women's labor and entrepreneurial growth, ie economic growth, and, consequently, the universal and differentiated well-being of society.

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# Relationship between happiness index and income on the example of Georgia

**Keti Chokheli**

Bachelor in Economics, The University of Georgia

**Saba Jilandze**

Bachelor in Economics, The University of Georgia

**Lika Okradze**

Bachelor in Economics, The University of Georgia

The happiness index and the standard of social status are two key items that are closely linked to each other because both are a matter of discussion in the social sciences. The Happiness Index is one of the tools to determine and perceive the status of individuals, their happiness, social well-being, economic equality, and all the indicators used to calculate the Happiness Index.

The research issue was interesting because the question arose as to why there is a pandemic of depression in high-income countries.

Subject and object of research: The object of the research is the world population, including the citizens of Georgia. The subject of the research is the growth of income and the level of human happiness and the relationship between them.

Theoretical and methodological bases of the research: The research process mainly uses already existing and recognized researches, papers, articles, the theoretical material contained in them is considered with the research interests. Existing statistics are used as well as independently conducted quantitative and qualitative studies on the example of the Georgian population.

The following methods are used in the research process:

1. Desk-Research - Recognized studies and articles have been found that have been used to discuss and apply existing theoretical material to achieve the aims and objectives of the research topic, which is to clarify the relationship between economic status and happiness than ever before.

2. Quantitative research - 150 people in different age groups were interviewed throughout Georgia.

3. Qualitative research - interviews were conducted with three experts.

Problem research status: There has always been a great deal of interest in this issue, this provision is reinforced by the fact that not only is there a sea of theoretical material about it but

also, in isolation, there is a happiness index that contributes greatly to the findings of existing research.

**Aims and Objectives of the Research** - The main goal of the research is to find a practical goal after the completion of the research, which will be adapted to the specific situation in Georgia and offer changes and reforms to the responsible bodies that are as relevant, feasible, thorough and accelerate the solution of existing problems. More specifically, the paper aims to study the correlation between happiness index and income level in the example of Georgia.

To achieve the established goal, it is necessary to perform the following tasks:

- I. Select and implement research methodology
- II. To study the theoretical aspects of the happiness index
- III. Analyze the relationship between the happiness index and income levels
- IV. Analysis of the situation in Georgia in terms of the happiness index
- V. Analysis of the situation in Georgia in terms of income redistribution
- VI. Underline and confirm the relevance of problems through various indicators
- VII. Study of people's attitudes towards happiness according to income levels.
- VIII. Defining the role of the happiness index in modern society and the world.

**Literature review.** The paper uses Georgian and foreign studies and scientific articles, which turned out to be quite valuable for the research, as each of them discusses issues that are key to the issue and necessary for the proper conduct of the research.

- Kakhniashvili N. 2016 Inequality of income distribution in Georgia, business and legislation. The main purpose of this article is to get acquainted with the current situation in the world, to consider the distribution of income using the Gini index in the case of Georgia, to compare it with other major countries in the world, and to draw its conclusions.

- Silagadze A. 2018. Gini Index - Wealth Distribution in the Post-Soviet Countries The article discusses issues related to the Gin index and focuses on how the Soviet world affected the post-Soviet countries and how this influence manifests itself in the distribution of wealth among the countries, as well as discusses the errors and how this can be reflected in existing statistics.

- Easterlin, Richard A .; Angelescu, Laura. March 2009. Happiness and Growth the World Over: Time Series Evidence on the Happiness-Income Paradox. This paper discusses the paradox of happiness, shows the relationships between research variables (happiness index, and gross domestic product) and examines them on the example of countries in Latin America and South Africa.

- Musikanski L. Cloutier S. Bejarano E. Briggs D. Colbert J. Strasser G. et al. 2017, Volume 9, Issue 1, Pages 4–31. Happiness Index Methodology This paper discusses the essence of the Happiness Index, how it is calculated, what it is used for, and other important issues related to this index.

- Easterlin R. A. ; Angelescu McVey L. ; Switek M. ; Sawangfa O. ; Smith Zweig J. ; October 26, 2010. The happiness – income paradox revisited. Department of Economics, University of Southern California, Los Angeles, CA 90089-0253 This research is of great importance because it is produced through all the usable and necessary information in the research process. The main essence of the research is that the sustainable development of the economic situation, in the long run, does not lead to a significant increase in happiness.

Hypothesis: Based on modern studies, it is a well-known fact that a person's happiness is closely dependent on his income. The higher the income the higher the degree of human happiness. The relationship between these two variables is positive. The relationship between wealth and subjective well-being is a major issue in social science research. Large-scale studies have established a complex relationship between income and happiness. For example, there is evidence that money does not always buy happiness. Once material wealth reaches a certain level, its further growth no longer contributes to happiness. For example, studies in the United States have shown that prosperity does not increase or decrease the growth rate above \$ 75,000 per year. Hence it reinforces the fact that happiness is individual and increased income does not necessarily increase the degree of happiness. (Killingsworth, 2021)

### **Happiness index in Georgia**

With an average score of 4,673, Georgia has the most unhappy citizens compared to neighboring countries, and it is not about the money that can not buy happiness, it is about at least six other factors that are crucial for nations to have happiness people. According to the UN World Happiness 2020 report, which includes 153 countries surveyed by Gallup World Poll, Georgia ranks 117th in the global Happiness Rankings worldwide.

The UN report says that quality of life can be reliably measured by various measures of well-being, income is only among them and not necessarily the most important. The other five key variables are freedom to make life choices, trust in social and political institutions, healthy longevity, level of support from friends and loved ones when needed, and generosity as a sense of positive community involvement. Compared to neighboring countries, Georgia lags behind Armenia in 116th place, Turkey in 93rd place, Azerbaijan in 89th place, and Russia in 73rd place. As for the leaders of the happiest nations, Finland has continued to occupy first place for the third year in a row and with a score that is now significantly ahead of other countries in the top ten. Denmark and Switzerland also increased their average scores from the last period's ranking. Denmark continued to take second place. Switzerland jumped from 6th to 3rd place with its big growth. Last year, the third-ranked country, Norway, is now in 5th place with a moderate decline in average scores, most of which were recorded in 2017-2018. Iceland was in 4th place; His new poll in 2019 did not change his 3-year average score. The Netherlands dropped to 6th place, one place behind the last period's ranking. The following two countries in the list were the same

as last year, Sweden and New Zealand ranked 7th and 8th, respectively, with a slight change in the average scores of both. In 9th and 10th places were Austria and Luxembourg.

### **The Gini index**

The Gini index is a significant issue in the current debate because the current statistics, such as the average per capita income in Georgia, do not accurately reflect the real picture. The second reason for its urgency is the presence of Georgia in the list of countries with economies in transition, given that one of the main focuses of the study is Georgia. If we look at the available statistics, it is easy to see that the countries with the highest Gini index are: Russia, Lithuania, and Georgia (including the post-Soviet countries), and the countries with the lowest Gini index are: Ukraine and Moldova. This fact indicates that the situation of income distribution in the first group of countries is bad compared to other countries and the three countries are in the worst situation (Silagadze, 2018). As already mentioned, the available statistics on the fact that the average salary is not so low do not reflect the real situation. Finally, this segment highlights another variable that has a very large impact on the quality of human happiness, and we can say in advance that the unfavorable situation in Georgia in terms of happiness index is due in large part to the reasons for this variable. The Maslow Pyramid, which sets the levels of human self-realization, is also essential to the problem at hand. After meeting these criteria, a person's chances of being happier than average increase, and financial capabilities are needed to meet these criteria (and many other finances focus on context). The variable (Satisfaction of the components of the Maslow pyramid, happiness index, financial capabilities of the person) is strongly, closely related to each other.

### **The level of crime and the rule of law**

In addition, such statistics were used as indicators to achieve the objectives of the research topic such as: The level of crime in Georgia and Sweden. More specifically, Sweden, one of the countries with the highest happiness index, compares the situation in Georgia, which sheds light on the problems that exist. A review of these statistics revealed a paradox which is that although Sweden has an index of happiness it also has a high level of crime. Which makes the proposition that the overall level of reduced crime makes people happier, and this variable is given less priority than other variables such as the rule of law and freedom of speech.

### **Conclusion**

Two independent studies were conducted to test the hypothesis. Within the framework of the quantitative research, 154 people were interviewed throughout Georgia, in different cities. A qualitative research was also conducted in which experts from three fields of economics were interviewed and they were given answers to important questions posed in the research.

Based on the results of the study, the hypothesis was confirmed. The results of the quantitative research showed that high income has a great impact on the subjective happiness of the population, however, topics related to the level of crime were identified. Comparison of crime rates in Georgia and Sweden has revealed that the overall reduced crime rate makes people happier is wrong, and that this variable is given less priority than other variables such as the rule of law and freedom of speech.

As for the qualitative research, the answers of the surveyed experts show that the most obvious correlation is the direct correlation between happiness and income, and they think that integrating the happiness index into the economy will be useful, they consider it a good complementary indicator and say it will be a good tool to assess economic development.

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# ВТЕЧА ВІД ПОЛЮВАННЯ НА ЛЮДЕЙ: ПОДВІЙНЕ ВИПРОБУВАННЯ

Новікова Ольга Федорівна

доктор економічних наук, професор, Інститут економіки промисловості НАН України Київ, Україна  
<https://orcid.org/0000-0002-8263-1054>

Американський фільм про полювання людей на людей вийшов на екрани кілька десятків років тому. За своїм сценарієм він був важким для перегляду та жорстоким. Деякі сцени були страшними та нелюдськими. Здавалося, що цей сценарій є надуманим, адже такого не може бути насправді. І коли в реальному житті ми зустрілися з такими самими обставинами, то зрозуміли, що це все-таки можливо.

Моя родина випробувала схожі жахіття на собі, та цей «кошмарний сон» повторився двічі – у 2014 і 2022 рр. Уперше нам довелося тікати у 2014 р. із Донецька до Києва від загрози життю через воєнні дії з боку Росії. Рятувалися всією родиною – разом із дочкою, зятем, онукою, важко хворою лежачою мамою, якій у 2014 р. виповнилося 88 років, та її доглядальницею. За 8 років ми пережили все: неприйняття та відторгнення, допомогу та співчуття, життя в орендованому житлі та гуртожитку, бідність... У зв'язку із психологічною травмою, спричиненою війною, мій стан здоров'я значно погіршився: я пережила втрату зору, онкологічне та багато інших захворювань, але головною втратою стала смерть мами і неможливість її поховати поруч із батьком у Донецьку.

**Доля науковців – внутрішньо переміщених осіб.** Більш розгорнутий опис вимушеного переселення та життя у знову набутому статусі – внутрішньо переміщеної особи (ВПО) міститься в таких авторських публікаціях: стаття «Путь переселенца: от адаптации к интеграции» («Дзеркало тижня», 2017 р.)<sup>1</sup>, наукові монографії «Внутрішньо переміщені особи: від подолання перешкод до стратегії успіху» (2016 р.)<sup>2</sup>, «Інтеграція внутрішньо переміщених осіб у територіальні громади: діагностика стану та механізми забезпечення» (2018 р.)<sup>3</sup> та багато інших.

Можливості випускати наукову продукцію протягом 2014-2022 рр. зберіглися, оскільки Інститут економіки промисловості Національної академії наук України (ІЕП НАН України) у серпні 2014 р. перемістився з Донецька до Києва. За підтримки НАН України наш колектив орендував приміщення, співробітники одержали декілька комп'ютерів для виконання робочих завдань і плідно працювали – видавали наукову продукцію для виходу з кризи в умовах воєнного конфлікту та розвитку економіки України. Фізичні, моральні та психологічні травми стали потроху загоюватися з придбанням житла та наявністю роботи.

Самовіддана праця всього нашого трудового колективу стала свого роду втіхою, тому що дозволяла переключитися від болю та гіркоти втрат, а отже, сприяла адаптації до нових умов. Надихали нові наукові напрями, які ми освоювали. Наукові дослідження із соціальної,

<sup>1</sup> Новікова О. Путь переселенца: от адаптации к интеграции. *Зеркало недели*. 2017. № 25, 01-07 июля.

<sup>2</sup> Внутрішньо переміщені особи: від подолання перешкод до стратегії успіху: монографія / О.Ф. Новікова, О.І. Амоша, В.П. Антонюк та ін.; НАН України, Ін-т економіки пром-сті. Київ, 2016. 448 с. [https://iie.org.ua/wp-content/uploads/monografiyi/2016/2016\\_mono\\_Novikova\\_Amosha\\_Antonyuk\\_2016.pdf](https://iie.org.ua/wp-content/uploads/monografiyi/2016/2016_mono_Novikova_Amosha_Antonyuk_2016.pdf)

<sup>3</sup> Інтеграція внутрішньо переміщених осіб у територіальні громади: діагностика стану та механізми забезпечення: монографія / О.Ф. Новікова, В.П. Антонюк, О.В. Панькова та ін.; НАН України, Ін-т економіки пром-сті. Київ, 2018. 244 с. <https://iie.org.ua/monografiyi-2018-r/integratsiya-vnutrishno-peremishhenih-osib-u-teritorialni-gromadi-diaagnostika-stanu-ta-mehanizmi-zabezpechennya-2018-r/>

економічної, промислової та трудової проблематики в умовах цифровізації економіки України були націлені насамперед на збереження та розвиток людського капіталу, активізацію громадянського суспільства, забезпечення стійкості економіки країни.

Наш науковий колектив перетворився на єдину згуртовану трудову родину, членами якої стали життєстійкі, відповідальні та креативні співробітники. Крім наукових інтересів, нас об'єднали спільне лихо, прагнення вижити в нових умовах і бажання продуктивно працювати на благо України. Дуже важливим став момент виходу з травматичного стану, спричиненого війною, через активну наукову діяльність. Занурення в роботу допомагало впливати на ситуацію, проявляти активну життєву позицію. Плідна праця, наукова та людська згуртованість, взаємодопомога та дбайливі теплі людські відносини у трудовому колективі стали нашим кредо. Сформувався високий рівень наукової корпоративної культури, який допоміг вистояти кожному з нас протягом 8 років збройного конфлікту на Донбасі, а також у період пандемії COVID-19. Ми перейшли на дистанційну форму роботи, при цьому продуктивність наукових результатів зросла майже вдвічі.

У цілому тематика наукових робіт фахівців ІЕП НАН України була спрямована на розвиток економіки України, підвищення її конкурентоспроможності, врегулювання збройного конфлікту на Донбасі, інтеграцію ВПО з Донецької та Луганської областей у місцях переселення. Інноваційний розвиток країни та прискорена цифровізація стали пріоритетними в наукових дослідженнях.

**Російське повномасштабне вторгнення в Україну 2022 р.** Оголошення війни 24 лютого 2022 р. стало для нас – тих, хто бачив жахіття війни на сході України на власні очі, – повною несподіванкою. Спочатку це здалося неперевіреною інформацією або помилкою. Створювалося враження, що наснився поганий сон, і всі от-от прокинуться... Адже не було ні очікування війни, ні жодних дій щодо підготовки до умов війни, ні необхідних продуктивних запасів – на той час був лише повний настрій на мирне життя. Терміново завершували написання і редагування колективної наукової монографії «Трансформація соціально-трудової сфери в умовах цифровізації економіки».

Виходячи з досвіду та розуміння, що війна вимагає від усіх консолідації дій і зусиль, наша родина вирішила об'єднатися в Ірпені. Моя доля – оберігати сімейне вогнище, бути запорукою спокою та гасити паніку, тому я виїхала з Києва до Ірпеня до дітей і онуків. Але ми опинилися в гарячій точці оборони Києва. Місце мого проживання в Києві (район Феофанії) виявилось набагато безпечнішим.

Для нас активні воєнні дії почалися з перших годин оголошення війни. Перші десять днів уся родина була разом – в Ірпені. Повітряні тривоги, комендантська година з 17:00 до 10:00, бомбардування аеропорту в Гостомелі (ми знаходилися за 5 км від Гостомеля), вибухи у Ворзелі, Бучі, підрих біля нашого містечка двох мостів, стрілянина з мінометів і гранатометів, гул винищувачів стали нашими новими буднями. Ми або сиділи в темних квартирах, або переходили до тамбура, або спускалися на цокольний поверх. І знову згадуєш фільм жаків – перед тобою тупик і тікати нема куди. Усі безпечні шляхи відрізані. Але найстрашніше – це авіаудари, бо від них ніде не сховаєшся. Гул літака, який пролітає надто низько, а потім вибухи... Три будинки нашого житлового комплексу розташовані на височині, і з 8 поверху, як у панорамному кіно, ми спостерігали клуби чорного диму від горіння.

На восьмий день війни була розміщена офіційна інформація про евакуацію жінок і дітей з Ірпеня залізницею до Києва (столиця так само неодноразово зазнавала обстрілів). Оскільки на той час це був єдиний шлях виїзду, ми скористалися цією можливістю. Наступного дня з дочкою та онукою о 9:00 уже чекали на пероні вокзалу, але дозволу на евакуацію не давали, тому що тривав найсильніший обстріл і було дуже небезпечно. Під снігом і дощем та обстрілами, які не вщухали, ми чекали більше трьох годин. Було багато жінок із дітьми, вагітних, людей похилого віку. На щастя, замість двох вагонів подали п'ять.



Хлопці з територіальної оборони, які під керівництвом мера Ірпеня Олександра Маркушина впорядкували процес вантаження жінок і дітей. На жаль, не всі бажуючі змогли виїхати, але нам пощастило... У кожному купе розмістилося по 15-16 людей, у вагонах були зайняті всі проходи. Їхали і молилися... Пізніше ми дізналися, що евакуація жінок і дітей потягом з Ірпеня тривала лише два дні, а на третій розбомбили залізницю. Нас не залишало відчуття дежавю – згадалося те, як ми вибиралися з хворою лежачою мамою під звуки вибухів із ризиком для життя, останнім потягом із Донецька до Києва...

У потягу з Ірпеня ми дізналися, що Церква християн-баптистів допомагає вивозити людей евакуаційними автобусами. Це було справжнім щастям! Чоловік дочки через два дні з величезними труднощами виїхав з Ірпеня до Чернівців разом із гуманітарної колоною, тому ми евакуаційним потягом вирушили туди ж.

**Життя на початку евакуації.** Чисельність біженців у Чернівцях станом на початок квітня 2022 р. за офіційним даними склала 10% від усіх жителів міста, хоча насправді на той момент їх було набагато більше. Нас прихистила Марія – місцева жителька Чернівців. Її жест асоціювався з покривом і захистом Божої Матері. Звістка про обстріл та руйнування 6 березня нашого будинку в Ірпені підкосила всю нашу родину, очі перестали бачити, а ноги – нормально пересуватися... Розпач і стан безвиході в цій ситуації вивели нас із ладу остаточно. Охопило таке відчуття, ніби під час стрибка з літака не розкрився парашут, земля йде з-під ніг... Наступного дня ми пішли до храму просити Господа про допомогу і підтримку. Несамовито молилися. Прийшло щиросердечне заспокоєння, але сил так і не було, різко погіршився зір. При виході з церкви я не побачила двох сходинок і впала. Результат – вивих і перелом правого плеча. Господь допоміг мені й усій родині переключитися з проблеми втрати житла на проблему надання мені допомоги.

Безпорадність у побуті через гіпс посилили бажання перемоги ворога, який грає роль мисливця на людей. Підкорити сили зла та нелюдськості, наблизити мир – усе це відновлювало сили та зміцнювало можливість осмислити, оцінити, проаналізувати і зрозуміти те, що відбувається навколо. Хотілось перешкоджати розвитку подій у руйнівному сценарії. Які ж причини викликали такі негативні наслідки?

**Інформаційна війна: причини та наслідки.** Кожна людина формує стратегію особистого життя на основі власного життєвого досвіду, цінностей, мотивів, ментальності, культури. Але в людському розвитку все більшої цінності набувають можливість і свобода вибору, які безпосередньо залежать від ступеня зовнішнього впливу на свідомість. Управління свідомістю людини стає найбільш пріоритетним використовуваним інструментом і на глобальному, і на національному рівнях для досягнення стратегічних воєнних цілей, реалізації національних пріоритетів розвитку, перемоги в політичній боротьбі. Саме управління свідомістю людини та підпорядкування далеким від її природи цілям і поведінці відіграло провідну роль у цій війні.

Інформаційна війна між Україною та РФ має тривалий характер і показала, що наша країна виявилася набагато слабшою і в технічному, і в комунікаційному, і в змістовному плані. Ворожість, брехня, вимисли, домисли, дезінформація, використання новітніх технологій впливу на свідомість людей тощо – усе це насамперед відгукнулося у свідомості росіян і населення території України, окупованої та анексованої РФ. Ми навіть не вели активної оборонної боротьби в цій інформаційній війні. Як результат, полювання на людей ретельно готується, мотивується шляхетними цілями, підкріплюється масованою брехливою інформацією та культивується ЗМІ РФ. Будь-яка війна – це підготовлене полювання на людей, території та ресурси. Високий ступінь довіри до організаторів такого полювання (війни) забезпечує прийняття будь-якої неправильної інформації, що змінює їхню свідомість. Убивство дітей, жінок, літніх людей виправдовується шляхетними цілями ворога врятувати світ, честь і «отечество». Уплутуючись у страшну гру, вони відчують стан азарту від

перемоги, яка вимірюється жертвами людей, руйнуваннями, збагаченням через мародерство, задоволенням від фізичного та психічного насильства. Вплив на свідомість мисливців на людей посилюється переконаннями, що вони є місіонерами реалізації глобальних демократичних цінностей – демілітаризації та денацифікації.

Потужною зброєю впливу на весь світ і громадян України зокрема є ядерна загроза. Ядерний шантаж і його реалізація – це ядерна катастрофа для людства. Певним важелем впливу на свідомість людей виступає захоплення російськими військовими Чорнобильської та Запорізької АЕС в Україні. Не лише для України, але і для всього світу їх небезпечно відвойовувати, однак ще більша небезпека – віддавати ці атомні станції в руки загарбників. Про це зазначає відомий історик із Гарварда, директор Українського наукового інституту Гарвардського університету Сергій Плохій. Усупереч усім міждержавним домовленостям, конвенціям про заборону використання під час воєнних дій фосфорного озброєння та хімічної зброї Росія його застосовує в Україні. На ці жорсткі порушення правил немає жодної реакції світової спільноти, яка не зупинила Росію і в 2014 р., коли було окуповано Донбас і анексовано АР Крим. Будь-яке зволікання в запобіганні загарбницьким діям перетворюється на непередбачувані нищівні наслідки для людей і держав.

Аналіз результатів соціологічних опитувань, здійснених російськими фахівцями протягом збройного конфлікту, підтверджує посилення агресії в росіян після його початку. Так, дані Всеросійського центру вивчення громадської думки станом на кінець березня 2022 р. свідчать про посилення в російському суспільстві підтримки війни в Україні. Якщо на кінець лютого і початок березня 2022 р. війну підтримували 71% громадян Росії, то в другій половині березня 2022 р. – уже 74%. При цьому вони відчують позитивні емоції від вторгнення – гордість, радість, довіру і надію. Більше половини опитаних старше 55 років підтримують війну з Україною. Це та вікова група, яка найбільшою мірою піддана інформаційному впливу телебачення через державні телеканали. Вікові групи призовного віку більше за інших відчують почуття тривоги та страху. Але в цілому простежується високий рівень довіри респондентів до Путіна і виправдання цілей війни. З одного боку, результати соціологічних опитувань на користь війни та її підтримки є «інформаційним живленням» для посилення бойового духу російської армії, якого вона дуже потребує, але з позицій гуманності, людяності, слов'янської ментальності, цивілізаційних цінностей, свободи та демократії, а також з позицій творення, перспектив розвитку, партнерських політичних й економічних відносин з іншими державами цей агресивний настрій російських громадян спрацьовує проти самої Росії. Створюється враження, що в політичних лідерів Росії розігруються апетити не лише завоювати Україну, але і залякати її європейських сусідів загрозами застосування ядерного озброєння.

Вплив інформації на свідомість людей у сучасних умовах цивілізаційного розвитку стає головним важелем управління поведінкою людини. Інформація, спрямована на використання та формування певних негативних стереотипів в умовах підготовки до війни та під час неї, мотивує, дає настрій і виправдовує будь-які руйнівні та нелюдські дії заради добре підготовлених інформаційних настанов. Ці аргументи орієнтовані на порятунок глобальних і національних інтересів, попередження загроз світовій і національній безпеці, розширення географії захоплення вже окупованих загарбником територій під гаслом сприяння справедливості та зміцнення російського правопорядку в невизнаних «ДНР» і «ЛНР» на користь розширення їх територіальних меж. Інформаційна війна була добре підготовлена та проведена, вона випередила фізичне вторгнення російських військ в Україну. Довіра до Путіна й уряду РФ разом із виконанням військового обов'язку та бажанням досягти переможних цілей і поставлених завдань стали запорукою воєнної агресії, знищення та руйнування стратегічних об'єктів, виробничої, ділової, освітньої соціальної інфраструктури, а головне – громадян України.

**Мотивації до згуртованості та єдності українців.** Несподіваний для Росії жорсткий спротив з боку не лише військових України, але і мирних жителів викликав злісну реакцію агресора, у якого яскраво проявилися риси мисливця, месника та загарбника. З'явився азарт руйнувати, вбивати, ґвалтувати, грабувати, мародерити й одержувати від цього задоволення. Особливо «солодким» виявилось полювання на мирних людей. Звірі полюють за наявності фізичного голоду та під час нападу на них. У росіян же не було цих тваринних інстинктів, але були викривлені амбіції показати шляхетність своєї нації, яка рятує весь світ від мілітаризації та нацизму. Ядерна держава здійснила напад на без'ядерну і поставила на терези ядерну загрозу як для України, так і для світового співтовариства. Навіть ці порівняння свідчать про бажання насадити «руський мир» і власний світовий порядок далеко за межами Росії.

На 37-й день війни (1 квітня 2022 р.) у Маріуполі під час обстрілу загинув рідний брат чоловіка моєї онуки, якому було 37 років. Він із родиною переховувався від авіаударів у підвалі будинку. Похід за водою став для нього фатальним...

Моє життя та життя моєї родини з 2014 по 2022 р. залежало від нав'язаного полювання на людей і території України, від прагнення насадити в моїй свідомості негатив до улюбленої України. Двічі за восьмирічний період ми набуваємо статусу внутрішньо переміщених осіб і тікаємо від загроз життю. Усе, як під час справжнього полювання: сплановані мисливцями заходи, використання новітнього озброєння для вбивства людей і знищення їх житла, стратегія і тактика дій для досягнення цілей насадження волі мисливця.

Удруге перебуваючи в ролі вимушеного переселенця в рідній країні, мимоволі осмислюєш особисті страждання, переживання та стимули до життя крізь призму воєнних подій, що відбуваються в країні. У 2014 р. ми мали нездоланне бажання врятувати безпомічну матір від небезпеки. Планували повернутися додому через півтора-два місяці, продовживши щасливе життя із сімейними турботами, з можливістю здійснення наукових досліджень для процвітання моєї Батьківщини – України. Я завжди пишалася тим, що я українка. Виступаючи на наукових конференціях ще за часів СРСР, я мала велику гордість від того, що представляла Україну та її чарівне місто – Донецьк. Мій рідний Донецьк після 2014 р. став чужим. Він зрадив мене, а я цього не пробачила, тому що залишилася вірною Україні. Покинувши власне житло, замінивши його на орендоване в Києві, переживаючи біль втрати та негоди, я робила все задля того, аби віддавати сили на пошук шляхів успішного розвитку України.

І от у 2022 р. ті самі мисливці почали переслідувати нас в нових місцях переселення. Ми, донеччани, є російськомовними, але добре знаємо і шануємо українську мову, українські пісні, українську харизму, пишаємося українським характером і красою українських жінок. Але чому надуманий нацизм є причиною для жорстокого полювання та переслідування всіх жителів України, у тому числі нас уже вдруге? Люди переживають цей моторошний стрес порятунку життя, коли на них полюють для знищення або захоплення як жертви з метою подальшого психологічного і морального насильства.

Усе це не вписується в цивілізаційні норми, людські та демократичні цінності, норми поваги та захисту прав і свобод людини, моралі та культури.

Із кожним випробуванням ми стаємо все сильнішими, бачимо зміни і в собі, і в нашому суспільстві. Такого патріотизму, згуртованості, єдності, взаємодопомоги, розуміння та прагнення захистити кожну людину, рідну землю й усі наші ресурси ворог не очікував побачити. Розрив дійсності з інформаційним зомбуванням не дав поштовху до переосмислення місії загарбників в Україні. Навпаки: цей розрив викликав бажання у агресора підтвердити правоту воєнної агресії, одержати максимальні матеріальні вигоди через вседозволене мародерство, а головне – реалізувати викривлену свободу у приниженні, образах, переслідуванні, знущанні над беззбройними захопленими людьми. Форми полювання на людей стали більш витонченими. Як захиститися від цього? Дієвим

способом для багатьох стала віра в Бога, бо тільки Він у змозі уберегти від нездоланих небезпек, вселити людяність і духовність.

Україна – країна віруючих людей (приблизно 2/3 громадян є віруючими)<sup>4</sup>. Релігійний та духовний потенціал уже працює. Я зрозуміла це завдяки війні на Донбасі у 2014 р. Я ні фізично, ні морально не змогла б упоратися з найтяжчими ситуаціями, якби не допомога Господа, яка на той час стала реально відчутною. Довелося переосмислити свою роль у житті. Знизилися амбіційні стремління, на зміну гордині прийшли терпимість і лояльність, а доброта, смиренність і любов стали безпрограшною зброєю в екстремальних ситуаціях.

**Зберегти людяність та людство.** Головне – це залишитися Людиною із властивою їй гуманністю, добротою, милосердям і дружелюбністю. Якщо між людьми та країнами будуються відносини ненависті один до одного, ворожості, взаємного неприйняття та агресії, то це може спричинити незворотні наслідки. На жаль, для цього на сьогоднішній день є всі передумови, якщо світова спільнота не консолідується в допомозі Україні та не усуне загрози поширення воєнної агресії на інші країни.

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<sup>4</sup> Украина религиозная. Государственная статистика и независимая социология  
<https://www.trtrussian.com/mnenie/ukraina-religioznaya-gosudarstvennaya-statistika-i-nezavisimaya-sociologiya-3986968>

# A roadmap for innovations and startups in the aluminium sector

**Ramil Hasanov Ilham**

Azerbaijan Technological University (UTECA), PhD candidate, Assistant Lecturer of Economics and Management Department. Ganja, Azerbaijan.

## Abstract

The subject of this research is about modern specific fields, innovations, and startups in aluminium industry. Aluminium is considered a metal of the future. Aluminium is the best innovative metal and innovations for aluminium are endless. The world will always need aluminium increasingly for a long-term period. So that is the main reason aluminium is advantageous and beneficial metal for startups.

The importance of this study is to explain modern and actual perspectives of innovations in aluminum sector. The essential factor is to unfold a roadmap for startups.

Keywords: aluminium, roadmap, innovations, startups, roadmap aluminium innovations, roadmap aluminium startups.

## Introduction

Aluminium has been recognized as an innovative metal since its industrial use. Aluminum is a promising metal for startups. These specific characteristics of aluminum allow its startup prospects to go a long way.

The purpose of this research is to present a general review of innovations and startups for the global aluminium industry. It reflects important aspects from physical parameters to business spheres of the future metal. The main peculiarity of this paper is to demonstrate a roadmap for the startup ecosystem in the aluminium sector. This laconic study will also give information about some startup organizations which have newcoming inventions. The examples are included from the green environment to AI technologies where aluminium and its allows can be used in unlimited forms. General analysis of this topic is based on the innovative spirit of special metal and accessible data coming from the main aluminium institutions to the public trends.

It is hoped this article will inform researchers because of its unique issue and attract some practitioners. Through this research, scientific and business spheres can open new horizons for the future.

## Materials and methods

Reflecting several specific shades of the modern era, this topic has been approached from new methods. Since the content of the research work contains the latest innovations, the base stock of the subject has been covered by information from various institutes and magazines, up to newspaper reports that have not yet sat on the scientific platform.

Global institutions like International Aluminium Institute, European Aluminium Association, European Aluminium, Aluminiumleader, and Aluminiuminsider are the main encyclopedic sources about the aluminium sector. The mega aluminium companies like Alcoa, Rio Tinto, Rusal, and Hydro are both theoretical and practical institutes. These greatest organizations are also the main innovative companies and form startup ideas on their platform.

Aluminum is one of the most useful metals in human society and this factor increases its economic importance. The rising economic interest increases the attention to technological factors. For this reason, the aluminum industry becomes a field that constantly requires innovative innovations for engineers, designers, and architects in terms of technological features. In the creation of this aspect, the fact that the physical conditions of the aluminum metal itself have unlimited possibilities plays an exceptional role and always leaves the door open for innovation. It has unique features such as variability of its physical-geometric shape, suitability for creative works, lightweight, corrosion resistance, known to be made as strong as iron, and recyclability. All these factors make aluminum the main material of choice for industrial enterprises.

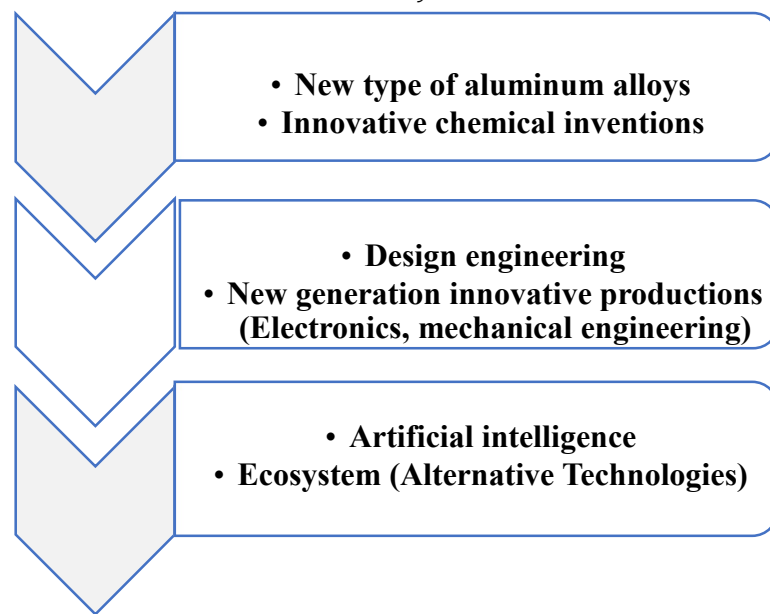
An entity with infinite possibilities will have more roads for innovation. Let's pay attention to several important properties of aluminum:

1. It has lightweight.
2. It is flexible.
3. It is solid
4. It is highly conductive.
5. It is durable and sustainable.
6. Recycling is easy and affordable.

As an industrial material, aluminum by its very nature offers endless opportunities for innovation, so the avenues for startups are vast. In this sense, it is possible to present strategic roadmaps for startups in the aluminum sector that will guide prospects.

If we look at the realities corresponding to the business environment, technological innovations, and economic ecosystem of the current world today and in the future, we can present a road map of the start-up sector on aluminum technologies for the near future of the modern world.

*Figure 1. Aluminum technologies startup roadmap  
It was formed by the author.*



Aluminum technologies, as the start-up sector, undergo rapid changes and evolution processes. In this regard, there are many ways in which these two spheres will develop joint projects. Tried to show the important directions for today and the future in the above chart.

New types of aluminum alloys and chemical innovations are at the core of the aluminum industry itself. Aluminum constantly requires chemical innovations within itself to meet the changing technological world and environmental requirements. From this point of view, several future-seeing startup projects can be formed and gain success within the mega aluminum industry.

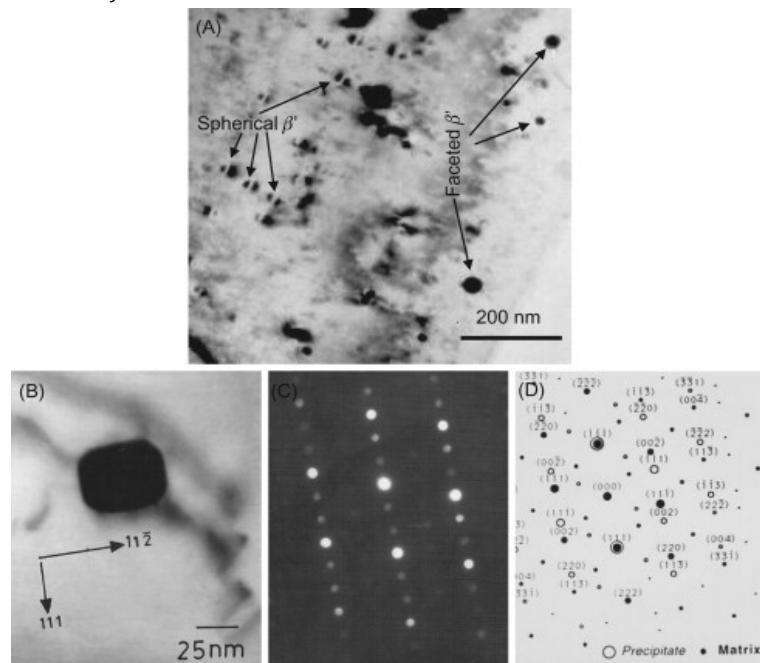
Aluminum's innovative nature has deep roots in its chemistry. Aluminum, which is much softer in its pure state (99% + unalloyed aluminum), changes its physical character incredibly when it is combined with even a small amount (between 1-5%) of other metal mixtures. The new alloy grades created with these additions are made very strong, hard, and corrosion-resistant in exchange for a slight increase in their weight. For example, a wire made of 7xxx series aluminum, made from an alloy of zinc and magnesium, can hold a loaded tractor in the air.

Innovative core production of aluminium is based on its chemistry. Although many alloys have been created on aluminum brands, the innovation process is still ongoing. An example is an aluminum- (Al-Li) compound, which has been successfully experimented with in recent years. By adding a certain percentage of lithium, many new physical properties are obtained, and the industrial use of aluminum is specifically expanded. Although the commercial weight percentage of lithium is considered to be 2.5% as a standard ratio, however lower or higher percentage of lithium may be used in addition according to certain physical requirements. (JOSHI, AMIT, 2007) For example, in the aerospace sphere, this brand has the potential to be widely used.



Picture 1. Microstructure and Precipitate Characteristics of Aluminum–Lithium Alloys

Satya Prasad, N. Eswara Prasad, Amol A.Gokhale



Aluminum-lithium alloys are lighter than other alternatives, less fuel-efficient (10-20%), and cheaper than aluminum-titanium alloys.

Design engineering and new generation innovative productions will form the basis of the changing global world, civilizations, cultures, urban infrastructures, and consumer goods of the future. It is possible to provide new generation technologies, which are always in the interest of humanity, with economic investments based on the base formed by startups. This sphere always has attractive indicators for startups.

Artificial intelligence and necessary ecosystem technologies will be the most visible realities in the future monitoring of the global world. Artificial intelligence is already building the bridges that will take humanity from the 4th industrial revolution to the 5th industrial revolution. Aluminum, which is considered the metal of the future, will be of great importance in the field of artificial intelligence, which creates great illusions with the endless miracles of human science and technology. (RIO TINTO, 2021)

The ecosystem of the future and alternative technologies are not only economic-technological innovation and profit but mainly the future fate of our planet.

Current innovations and necessary technological inventions, innovations are the greatest forces that will act as the main savior of mankind. In this sense, aluminum metal, which is in a strong position against its alternatives, will maintain its necessity in these areas as well. For start-up sectors, aluminum will be an indispensable product of innovation in some spheres.

It is possible to draw a successful graph by looking at the current directions mentioned in terms of aluminum innovations and startup prospects, forming a scientific-technological base, researching the market, and investing. Since the 21st century, aluminum has surpassed most alternatives due to its innovative shades. As the economic world moved rapidly through the

period of technological development, changes occurred frequently, and aluminum cemented its place in the current revolutionary innovations. In most innovative products, some possible utility coefficients of aluminum were taken into account. Aluminum has become a material with limitless possibilities for the innovative world.

Aluminum is considered a miracle for modern technology. Aluminum is still considered a very young metal for the future. Today, aluminum is used in the world from solar panels to modern battery technologies, from microelectronics to powders intended for 3D printing. (DEBANJALI SENGUPTA, 2020)

The biggest fundamental innovation for aluminum is that its remanufacturing technology itself is very cost-effective. Thus, the energy saving required for the re-production of aluminum is 90% less energy consumption than the first production.

The giant American aluminum producer Alcoa Corp. and the Anglo-Australian mining giant Rio Tinto announced the world's first carbon-free aluminum smelting process. (RIO TINTO, 2018)

It is called this innovative breakthrough "The most significant innovation in the aluminum industry in more than a century." This revolutionary new method for aluminum smelting produces oxygen and can offset all direct greenhouse gas emissions emitted during the electrolytic aluminum smelting process.

Alcoa and Rio Tinto estimate that once fully implemented in Canada, this new technology will remove the equivalent of 1.8 million cars from the country's roads. At the same time, both companies have partnered with Elysis to commercialize the process by selling that technology package from 2024. (ALCOA, 2021)

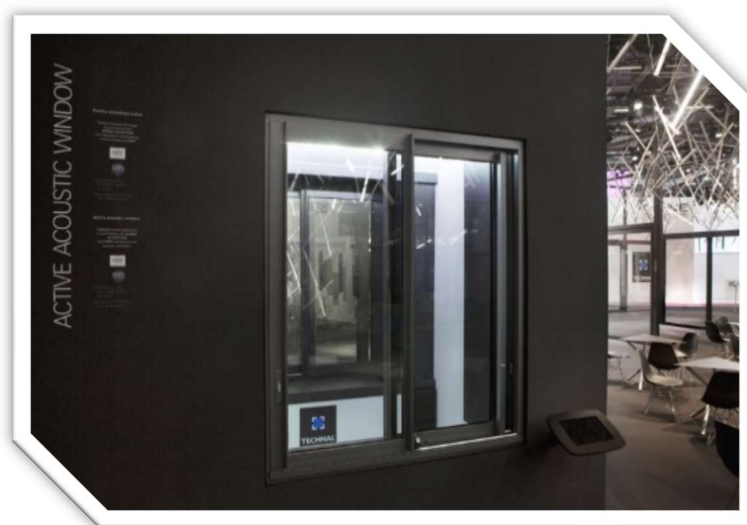
Russian aluminum giant Rusal has announced the invention of a new unique aluminum-scandium alloy (NICOLE KARETA, 2021). The company's scientists claim that the new brands, which will consist of a unique mixture of aluminum, scandium, and magnesium, will meet several important needs for many areas, especially the shipbuilding industry. The cheaper and more corrosion-resistant Rusal Al-Mg-Sc alloys are in the process of being certified for mass production and will compete with the more expensive alloys available in the shipbuilding, automotive, and aerospace markets for the foreseeable future.

Constellium has introduced Aeral™, a new aluminum solution designed for the production of aerosol cans using the Drawn and Ironed (D&I) technology used in the production of beverage cans. Constellium's Aeral™ innovative material allows a minimum 30% weight saving compared to traditional alternatives while maintaining the same level of performance in terms of pressure resistance and great flexibility. This innovation will drastically reduce the environmental impact of aerosol cans and fundamentally change the aerosol market. Constellium (NYSE) is a global sector leader developing a range of high-value aluminum products, creating innovations for a wide range of markets including aerospace, automotive, and packaging. The company's revenue in 2021 was 6.2 billion euros. (CONSTELLIUM, 2022)

As the rate of urbanization increases, the noise level in cities increases. For example, in France, the social cost of noise is estimated at 57 billion euros annually. The need for sound insulation is also a big problem for architects designing new buildings or renovating old buildings. The engineers of the Hydro company began to look for an innovative innovation in this matter. (EUROPEAN ALUMINIUM, 2021)

The goal was to design a window that lets air in but doesn't let the sound out. Engineers, together with Gamba Acoustique and the CNRS Mechanics and Acoustics Laboratory, created a window model that opens approximately 10 centimeters and reduces the noise sufficiently, but at the same time does not cause any more discomfort.

*Picture 2. Active acoustic window*



Energy batteries are one of the important innovative elements of the future. Aluminum-ion batteries show great promise in this regard. In modern research, aluminum-ion batteries charge faster than lithium-ion alternatives and hold more energy for longer.

New research has shown significant innovations in the field of aluminum-ion battery cells. Australia-based Graphene Manufacturing Group (GMG) has joined ground-breaking research at the University of Queensland to develop a potentially revolutionary battery that can charge 60 times faster than lithium-ion alternatives and hold three times more energy than the best aluminum-ion batteries available today. (GMG, 2022)

*Picture 3. GMG Graphene Aluminum-Ion battery*



The role of artificial intelligence (AI - Artificial Intelligence) is growing rapidly in the world of our future. The use of aluminum technologies in the field of artificial intelligence is one of the most modern scientific and technological studies. Researchers, innovators, and those looking for new business projects with an interest in this field are investigating how aluminum brands can be useful in the artificial intelligence industry. Whether in the robotics industry or micro technologies, aluminum has many shades that will prove its processing potential.

It is possible to show many startups operating in the aluminum sector:

ELYSIS

Proud Source Water

Log 9 Materials

LumiShield

Vélosophy Cycles AB

ValCun

It was particularly intrigued by the plan of Jindal Aluminum, one of India's largest aluminum producers, to invest in AI-based startups. (JINDAL ALUMINIUM, 2017)

This investment by the giant aluminum company of India, which is increasingly experiencing a rapid rise in the technological sphere, especially in the field of startups, is certainly not without reason and is a step towards the future.

Another interesting factor is that Vedanta Aluminum Business, another large aluminum producer in India, announced plans to collaborate with startups in innovation and technology. (SNS | BHUBANESWAR, 2021)

## Results and discussion

The essence of this research work is to show specific innovation and start-up trends in the aluminum industry from a global perspective. In addition to the potential of innovations in the aluminum sector, the conclusions reached on the topic have also expressed several necessary aspects.

The most important topic that will be the subject of discussion is the essential nuances related to the future of our planet. The most important factor to be emphasized here is the increasing importance of aluminum metal in the global sphere over time. At the same time, along with economic-technological innovations, ecological factors are brought to the fore in a serious form.

## Conclusion

Startups created by innovation and its implementation will play a key role in the economic system of the future world. Startup projects formed by scientific-technological research and economic entrepreneurship cover many spheres of society. Although there is a wide view of the startup sector in many areas in the scientific base, it is not very noticeable in some spheres. One of them is the aluminum sector.

The most important aspect of this research work is the attempt to develop a roadmap for innovation and startups related to the aluminum industry. Although concise, the specific details that touch on the important factors have been investigated in the research and the available information has been put forward. The pulse of the global world has been looked at in new ways.

The article describes the possibilities available from the chemical inventions of aluminum to modern electronic technological inventions. Current perspectives are touched upon, from the latest innovations of large manufacturing companies to startup schools with small startup ideas. As a result, the most important aspect of the research work is a compass for innovation by preparing a roadmap for startups related to the multifaceted aluminum sector.

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# Digitalization for Breaking The institutional “trap” in Georgian Economy

**Surmanidze Natia**

Ph.D., Associate Professor, Guram Tavartkiladze Tbilisi Teaching University, The University of Georgia, Ilia State University

**Chagelishvili Ana**

Ph.D. student, Ivane Javakhishvili Tbilisi State University,

The integration of digital technologies in the business sphere has been carried out at a particularly fast pace as a result of the spread of the Covid-19 pandemic. Digitization has become an essential requirement for companies of almost all sizes to survive the lockdown. The implementation of modern technologies in business processes is uniquely beneficial for companies, however, the issue of generating finance is highlighted, which is a big challenge for small companies worldwide. Barriers to access to finance are particularly acute in developing economies. Georgia represents the post-Soviet space, and it was the Soviet experience that separated the country from a healthy development trajectory. Accordingly, it is a difficult process for a country in the process of institutional formation to promote the competitiveness of operating companies in the international markets under the conditions of a market economy. (Surmanidze, 2022) Technological progress is a condition for any business to create a final product with high standards, but it requires investments in research and development. The limited resource of access to finance limits the ability of companies to produce high-standard products and, accordingly, the ability to create additional value. That is why it is necessary to focus the digitization process as much as possible in the direction of increasing access to finance, which will ultimately allow companies to generate additional financial resources.

## Entrepreneurship in the economy of Georgia

In the economy of Georgia, like the economies of the developing countries of the world, the development of small entrepreneurship is a particularly important challenge. The state implements several incentive projects that contribute to its development, for example, the "Enterprise Georgia" program, events promoting the participation of entrepreneurs at world exhibitions, as well as many tech labs, which are tasked with simplifying the process of introducing technologies for small entrepreneurs.

As of 2022, almost 93% of enterprises in Georgia are represented in the form of an individual enterprise or a limited liability enterprise. Among them, the percentage share according to active status is even higher and is approximately 95%. The mentioned fact clarifies



how important a role these companies play in ensuring the sustainable development of the economy. (Geostat, 2022)

Small and medium-sized enterprises play a significant role in the economy of Georgia, they make up about 60% of the total output and added value. Moreover, for a country in the active phase of social problems, the small business sector creates about 63% of jobs. In terms of wages, medium-sized enterprises from the SME sector lead in terms of average monthly wages, as well as labor productivity per employee. (Geostat, 2022)

The issue of access to finance is also quite relevant in Georgia, and this is proven by the lack of capital in the SME sector. Large enterprises have almost 10 times more capital productivity than small and medium enterprises. However, in terms of capital equipment, medium-level enterprises are still leading.

The given reasoning, supported by statistical indicators, confirms that the SME sector is a strong pillar of the Georgian economy. If it is stimulated in terms of the development of digital technologies, it will allow them to increase productivity, and create added value and therefore more jobs, which will eventually redistribute the social population and make the prospect of eliminating social problems more tangible.

### **Profitability of digitalization**

Many scientists call digitization a new industrial revolution, therefore it is more effective for the economy than its predecessor revolutions. Effectiveness is expressed in the fact that businesses should be resistant to global shocks, and even more so small businesses because it is the individual enterprises of the SME sector that have a small market share in the economy and less access to finance. Therefore, the fourth industrial revolution is the best way to reduce costs. In conditions where the production volume was reduced during the pandemic for several small enterprises, variable costs were reduced, although a rapid reduction of fixed costs could not be achieved, because the contracts were based on long-term rights and obligations. Those companies that can quickly create virtual offices, and digital management of sales and purchases, have overcome the shock and regenerated with fewer losses. (Bagale, Vandadi, Singh, 2021)

The pandemic and government decisions to lock down countries have made it clear that the digitization of small and medium-sized businesses must cover the entire production and supply chain, and not just the operational process of producing goods and managing related processes (as in previous industrial revolutions). Digitization of SMEs should help companies to overcome global challenges such as sustainability, saving resources and energy, and improving productivity. Sharing data during the production phase promotes efficiency for everyone involved. More personalized functions for the customer and more diversity, openness, and globalization of the supply chain will be gained. In particular, as a result of the fourth industrial revolution, the return to individuality should be implemented.

Only digitization is able to solve the problem of access to finance in two directions: (World bank, 2022)

- Improving credit infrastructure (credit reporting systems, secured transactions, collateral registries, and insolvency regimes) that can lead to greater access to finance for SMEs.
- Introducing innovations in SME financing, such as e-lending platforms, use of alternative data for credit decision-making, e-invoicing, e-factoring, and supply chain financing.

In this regard, some interesting trends can be seen in Georgia, which are organized by banks. One of these innovations is a mobile terminal, i.e. a POS terminal integrated into a mobile phone. (Bank of Georgia, 2022) For small and medium-sized enterprises, this is a way not to lose customers who do not have the cash to make payments. In general, NFC technologies are very beneficial for small entrepreneurs in terms of increasing the efficiency of financial management, and therefore banks need to make the process of integrating them into the business as flexible and simple as possible.

### Conclusion

Digitization has an important role for developing countries, and in Georgia, it is necessary for state institutions to essentially focus on facilitating access to technology for small entrepreneurs. The lack of finance creates a barrier for the SME sector to be able to utilize the latest technological opportunities. In contrast, their competitiveness is doomed in the modern technological era. At the same time, the banking sector should help by providing low rates to encourage small enterprises to want to introduce and use cashless payments. Cashless payment, on the other hand, will increase access to finance for business.

In conclusion, it should be said that the introduction of technologies is the only non-alternative way to get out of the institutional trap, which is a prerequisite for economic development and even more sustainable economic development for Georgia.

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## Основные трудности внедрения радикальных инноваций в сырьевой отрасли экономики

**Сарсен. К. А.**

PhD докторант, Л.Н. Гумилева Евразийский национальный университет, г. Нур-Султан, Казахстан

**Кирдасинова К.А.**

к.э.н., профессор, Л.Н. Гумилева Евразийский национальный университет, г. Нур-Султан, Казахстан

**Естурлиева А.И.**

к.э.н., доцент, Каспийский государственный университет технологий и инжиниринга им. Ш.Есенова, г.Актау, Казахстан

Барьеры радикальных инноваций (РИ) представляют собой сложное явление, понимание которого остается весьма ограниченным. Благодаря аналитическому обзору существующих исследований, включающему контент-анализ статей, это исследование рассматривает наиболее известные классификаций инновационных барьеров, охватывающую внешние и внутренние барьеры. Внешние барьеры, связанные с сопротивлением клиентов и неразвитой сетью, и экосистемой, а также внутренние барьеры, связанные с ограниченным мировоззрением. Для углубленного определения преград инновации в статье рассматриваются различные определения данного термина а так же предоставляется авторское определение термина инновация. Также статья проводит различие между радикальными процессными и продуктовыми инновациями. В статье подчёркивается важность исследований радикальных процессных инноваций поскольку исследования в данном направлении остаются скудными. Цель данного исследования состоит в том, чтобы разработать классификацию барьеров радикальных инноваций на основе систематического литературного обзора. Соответственно, это исследование направлено на то, чтобы внести свой вклад в существующую литературу по барьерам радикальных инноваций. Первая задача проанализировать сущность инноваций и дать авторское определение. Вторая выявление барьеров, характерные для радикальных инноваций.

В результате литературного обзора выявлены следующие наиболее распространенные проблемы внедрения радикальных процессных инноваций как:

низкая экономическая выгода в краткосрочной перспективе, отсутствие финансирования со стороны, высокая стоимость программного и аппаратного обеспечения, отсутствие сбора, интеграции и возможности управления данными, отсутствие вознаграждения за инновацию, отсутствие доступа к рыночным данным для интеграции выбранных технологии с существующей инфраструктурой, принятие выбранных технологии, отсутствие понимание умных электронных контрактов для использования выбранной технологий, отсутствие способности создавать и управлять независимыми онлайн порталами поддерживающими выбранные технологии и т.д..

В статье так же рассматриваются положительные стороны процессных инноваций а именно экономическая выгода посредством создания коммерческой инновационной концепцией, как «точно вовремя», «бережливое производство».

**Ключевые слова:** радикальная инновация, барьеры, финансы, товар, услуга, продукт, концепция.

**Введение.** Барьеры, с которыми сталкиваются сырьевой отрасль экономики и другие процессно ориентированные отрасли в процессе внедрения радикальных инноваций кажутся сложным, многогранным явлением, поскольку исследование этого явления остаются скудными. Таким образом, цель данного исследования состоит в том, чтобы разработать классификацию барьеров радикальных инноваций на основе систематического литературного обзора. Соответственно, это исследование направлено на то, чтобы внести свой вклад в существующую литературу по барьерам радикальных инноваций. Первая задача проанализировать сущность инноваций и дать авторское определение . Вторая выявление барьеров, характерные для радикальных инноваций.

Радикальные инновации могут быть представлены в двух разных формах, таких как инновация продукта и инновация процесса, но недавние исследования в большей степени сосредоточены на определении проблем, связанных с внедрением продуктовых инновации, в то время как процессные инновации также важны.

Общеизвестно, что внедрение радикальных инноваций имеет «решающее значение для устойчивого развития фирмы и восстановления ее конкурентных позиций» [1]. Зарубежные авторы утверждают, что радикальные инновации являются основной силой, которая продвигает вперед и обеспечивает стабильный экономический рост фирмы и укрепляет ее жизнеспособность [2]. Не секрет, что фирмы на пути внедрения радикальных инноваций сталкиваются с множеством различных препятствий. Мы можем наблюдать, что исследование этих вызовов создает особое научное движение, определяемое как «барьеры радикальных инноваций». Данное научное движение нацелено ответить на вопрос «какие основные факторы отрицательно влияют на процесс внедрения радикальных инноваций и препятствуют росту фирмы?».

В современной литературе показано, что в основе радикальных инноваций могут лежать продуктовые инновации, процессные инновации или их сочетание, поскольку они часто побуждают друг друга [3]. Несмотря на то, что радикальные и постепенные инновации одинаково важны для долгосрочного успеха фирмы, большинство исследований посвящено радикальным инновациям. Исследования, акцентирующие внимание только на радикальную инновацию, не благоприятствуют развитию науки «инновационный менеджмент», поскольку не охватывают все аспекты. Например, в ориентированных на процесс отраслях, таких как добыча нефти и газа и большинство сегментов сельскохозяйственного рынка, где продукт является однородным, очень мало шансов выделить продукт на рынке за счет внедрения радикальных инноваций. Также мы можем наблюдать, что в зрелых компаниях, где инновации продуктов играют решающую роль, внимание также смещается на процессные инновации [4]. Отсюда следует что сырьевые отрасли достигают конкурентного преимущества только за счет эффективного внедрения процессных инноваций. Одной из положительных сторон процессных инноваций является то, что у них также есть шанс стать независимой коммерческой инновационной концепцией, такой как «точно вовремя», «бережливое производство», и принести коммерческую выгоду за счет лицензирования и учебных курсов/сертификатов. Однако этих знаний недостаточно для определения всех барьеров, препятствующих успешной реализации проектов радикальных процессных инноваций.

**Обзор литературы.** Чтобы глубоко проанализировать существующие знания о барьерах радикальных инноваций и создать комплексное понимание барьеров радикальных инноваций, мы провели систематических обзоров литературы трудов зарубежных ученых. Макдермотт и О'Коннор (2002) в своем исследовании подчеркивают различия в определениях инновации, что радикальные инновации внутри организации сильно отличаются от постепенных инноваций и что они имеют решающее значение для долгосрочного успеха фирмы. К основным трудностям внедрения радикальных инноваций ученые относят внутреннюю культуру которая часто оказывает давление на принятие решение в сторону наименьшего риска а так же проблемы возникающие в фирме при переходе в новую незнакомую среду [1]. В то время как Ученные Барегех, А., Хемсворт, Д. и Роули, Дж.. (2014) придерживаются интегративной теории об инновации и отвергают идею о организационном взаимодействии с типами инноваций в отрыве друг от друга. В своем исследований МСП в продовольственном секторе Великобритании предоставляют доказательства в поддержку более целостного подхода к инновационным исследованиям [3]. Де Араужо Бурхарт и Ульхой (2011) в своем исследований ставят под сомнение идею о том что радикальные инноваций часто возникают вне фирмы и зачастую зарождаются стартапах и молодых фирмах в то время как устоявшиеся компании более склонны к постепенным инновациям. Отсюда исходит что рекомендаций о создании инноваций вне фирмы являются так же не целостными.

Ученные предлагают альтернативные подходы внедрения радикальных инноваций в фирмах без крайних форм разделения [2].

**Основные положения** . Для определения преград радикальных инновации важно точное понимание сущности понятия инновация. Однако мы можем наблюдать что нет четкого согласия между учеными о том, что такое инновации (Chen 2017). Общее определение, поддающееся адаптации для разных дисциплин и охватывающих различные аспекты инноваций является необходимой задачей, поскольку "термин " инновация", как известно, неоднозначен и не имеет ни единого определения, ни меры"[5]. Так например инновация может быть широко определена на уровне фирмы как «внедрение нового или значительно улучшенного продукта (товара или услуги) или процесса» [6]. Так в таблице (1) мы затронули различные определения термина инновации показывающие многогранность и многоаспектность данного понятия.

Таблица 1.

### Определения термина инновация

| Ученые                                | Определение термина инновация                                                                                                                                                                                          |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aronson (2008)                        | Согласно Аронсону, инновация включает в себя либо акт внедрения, либо то, что внедряется само по себе.                                                                                                                 |
| Velo and Rizzini (2008)               | Инновация это создание ощутимой социальной ценности за счет свежего мышления или введения чего-то нового                                                                                                               |
| (Zhang 2011)                          | Инновация это создание новых возможностей за счет использования творческих идей                                                                                                                                        |
| (Gaynor 2013)                         | Инновация это процесс который ведет к коммерциализации изобретения, а также к разработке и внедрению ценной технологии.                                                                                                |
| Baregheh, Rowley, and Sambrook (2009) | Они определяют инновацию как многоступенчатый процесс преобразования организационных идей в новые или улучшенные продукты, процессы или услуги для продвижения, конкуренции или успешной дифференциации на рынке.      |
| Плесси (2007)                         | Инновации как создание новых знаний и идей для достижения новых бизнес-результатов, направленных на улучшение внутренних бизнес-процессов и структур, а также на создание продуктов и услуг, ориентированных на рынок. |

\*Источник: [6]



Исходя из данного анализа литературы мы выдвигаем следующее определение инноваций. Инновация это создание и внедрение новых идей или улучшение существующих процессов, продуктов или услуг с целью достижение конкурентных позиций и устойчивого развития компании.

Инноваций в свою очередь для простоты определения степени «радикальности» нововведений условно разделены на два типа, которые в свою очередь выражают два крайних значения называемых постепенными и радикальными инновациями. Инноваций входящие в радикальную группу значительно отличаются от имеющихся технологий и практик, в связи с этим требуют «совершенно новых навыков, а также высокого уровня понимания потребностей рынка» [7]. Радикальные инноваций сопровождаются рядом плюсов таких как значительно высокие темпы производительности, существенное уменьшение денежных затрат. В литературе ведутся серьезные споры о точном определении радикальной инновации в большинстве современных концепций подчеркиваются четыре характерные особенности таких инновации как : (1) технологическая неопределенность, (2) техническая неопытность фирмы, (3) неопытность фирмы в бизнесе, связанная с результатами инновации и (4) существенные затраты [8]. Как и ожидалось, сочетание этих факторов создает существенные проблемы для фирм, намеревающихся внедрить и впоследствии получить прибыль от радикальных инноваций, известных в литературе как «барьеры» на пути к радикальным инновациям.

## Материалы и методы

Дизайн исследования, состоял из двух главных этапов как выявление и сбор статей о инноваций с акцентом на барьеры и второй этап контент анализ выявленных статей. Первый этап а именно эмпирическая часть исследования включал два анализа данных. Критерий отбора первого анализа основывались на заголовке статьи, ключевых словах, научности публикации. Второй анализ отобранных статей включал контент анализ всего текста на релевантность к теме исследования. Второй этап а именно контент анализ выявленных статей включал индуктивный и дедуктивный метод исследование статей для классификаций барьеров по трем категориям.

## Результаты

Исследования общих инновационных барьеров позволяют лучше понять барьеры радикальных инноваций, предлагая ряд категорий барьеров. Наиболее распространенная классификация инновационных барьеров, по-видимому, основана на разделении барьеров на внутренние и внешние барьеры. Это деление позволяет распознавать барьеры, на которые может повлиять фирма, и барьеры, которые частично

или полностью находятся вне ее влияния. Внутренние барьеры возникают внутри фирмы и тесно связаны с ее управлением и организацией и включают вопросы, касающиеся, например, финансовых ресурсов, компетенций и мышления. Внешние барьеры исходят из внешней среды фирмы и возникают, когда фирма взаимодействует с другими организациями или участниками экономических и инновационных систем; к ним относятся вопросы, касающиеся, например, поведения конкурентов, клиентов, партнеров и правительства [9]. В таблице 2 указаны барьеры на пути к инновациям по мнению зарубежных ученых.

Таблица 2.

### Барьеры на пути к инновациям

| Авторы                                                                            | Барьеры                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feldman, J. M. (2022).[10]                                                        | Автор выделил инновационное отставание компании; слабость промышленного профиля и эндогенных мощностей; неудачи в системной интеграции и противоречия косвенной промышленной политики, а именно недостаточная прямая и косвенная поддержка компании от государства как основные преграды для инноваций в Американской компаний Бад.                                                                                                                                                         |
| Huang, Y. F., Azevedo, S. G., Lin, T. J., Cheng, C. S., & Lin, C. T. (2021). [11] | Данные авторы выявили шесть основных барьеров для инноваций в сфере круговой текстильной промышленности как : низкий потребительский спрос на переработанные текстильные изделия, отсутствие успешных бизнес-моделей замкнутого цикла, проблема совместных инноваций между партнерами по цепочке поставок, отсутствие высококачественных перерабатываемых материалов и высокие затраты, но низкая экономическая выгода в краткосрочной перспективе.                                         |
| Ullah, F., Sepasgozar, S. M., Thaheem, M. J., & Al-Turjman, F. (2021) [12]        | Данные авторы утверждают что в сфере недвижимости барьерами для внедрения инновационных технологий являются: высокие риски связанные с высокой стоимостью программного и аппаратного обеспечения, высокая сложность выбранной системы распространения технологий, низкий уровень осведомленности, низкий уровень спроса пользователей, слабая техническая интеграция, отсутствие государственных стимулов, отсутствие поддержки НИОКР, отсутствие политики, отсутствие правил и стандартов. |
| Torres de Oliveira, R., Gentile-Lüdecke, S., & Figueira, S. (2022). [13]          | Данные авторы выделили следующие барьеры для инноваций: высокий экономический риск, высокие затраты на инновации, отсутствие финансирования со стороны, отсутствие средств                                                                                                                                                                                                                                                                                                                  |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>внутри компании, нехватка квалифицированных кадров, отсутствие стимулов для инвестиций в обучение, отсутствие вознаграждения за инновации, отсутствие свободы для развития собственных идей, низкий уровень обмена идеями внутри фирмы, сильный контроль со стороны начальника, низкий уровень сотрудничества внутри компании, отсутствие информации о технологии, отсутствие информации о рынке, трудности с поиском партнеров для совместной инновационной деятельности, низкий уровень доверия к местным институтам, низкий уровень защиты интеллектуальной собственности, доминанция устоявшихся предприятия, низкий уровень взаимодействия с исследовательскими институтами.</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Предыдущие исследования показывают, что фирмы, разрабатывающие радикальные инновации, сталкиваются с большим количеством барьеров, чем другие фирмы, поскольку участие в инновационной деятельности, как правило, повышает их осведомленность о связанных с этим трудностях.

### Обсуждение

Следует признать, что из-за редкости радикальных инноваций большинство выводов исследований основываются на случаях постепенных инновации. Тем не менее эти исследования показывают, что процессным инновациям препятствует нехватка человеческого капитала, нехватка финансовых ресурсов, низкий приоритет процессных инноваций, организационная структурная инерция, непомерно высокая стоимость инновационных проектов [14]. В таблице 3 произведена классификация барьеров на пути к инновации.

Таблица 3.

## Классификация барьеров на пути к инновации

| Барьеры экономические и технологические                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Барьеры организационные                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Барьеры внутренней и внешней среды                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Низкая экономическая выгода в краткосрочной перспективе, отсутствие финансирования со стороны, высокая стоимость программного и аппаратного обеспечения, отсутствие средств внутри компании, высокая сложность распространения выбранной технологии, отсутствие сбора, интеграции, обслуживания и возможности управления данными, отсутствие вознаграждения за инновацию, отсутствие доступа к рыночным данным для интеграции выбранных технологии с существующей инфраструктурой, отсутствие правовой базы, поддерживающей принятие выбранных технологии, отсутствие понимания умных электронных контрактов для использования выбранной технологии, отсутствие способности создавать и управлять независимыми онлайн порталами поддерживающими выбранные технологии. | Низкий уровень сотрудничества внутри компании, сильный контроль со стороны начальника, отсутствие доверия руководства и кредиторов к инновациям и внедрениям новых технологий, крайне жесткие специфические для фирмы стратегии и институциональные ограничения, отсутствие навыков цифровой коммуникации среди агентов, отсутствие организационной готовности инвестировать в рынок цифровых технологий, недостаточная осведомленность о повышении производительности благодаря инновационной технологии, отсутствие координации и сотрудничества заинтересованных сторон, отсутствие организационной готовности перейти от человеческих посредников к посредникам основанным на ИКТ. | Низкий уровень обмена идеями внутри фирмы, отсутствие государственных стимулов, поддержки НИОКР, политики, правил и стандартов, высокие требования пользователей к безопасности и конфиденциальности, отсутствие общественного спроса на выбранную технологию, отсутствие доверия к передаче организационных данных на аутсорсинг, высокая устойчивость к принятию выбранной технологии пользователями (когнитивный диссонанс), нехватка квалифицированных кадров, трудности с поиском партнеров для совместной инновационной деятельности, низкий уровень доверия к местным институтам, низкий уровень защиты интеллектуальной собственности, доминанция устоявшихся предприятия, низкий уровень взаимодействия с исследовательскими институтами. |

## Заключение

Был проведен подробный обзор выбранных статей, в котором выявлены основные препятствия на пути к инновации которые были распределены по категориям как: барьеры экономические и технологические, барьеры организационные и барьеры внутренней и внешней среды. В первой категории представлены барьеры как : низкая экономическая выгода в краткосрочной перспективе, отсутствие финансирования со стороны, высокая стоимость программного и аппаратного обеспечения, отсутствие средств внутри компании, высокая сложность распространения выбранной технологии, отсутствие сбора, интеграции, обслуживания и возможности управления данными, отсутствие вознаграждения за инновацию, отсутствие доступа к рыночным данным для интеграции выбранных технологии с существующей инфраструктурой, отсутствие правовой базы, поддерживающей принятие выбранных технологии, отсутствие понимание умных электронных контрактов для использования выбранной технологий, отсутствие способности создавать и управлять независимыми онлайн порталами поддерживающими выбранные технологий. Вторая категория содержит следующие барьеры: низкий уровень сотрудничества внутри компании, сильный контроль со стороны начальника, отсутствие доверия руководства и кредиторов к инновациям и внедрениям новых технологий, крайне жесткие специфические для фирмы стратегии и институциональные ограничения, отсутствие навыков цифровой коммуникации среди агентов, отсутствие организационной готовности инвестировать в рынок цифровых технологий, недостаточная осведомленность о повышении производительности благодаря инновационной технологии, отсутствие координации и сотрудничества заинтересованных сторон, отсутствие организационной готовности перейти от человеческих посредников к посредникам основанным на ИКТ. Третья категория включает следующие барьеры как: низкий уровень обмена идеями внутри фирмы, отсутствие государственных стимулов, поддержки НИОКР, политики, правил и стандартов, высокие требования пользователей к безопасности и конфиденциальности, отсутствие общественного спроса на выбранную технологию, отсутствие доверия к передаче организационных данных на аутсорсинг, высокая устойчивость к принятию выбранной технологии пользователями (когнитивный диссонанс), нехватка квалифицированных кадров, трудности с поиском партнеров для совместной инновационной деятельности, низкий уровень доверия к местным институтам, низкий уровень защиты интеллектуальной собственности, доминация устоявшихся предприятия, низкий уровень взаимодействия с исследовательскими институтами.

Данное исследование поможет специалистам практикам учитывать все аспекты при внедрениях процессных инноваций и достичь устойчивого развития фирмы. Однако в сырьевых отраслях фирмы единственный эффективный способ добиться устойчивого развития и уменьшить воздействие на окружающую среду это внедрить инновационные

технологий. Результаты исследования позволяют лучше понять барьеры на пути инноваций что в конечном итоге помогает компаниям и руководителям избегать их. Таким образом, несмотря на признание важности радикальных инноваций, в существующей литературе отсутствует понимание барьеров на пути их реализации. Этот вопрос остается открытым и требует дальнейших исследований.

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Сарсен. Қ. А. <sup>1</sup> \*, PhD докторант

\*e-mail: sarsen.kassym@yandex.kz

Кирдасинова К. А. <sup>1</sup>, э. ғ. к., профессор

e-mail: marso310@mail.ru

Естурлиева А. и. <sup>2</sup>, э. ғ. к., доцент

e-mail: estur2@mail.ru

<sup>1</sup> Л. Н. Гумилев атындағы Еуразия ұлттық университеті, Нұрсұлтан қаласы, Қазақстан

<sup>2</sup> Ш. Есенов атындағы Каспий мемлекеттік технологиялар және инжиниринг университеті, Ақтау қ., Қазақстан

## **Экономиканың шикізат саласына радикалды инновацияларды енгізудің негізгі қиындықтары**

### **Андатпа**

Радикалды инновацияның кедергілері (РИ) күрделі құбылыс болып табылады, оны түсіну өте шектеулі болып қалады. Мақалалардың мазмұнын талдауды қамтитын қолданыстағы зерттеулерге аналитикалық шолу жасай отырып, бұл зерттеу сыртқы және ішкі кедергілерді қамтитын инновациялық кедергілердің ең танымал классификациясын қарастырады. Клиенттердің қарсыласуымен және дамымаған желімен және экожүйемен байланысты сыртқы кедергілер, сондай-ақ шектеулі дүниетаныммен байланысты ішкі кедергілер. Инновациялық кедергілерді терең анықтау үшін мақалада осы терминнің әртүрлі анықтамалары қарастырылады, сонымен қатар инновация терминінің авторлық анықтамасы беріледі. Сондай-ақ, мақалада түбегейлі процестер мен өнім инновациялары арасындағы айырмашылық бар. Мақалада түбегейлі технологиялық инновацияларды зерттеудің маңыздылығы атап өтілген, өйткені осы бағыттағы зерттеулер тапшы болып қала береді. Бұл зерттеудің мақсаты-жүйелі әдеби шолу негізінде радикалды инновациялардың кедергілерінің классификациясын жасау. Тиісінше, бұл зерттеу радикалды инновацияның кедергілері бойынша қолданыстағы әдебиетке өз үлесін қосуға бағытталған. Бірінші міндет-инновацияның мәнін талдау және автордың анықтамасын беру. Радикалды инновацияларға тән кедергілерді екінші анықтау.

Әдеби шолу нәтижесінде радикалды технологиялық инновацияларды енгізудің келесі кең таралған проблемалары анықталды: қысқа мерзімді перспективада төмен экономикалық пайда, сыртқы қаржыландырудың болмауы, бағдарламалық және аппараттық құралдардың жоғары құны, жинаудың, интеграцияның және деректерді басқару мүмкіндігінің болмауы, инновациялық сыйақының болмауы, таңдалған технологияларды қолданыстағы инфрақұрылыммен біріктіру үшін нарықтық деректерге қол жетімділіктің болмауы. таңдалған технологияларды қабылдау, таңдалған технологияларды пайдалану үшін ақылды электрондық келісімшарттар туралы түсініктің болмауы, таңдалған технологияларды қолдайтын тәуелсіз онлайн порталдарды құру және басқару қабілетінің болмауы және т. б..

Мақалада сонымен қатар технологиялық инновацияның жағымды жақтары қарастырылады, атап айтқанда "дәл уақытында", "үнемді өндіріс"ретінде коммерциялық инновациялық тұжырымдаманы құру арқылы экономикалық пайда.

Sarsen. K. A. .<sup>1</sup> \*, PhD doctoral student

\*e-mail: sarsen.kassym@yandex.kz

Kirdasinova K.A. .<sup>1</sup> , Candidate of Economics, Professor

e-mail: marso310@mail.ru

Esturlieva A.I. .<sup>2</sup> , Candidate of Economics, Associate Professor

e-mail: estur2@mail.ru

<sup>1</sup>L.N. Gumilyova Eurasian National University, Nursultan, Kazakhstan

<sup>2</sup> Caspian State University of Technology and Engineering named after Sh.Yesenov, Aktau, Kazakhstan

## **The main difficulties of introducing radical innovations in the raw materials sector of the economy**

### **Annotation**

Barriers to radical innovation (RI) are a complex phenomenon, the understanding of which remains very limited. Thanks to an analytical review of existing research, including content analysis of articles, this study examines the most well-known classifications of innovation barriers, covering external and internal barriers. External barriers associated with customer resistance and an undeveloped network and ecosystem, as well as internal barriers associated with a limited worldview. For an in-depth definition of innovation barriers, the article discusses various definitions of this term and also provides the author's definition of the term innovation. The article also distinguishes between radical process and product innovations. The article emphasizes the importance of research on radical process innovations, since research in this direction remains scarce. The purpose of this study is to develop a classification of barriers to radical innovation based on a systematic literature review. Accordingly, this study aims to contribute to the existing literature on barriers to radical innovation. The first task is to analyze the essence of innovation and give the author 's definition . The second is the identification of barriers characteristic of radical innovations.

As a result of the literature review, the following most common problems of introducing radical process innovations were identified as: low economic benefit in the short term, lack of financing from the outside, high cost of software and hardware, lack of data collection, integration and management capabilities, lack of remuneration for innovation, lack of access to market data for integrating selected technologies with existing infrastructure, adoption of selected technologies, lack of understanding of smart electronic contracts for the use of selected technologies, lack of ability to create and manage independent online portals supporting selected technologies, etc.

The article also examines the positive aspects of process innovations, namely economic benefits through the creation of a commercial innovation concept, such as "just in time", "lean manufacturing".

## Legal Sciences

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# CRITERIA FOR EVALUATING THE EFFECTIVENESS OF BUDGETING THE COSTS OF AN ENTERPRISE FOR LABOR PROTECTION

Sarybayeva Inara Elshatovna

master's degree, Researcher, Republican Research Institute for Labor Protection of the Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan, Kazakhstan, Nur-Sultan

Сарыбаева Инара Ельшатовна,

магистр, научный сотрудник, Республиканский научно-исследовательский институт по охране труда министерства труда и социальной защиты населения Республики Казахстан, Казахстан, г. Нур-Султан

# КРИТЕРИИ ОЦЕНКИ ЭФФЕКТИВНОСТИ БЮДЖЕТИРОВАНИЯ ЗАТРАТ ПРЕДПРИЯТИЯ НА ОХРАНУ ТРУДА

**Abstract:** The results of scientific researches received during the scientific and technical program on a theme: "Risk-oriented organizational-economic mechanisms of ensuring of safe labor in conditions of modern Kazakhstan" (IRN OR11865833-OT-21) within the limits of program target financing of researches of the Republican research institute for occupational safety and health under MLSP of the Republic of Kazakhstan have been presented in the given article.

**Keywords:** efficiency, efficiency criteria, cost budgeting, performance indicators, labor protection.

**Аннотация:** В статье представлены результаты научных исследований, полученные в ходе реализации научно-технической программы на тему: «Риск-ориентированные организационно-экономические механизмы обеспечения безопасного труда в условиях современного Казахстана» (ИРН OR11865833-OT-21) в рамках программно-целевого

финансирования исследований Республиканского научно-исследовательского института по охране труда МТСЗН РК.

**Ключевые слова:** эффективность, критерии эффективности, бюджетирование затрат, показатели эффективности, охрана труда.

The evaluation of the effectiveness of labor protection measures is quite multifaceted: science, technology, environment, society and economy. (Table 1).

Table 1

Types of effectiveness from measures to ensure safe work

| Name of efficiency       | Characteristic                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scientific efficiency    | It is expressed in the growth of scientific information (the identification of new laws, the discovery of new phenomena, etc.), Intended for the use and consumption of labor protection in other areas of knowledge.                                                                                                                                                                              |
| Technical efficiency     | It manifests itself in the practical sphere of activity in the form of the development of safe equipment, rational processes, means of individual or collective protection, etc.                                                                                                                                                                                                                   |
| Environmental efficiency | It consists in reducing air, water and soil pollution, as well as in maintaining human health, which is the main goal of the ecosystem.                                                                                                                                                                                                                                                            |
| Social efficiency        | It is formed on the basis of reducing moral, material, physical and other damages that bring uncomfortable conditions to human life (incompatible with life). The social effectiveness of labor protection measures, like other types of efficiency, may not appear immediately, but at a distant time. This is its peculiarity. But they are important, and it is difficult to overestimate them. |

«Economic efficiency is an expression of social influence and therefore cannot act as an independent goal. The economic efficiency of the implementation of labor protection measures is expressed in a decrease in labor costs per unit of manufactured products and ultimately manifests itself in an increase in production efficiency. Also, economic efficiency is based on the concept of measuring the prevented damage caused by the low level of employees in unfavorable working conditions, occupational injuries and occupational morbidity [1].

The key signs of the economic effectiveness of methods that increase working conditions are:

a) the growth of labor productivity, determined by such certain indicators as a decrease in the labor intensity of products, a relative decrease (release) in the number of employees, an

increase in the volume of production, savings on working time, savings from reducing the number of occupational accidents and diseases.;

b) The annual economic impact (reduced cost savings), determined by certain indicators such as savings on cost elements of production, profit growth per one tenge. The amount of costs, the payback period for one-time costs.

The economic efficiency of measures aimed at creating favorable working conditions is determined for:

- selection of the optimal variant of the expected solutions from the point of view of socio-economic efficiency;

- determine the impact of occupational safety measures on both the main technical and economic indicators of the productive activity of the enterprise (workshop, site) and the amount of material losses associated with accidents, morbidity and staff turnover, as well as take this impact into account when developing the enterprise's business plan, planning activities within the framework of social partnership;

- demonstrate the growth of labor productivity in m-planning due to the improvement of working conditions;

- demonstrate the moral and material incentives of employees for inventions, innovation proposals, successful implementation of measures to ensure safe and healthy working conditions, including at the stage of designing new facilities and reconstructing existing ones.

« The calculation of economic efficiency is by comparing the existing standards or actual (in the absence of standards) labor, material and financial costs per unit of production (work) before the implementation of the measures with the cost standards established after the implementation of the measures» [2].

Economic efficiency is determined at the following stages of the development and implementation of measures to create favorable working conditions:

- at the planning stage of measures to improve working conditions (estimated efficiency) in order to justify the socio-economic efficiency of the expected solutions and choose their optimal option ; when comparing the options for expected measures to improve working conditions, preference should be given to those that provide the greatest social impact;

- the results of the implementation of the evaluation measures after implementation (actual effectiveness).

The method used to calculate economic efficiency should take into account the specific conditions of production and the nature of the activities carried out. In each specific case of improving labor protection, all the calculation methods described here can be used, several of them can be used, or one of them can be used.

«The economic efficiency of implementing measures to improve working conditions is manifested in reducing the costs associated with employee health loss compensation, reducing



unplanned losses of enterprises, and ultimately in improving the economic efficiency of production» [3].

Economic efficiency is calculated by comparing the current economic consequences of unfavorable working conditions before the implementation of measures with the actual costs determined after the implementation of measures to improve working conditions. The best option is considered to be a measure to improve working conditions, which has the greatest economic effect, or provided that the losses to be prevented are identical, the costs of achieving them are minimal. Economic efficiency is determined both at the stages of development and at the stages of implementing measures to create favorable working conditions. The effectiveness of labor protection measures is determined both at operating enterprises and at enterprises at the design, construction and reconstruction stages.

The main task in assessing the economic effectiveness of measures is to assess the economic harm caused by unfavorable working conditions before and after the implementation of measures.

The valuation of the economic efficiency of labor safety measures is based on the value of the prevented damage (prevented losses) from the unsatisfactory state of labor protection.. The damage prevented is represented here by the difference in damage before and after the implementation of the planned labor protection measures, and its reduction requires appropriate costs.

« At the same time, it must be remembered that the results of labor protection measures are long-term, and the cost of implementing these measures is often one-time. Therefore, the evaluation of economic efficiency should be carried out taking into account discounting (bringing results and costs at different times to an estimated point in time) ». [4]

All economic consequences of accidents that cause temporary or permanent disability can be divided into two categories: business losses caused by employee injuries and compensation costs for the consequences of loss of disability [5].

Thus, the results of labor protection measures are of a long-term nature, while the costs of their implementation are often of a one-time nature. Therefore, the assessment of economic efficiency should be carried out taking into account discounting (bringing different-time results and costs to one estimated point in time).

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## Қылмыстарды тергеп-тексеруді ұйымдастыру бойынша криминалистика ілімінің объектісі мен пәні.

Қайыргелді Қобыланды Ержанұлы

Б. Бейсенов атындағы Қарағанды академиясы, Қарағанды қ., Қазақстан Республикасы.

**Аннотация.** Мақалада қылмыстарды тергеп-тексеруді ұйымдастыру бойынша криминалистика ілімінің объектісі мен пәні, сонымен қатар қазіргі заманғы тұжырымға сәйкес келетін негізгі ерекшеліктері көрсетілген. Жүйелі түрде нақты теориялық фактілер мен құрылымдарға, сонымен бірге әр санатқа жеке түсіндірме берілген. Криминалистика іліміндегі тергеп-тексеруді ұйымдастыру ережелерінің объектісі мен пәніне байланысты негізгі заңдылықтарын терең бағытта қарастыру сұрақтары белгіленген.

**Түйін сөздер:** Қылмыстық процесс, криминалистика, криминалистік техника, криминалистік тактика, криминалистік оқыту, сотқа дейінгі тергеп-тексеру, тергеп-тексеруді ұйымдастыру, объект, пән.

Kaiyrgeldi Kobylandy Erzhanuly,  
B.Beisenov Karaganda academy of the Ministry of internal Affairs of the Republic of Kazakhstan,  
Karaganda, the Republic of Kazakhstan.

**Annotation.** The article shows the object and subject of criminology, as well as the main features corresponding to the modern concept of organizing the investigation of crimes. Specific theoretical facts and structures are systematically presented, with individual explanations for each category. The questions of in-depth consideration of the main laws related to the object and subject of the rules of the organization of investigation in the science of criminology are set.

**Key words:** Concepts of criminal process, criminology, criminological technique, criminological tactics, criminological training, pre-trial investigation, organization of investigation, object, subject.

Қылмыстарды тергеп-тексеруді ұйымдастырудың криминалистикалық теориясының қазіргі заманғы тұжырымдамасы объекті мен пән ерекшеліктерін ескере отырып, аталған ғылыми білім саласының ішкі қатынастарына қызмет етумен қатар оны бір бағытта негіздейді. Сонымен бірге оның одан әрі прогрессивті дамуының негізгі заңдылықтарын айқындауы керек. Бұл жүйеде ғылыми білімнің объектісі мен пәнінің түсінігі және құрылымы маңызды орын алады, себебі табысты ғылыми әрекет тек зерттелетін сыртқы дүние құбылысын нақты түсіну арқылы ғана мүмкін болады.

Криминалистика объектісін тікелей қалыптастыру міндетін В.В. Клочков, В.А. Образцов, О.В. Чельшев, А.Ф.Аубакиров, С.И. Кисленко, С.И. Коновалов, В.Я. Колдин және Н.П. Яблоковтың зерттеулерінде нақты анықталып зерделеген. Криминалистика пәнінің анықтамасын А.Н. Васильев, Р. Белкин, И.Ф. Крылов, Ю.И. Краснобаев, В.Е. Корноухов, А.М. Кустов, В.В. Степанов секілді атақты орыс ғалымдары жан-жақты талдаған.

Криминалистика ілімінің пәні, ғылым объектісінің санатымен тығыз байланысты, сондықтан бұл екі санат жұп категорияларға жатады. Сонымен бірге осы жинақ элементтерінің бірінің басымдығы туралы мәселе туындайды. Объект – қоғамдық қатынастардың белгілі бір қабатын білдіретін және олардың өмір сүруінің қажеттілігін анықтайтын объективті құбылыс ретінде негізгіге айналады. Криминалистикалық ілімнің объектісі мен пәні бір-бірімен тығыз байланысты, бірақ толық сәйкес келмейді. Объект ұғымы кеңірек, ол субъектілердің, қоғамдық қатынастардың танымдық және практикалық әсеріне ұшырайтын сыртқы дүние құбылыстарын қамтиды. Пән – бұл ғылыми

білімнің осы саласы зерттейтін объектінің белгілі бір аспектісі, оның бөлігі немесе жеке сала ретінде қарастырылады. Осыдан, бұл екі сала анықтамасы, ең маңызды сұрақтардың жиынтығы болып белгіленеді. Қарастырылатын жұп категориялары, криминалистикалық ілім зерттейтін мәселелердің шеңберін алдын ала анықтайды.

Объект, әдетте, бірқатар ғылымдарға ортақ, бірақ бір ғылымның пәні екінші ғылымның пәнімен сәйкес келе бермейді. Криминалистикалық ілімнің белгілі бір ғылыми саласының дербестігі мен өзіндік ерекшелігін, оның басқа білім жүйесінен айырмашылығын анықтайтын өзінің тікелей пәні бар. Қазіргі кезде бар объектілердің көптілігі, әсіресе объективті шындықтың әртүрлі аспектілері мен көріністерін сипаттайтын таным объектілерінің әртүрлілігі, көптеген ғылымдардың болуын айқындайды.

Объектіні зерттеу мақсаттылықты білдіреді, себебі кез келген объект көп қырлы, күрделі байланыстар жүйесі бар, бірақ оның барлық аспектілері белгілі бір ғылыми сала үшін танымдық қызығушылық тудыруы мүмкін емес. Сондықтан, барлық білім қызығушылық саласына жатады деп тануға болмайды. Сонымен қатар, бірқатар жағдайларда зерттеуді қате бағытта ілгерілету оң мәнге ие, өйткені мұндай білімнің нәтижесі объектіні немесе оның жеке аспектілерін одан әрі зерттеу үшін қажеттілердің қатарынан алып тастау болып табылады.

В.В. Клочков криминалистиканың объектісі мен субъектісінің арақатынасын қарастыра отырып, объект пен субъект ұғымдарын қалыптастыру үшін субъектіні дүниеден оқшауланған белгілі бір тұтастықты білдіретін категория ретіндегі жалпы философиялық анықтаманы негізді түрде атап өтті. Криминалистика ілімінің объектісі, оның пікірінше, «бұл криминалистикаға белгілі бір құбылыстарды, процестерді, әрекеттер мен шындықты білдіретін күйлер ретінде танылады». Бұл ретте автор тек криминалистиканы ғана емес, басқа ғылымдарды да зерттейтін, біртекті элементтерден тұратын криминалистикалық объектінің күрделі құрылымын атап өтті.

Біздің ойымызша, білімнің объектісі, пәні және ғылым пәні әртүрлі, бірақ өзара байланысты және өзара тәуелді санаттар. Объект – бұл криминалистикалық зерттеуге бағытталған әлеуметтік қатынастар, процестер, құбылыстар және фактілер жиынтығы.

Білім пәні ғылым пәнімен тығыз байланысты, ол ғылым пәнін ақпаратпен қамтамасыз ететін құрал. Ғылымның пәні – оның білім субъектісінің қызмет етуі арқылы алынған ақпаратпен толтырылатын, қалыптасатын ұғымдық мазмұны болып табылады. Сондықтан, объектінің белгілі бір саласын зерттеумен шектелетін уақытша жұмыс категориясы ретіндегі білім пәнін іргелі, динамикалық болса да, құбылыс ретіндегі ғылымды танудың пәнін ажырату керек. Белгілі бір білім пәнін зерттеу барысында белгілі бір сипаттағы нәтижелер, әдетте, ғылым пәнінің элементтеріне әсер етеді.

Қылмыстарды тергеп-тексеруді ұйымдастырудың криминалистикалық ілімінің объектісі әртүрлі факторлардың әсерінен қалыптасады: біріншіден, криминалистика объектісі оған шешуші әсер етеді деген алғышарттан шығу керек. Осы ережені негізге ала отырып, қылмыстарды тергеп-тексеруді ұйымдастыру жөніндегі криминалистикалық ілімінің объектісі криминалистика объектісінің бір бөлігіне кіреді; екіншіден, объект ғылыми факт ретінде, ал пән – оны сипаттайтын заңдылықтардың жиынтығы ретінде әрекет етеді; үшіншіден, қылмыстарды тергеп-тексеруді ұйымдастыру туралы криминалистикалық ілімінің зерттеу объектісі, бір жағынан, сот-медициналық сараптама саласындағы қызметті ұйымдастыруды криминалистикалық қамтамасыз етуді жүзеге асырудың тиімді әдістерін және құралдарын әзірлеуге байланысты қоғамдық қатынастар болып табылады, екінші жағынан, қылмыстарды ашуды, тергеуді және алдын алуды ұйымдастыруда барынша тиімділікке қол жеткізуге бағытталған объективті шындықтың құбылыстары, процестері, фактілері.

Жоғарыда келтірілген факторлар қылмыстарды тергеп-тексеруді ұйымдастырудың криминалистикалық ілімінің объектісі қоғамдық қатынастарға байланысты қылмыстық сот ісін жүргізу саласындағы қызметті ұйымдастыруды криминалистикалық қамтамасыз етудің әдістері мен құралдары болып табылады. Қылмыстық сот төрелігі саласындағы қызметті ұйымдастырудың теориялық ережелерін және олардың іс жүзінде жүзеге асырылуын көрсететін белгілі бір құбылыстар, процестер, объективті шындықтары жатады. Сондай-ақ қылмыстарды тергеп-тексеруді ұйымдастыру бойынша криминалистикалық ілімінің пәнін жан-жақты зерттеу және соның нәтижесінде криминалистикалық ілімінің ең тиімді ережелерін іске асыру үшін ғылым мен

тәжірибенің заманауи талаптарына сай келетін криминалистикалық ұсынымдар кешенін әзірлеу алдағы уақытта негізгі бағыт болып табылады.

Қылмыстарды тергеп-тексеруді ұйымдастыру туралы криминалистикалық ілімінің пәні – объективті фактілердің, құбылыстардың, шындық процестерінің белгілі бір жиынтығы ретінде белгіленеді. Осы негізде анықталған қызмет ету заңдылықтары, оларды өзгерту үшін әдістер мен құралдарды әзірлеу арқылы кемелденуде.

Қылмыстарды тергеп-тексеруді ұйымдастырудың криминалистикалық ілімінің объектісі мен пәнін түсінудің әдіснамалық мәні – тек білімінің негізінде ғана емес, сонымен қатар бағытты дұрыс анықтауға, теориялық және практикалық тұрғыдан табысты зерттеуге бағытталады.

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## Pedagogical Sciences

### Формирование вокально-исполнительских навыков у будущего учителя музыки.

Куаншалиева Раушан Жардемовна

магистр музыкального образования, старший преподаватель Западно-Казахстанский университет имени М. Утемисова

Техническое обеспечение учебного процесса, современное музыкальное образование путем соединения лучших образцов классической и современной музыки позволяет создать учебный процесс, повышающий интерес обучающихся к пению.

В образовании сочетание образцов классической музыки с современной музыкой в духовной связи возможно только в том случае, если сам учитель музыки компетентен и может сам исполнять некоторые произведения. Важной частью урока музыки является формирование навыков преподавания и исполнения песен. При этом подача учителя музыки в его исполнении зачастую играет решающую роль в формировании отношения учащихся к песне и мотивации к усвоению музыкального материала. Для этого учитель музыки должен изучить тонкости певческого голоса как музыкального инструмента.

Профессионализм певческого голоса и однородность в звучании - это длительный процесс, который совершенствуется систематическими распевками по формированию голоса с правильным выбором техники, точностью приемов звукоизвлечения, правильным владением музыкальными стилями и общей исполнительской культурой.

Голос певца в исполнительском мастерстве раскрывается через богатство художественного содержания обучаемого произведения, присущие ему внутреннее чувство, настроение, диапазон голоса, глубину смысла музыкально-поэтического текста.

Достижение высокого уровня пения начинается с овладения передовыми вокальными данными. Поэтому формирование вокально-исполнительского мастерства следует рассматривать как составляющую профессионального развития будущего учителя музыки. В данной статье мы, как педагог-вокал, делимся методами, используемыми при формировании вокально-исполнительских навыков будущих учителей музыки. В нашем опыте мы используем одну из педагогических технологий, системный метод обучения. Методика системного обучения вокалу рассматривает исполнительское мастерство как сложное, многоуровневое, многогранное явление. Метод систематического обучения позволил сформировать исполнительское мастерство

будущего педагога-музыканта путем синтеза основных направлений понимания. Системные методы обучения были разработаны учеными-педагогами-музыкантами Э.Б.Абдуллиным, Ю.Б.Алиевым, О.А.Апраксиной, Л.Г. Арчажникова, Л.А. Безбородова, В. Я. Петрушин, В. ГРАММ. Райников. , Г. М. Цыпин, А. Л. Гоцдинер, Л. Л. Бочкарев, Л. А. Баренбойм, Н. К. Бакланова, Р. Ф. Сулейманов, М. М. Берлянчик и другие. использовал в своих экспериментах и достиг цели [1. 326]. С целью выявления структурных компоненто в системного подхода к обучению и их содержания они классифицировали их следующим образом:

1) Мотивационно-волевой компонент в методике систематического обучения включает направленность на исполнительскую вокальную деятельность и психологическую подготовку к публичному пению при формировании фокусно-исполнительских навыков;

2) оперативно-технологический метод в методе систематического обучения предусматривает приобретение навыков слуха, голосообразования, дыхания, артикуляции;

3) направлена на развитие самоконтроля, саморегуляции на пути профессионального становления, умения преодолевать технические трудности выполнения при выполнении нормативно-психологической деятельности методом систематических занятий;

4) Индивидуальная творческая деятельность в методе систематического обучения показывает индивидуально-творческий характер исполнения.

Методика систематических занятий по формированию вокально-исполнительских навыков является универсальной для любого педагога-музыканта. Однако наиболее специфические характеристики профессионального описания компонентов исполнительского мастерства вокалиста относятся к операционно-технологической подсистеме и базируются на вокальном мастерстве. ФУНТ Дмитриев понимал характер работы голосового аппарата, определенные «динамические стереотипы певческого мотора», обеспечивающие профессиональное звучание голоса [2, с.628]. Педагоги по вокалу Л.Б.Дмитриев, Г.П.Стулова, А.Г.Менабени, В.Багадуров, В.П. Морозов, А.М.Вербов, В.В.В. Емельянов и др. в своих работах среди основных приемов голосовой техники они выделяют следующие: дыхание, резонанс, артикуляция, звукоизвлечение, вокальный слух, эмоциональная выразительность исполнения, используя в своей работе голосовые подсказки из научных исследований этих педагогов , самое главное в формировании вокально-исполнительского мастерства будущего учителя музыки находится в образовательной среде Мы сгруппировали следующие компоненты технологической подсистемы: вокальные способности. Они:



- навыки звукообразования: правильное интонирование, чувство резонанса, целенаправленное управление регистром звука, использование различных видов звуковой атаки, подвижность голоса;
- навыки аудирования: выделение из звукового потока качественных характеристик звучания песни, сопоставление их с развитыми вокально-слуховыми выражениями, определение эмоциональной окраски звучания;
- навыки дыхания: пение, оптимальный объем дыхания для определенного вида вокальной партии, умение передать дыхание всей музыкальной фразе;
- артикуляционные навыки: четкость и правильность дикции, логическая выразительность, фразировка, выразительность [3,138 с.].

Дадим краткую характеристику основным направлениям вокальной работы на начальном этапе, которые формируются посредством вышеназванных умений.

1. Первые шаги в работе педагога через необходимые условия подготовки к вокально-исполнительскому процессу певца связаны с усвоением новой привычки внимательного отношения не только к голосу ученика, но и ко всему телу. Правильное и удобное положение тела, его свобода в звукообразовании, способность координировать работу мышц определяют эффективность работы голосового аппарата. Поэтому певческое внимание будущего учителя музыки должно быть направлено с первых занятий на свободное положение тела, головы, рук, ног, естественность дыхания, чувство зевоты при пении. В этом случае процесс голосообразования будет продуктивным.

2. Дыхание, т. е. певческое дыхание, — основа образования гласных, энергетическая система, определяющая силу, продолжительность и окраску тона. Опираясь на свой опыт, педагог предлагает певцу, начинающему осваивать новую певческую азбуку, возможные варианты обучения правильному дыханию, при которых обеспечивается нормальное и равномерное давление воздуха под голосовыми связками. Однако работа дыхательной системы характеризуется рефлекторностью. Поэтому приспособление процесса дыхания к пению требует нахождения реакций, последовательной и длительной интеграции ощущений, устранения различных мешающих мышечных сокращений.

3. В работе со звуком будущий учитель музыки должен обучаться изучению возможностей и особенностей своего голоса под руководством педагога по вокалу, а формируя исследовательские навыки, он будет искать способы эффективного использования своего голосового аппарата, резонанса, работать над согласованием работы всех отделов речевого аппарата, звукообразованием, выработкой правильных звукоизводящих механизмов.

4. Для достижения мастерства вокального искусства в работе над артикуляцией необходимо знать не только владение звуковыми возможностями своего голоса, но и



характер музыки, умение выражать различные оттенки чувств, ее является важным условием четкого и правильного произнесения текста.

5. Вокально-исполнительский навык формируется только тогда, когда особое внимание уделяется гигиене голоса и тренировке голоса.

С первого занятия вокалист, формирующий будущего учителя музыки, должен соблюдать ряд вокальных правил:

- работа в комфортном диапазоне и динамике;
- постепенное расширение звукового и динамического диапазона;
- не понижай голоса,
- Уроки вокала должны быть ежедневными и систематическими [4].

Следуя указанным выше методическим рекомендациям, мы сочли целесообразным дать определение изучаемому явлению на основе изучения компонентов вокально-исполнительского мастерства. Вокально-исполнительское мастерство будущего учителя музыки зависит от развития определенного уровня вокальной деятельности, обеспечиваемого ее составными элементами, а именно: мотивационно-волевой, операционально-технологической, нормативно-психологической, индивидуально-творческой деятельности. Формирование составных элементов также определяет формирование и развитие его профессионального мастерства [5, 262 с]. Обобщая небольшие исследования в нашей статье, отмечаем, что в формировании вокально-исполнительского мастерства будущего учителя музыки каждый урок должен быть спланирован и систематически комплексно использован, и только тогда будет достигнут результат.

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# Application of Project-Based Learning in biology classes and extracurricular activities

Sevinj Mehdiyeva Nizami

Azerbaijan State Pedagogical University, Faculty of Chemistry and Biology, teacher

**Summary:** The article is devoted to the application of project-based learning in biology classes and extracurricular activities. This method is considered in terms of achieving the goals of modern education, the intellectual and moral development of a person, the formation of critical thinking, and the ability to work with information.

**Keywords:** project, extracurricular activity, research, biology, student

One of the main tasks of a modern teacher is to create a favorable environment for students to fully realize their educational and, most importantly, creative potential in the classroom and extracurricular activities. Project-Based Learning (PBL) is the mainstay of this foundation. The most important projects for schoolchildren are those in which real-life problems solved. Because the conclusions of solving this problem are practically applicable. Extracurricular activity is a form of training aimed at the expansion of knowledge, development of creativity, and professional orientation of students according to their inclination, interest, and ability. Extracurricular activities are not restricted by strict time limits, unlike classes. The main difference is that extracurricular activities place more emphasis on working on projects rather than theoretical material. The objectives of extracurricular activities are as follows:

- creation of conditions for the development of one's own interests based on free choice, understanding of spiritual and moral values and cultural traditions;
- creating conditions for positive communication of students at school and outside its boundaries, to show initiative and independence, responsibility, and sincerity in real-life situations.

The extracurricular activity involves working in several areas, one of which is project activity. Project-based learning is a new approach encouraging student active participation in class, supporting high-level cognitive activities, and requiring the use of a wide variety of tools and resources, also requiring the combined use of academic, social and life skills. If a project-based learning approach is incorporated into classroom and extracurricular activities, students can progress in cognitive, affective, and psychomotor domains.

The project method is based on the followings:

- development of students' cognitive skills;
- the ability to independently create their own knowledge;
- to navigate in the information space;

- development of critical thinking.

Project-based learning consists of several stages.

- Selection of the project: definition of the topic, search and analysis of the problem, determination of the project purpose.
- Analysis: analysis of available data, search for information gaps, data collection and study.
- Practical: implementing planned operations, making changes in design and technology.
- Presentation: preparation of presentation materials, presentation of the project, investigation of the possibilities of using the project results.
- Project evaluation: analysis of project results, and evaluation of project quality.

Involving students in projects helps to develop their interest in biology, also to reveal talented students. Projects should be carefully planned by teachers to be fun and exciting for students. Planned projects should not have a very complex structure. Otherwise, complex projects may cause completion and students' interest in the subject may decrease. Teachers should guide the project selection. Let's consider some project topics.

In the project "Medicinal plants of our land", the class is divided into several groups: doctors, cooks, cosmetologists and phyto designers. Each group should carry out a project on the use of plants in their area. For example, a medical group prepares a collection of material on medicinal plants in the form of a booklet, shows what diseases these plants are used for, adds medical recipes of folk medicine, photos of plants. A group of chefs collects information about which herbs are used in the preparation of national dishes and shoots a video clip. A group of cosmetologists prepares the information collected about the beneficial properties of various herbs for skin and hair in the form of a photo collage. A group of phyto designers prepares a project on the aesthetic use of decorative plants. Children prepare a brochure about the rules of growing these plants, storage conditions, and making compositions from them.

In the project "Plastic bottles: finding, or a problem for humanity?", the main aim of the project is to study the importance of plastic bottles in the life of modern people and their impact on the environment. The topic of the project is quite relevant, because every year millions of plastic bottles are produced and thrown away. The bottles used are a big environmental problem. One of the most urgent environmental problems in the world is the recycling of plastic containers. The practical significance of the research is to teach schoolchildren to take care of the nature surrounding us, to find a second life for plastic bottles. For this purpose, the students set the following tasks:

- to learn the history of the creation and use of plastic bottles;
- to study the chemical properties of the material from which plastic bottles are made;

- to consider environmental problems related to environmental pollution with plastic bottles;
- to educate students about respect for natural resources;
- to develop a sense of responsibility for the environmental condition of the planet;
- to explore possible ways to use plastic bottles in daily life.

The project "School as an ecosystem" aims to determine the impact of the environment on the school. Students are given the following tasks:

- Describe the school as an ecosystem.
- Identify sources of environmental "pollution" at school and the measures to reduce their impact on humans.
- Draw up the environmental passport of the school.

The results of the study can be used to solve environmental problems not only for children but also for adults.

The "Know thyself" project is very interesting for students because they discover themselves. Consequently, students expand their knowledge of proper body formation, analyzers, the effect of harmful habits on the body, engage in self-education, and pay attention to their health.

By working on a biology research project for "Drugs: types and their properties", students research and learn about the differences between types of drugs, their modern versions, and effects on human health. The project raises the issue of drug addiction.

The problem of obesity is very relevant in modern times. Obesity is now considered a global epidemic worldwide. Simultaneously, the prevalence of obesity increases not only among adults but also among children. While working on a research project on "Obesity" in biology, students learn that the development of obesity is related not only to external factors but also to internal (genetic) factors, then obesity causes diseases of the cardiovascular system, diabetes, liver, respiratory system, and other diseases.

While the project work on "Study of blood groups and their influence on a human character" is implemented individually, the differences between blood groups, their composition are studied, and it is also determined whether the blood group affects a person's character.

The application of the project method is a necessary component to prepare students for deciding on their future professional choice. In today's world, professional success is determined in many ways by a person's ability to set goals, draw up an action plan, find and analyze the necessary information and resources, and evaluate correctly the results. Independence, mobility, and initiative are required in decision-making. It is assumed that the foundations for the development of a thinking, independent, creative personality will be laid at school. So project-based learning is so important.

# What should the students know for improving the quality of their writing works?

Ilhama Rahimova Rafique

PhD, Pedagogical sciences, Azerbaijan University of Technologies

**Abstract:** This article covers five practical ideas-recommendations for students to self-review, revise and improve the pre-submission written work. Since the author of this article tried the given advices on herself and with the help of her students, she can firmly recommend those five tips for students to follow them. According to the author's opinion if students follow those five tips they can make progress in writing.

**Key words:** self-assessment, computer, dictionaries, feedback.

This article describes five practical ideas-recommendations to help students improve their written work. The article is addressed directly to students, and contains working examples of the problems that we, teachers, most often encounter in the written work of our students. Let's try to give our students the opportunity to sort out their mistakes by themselves, and we will only direct them in the right direction. The following approaches to self-checking written work may be suitable for most students.

Dear students, the hardest part of checking any written paper is identifying those small errors that can be corrected before handing in the written assignment to the teacher. When speaking of writing assignments, I mean essays, abstracts, term papers and theses that you write at home on your own. Completing your home writing assignment is actually a false finish and therefore, a re-finish is necessary. If you read this article up to the end and try the methods described below at least one time, you will see by yourself how effective they are.

Before we start, you will need the following things at hand: 1) A set of marker pens in various colors or colored pencils (it is desirable to have at least five colors to begin with); 2) A mobile phone with a recording application; 3) A dictionary of synonyms, you can also use a soft version and/or an application; 4) One of your written works (abstract, essay, term paper, etc.)

So let's get started, choose a specific color marker pen or colored pencil for specific vocabulary parts, for example, use yellow for nouns, green - for verbs, and other colors for adjectives, conjunctions, etc. Browse your written work and highlight any examples you can find. Then, think on the following: "Is this the best word you can use?" Do these words really (exactly/precisely) express (say/show) what you want to say (express)? Can you find another

(the second), better (superior) word? You can also think more carefully on the words you know, or you can consult a dictionary.

You can use the dictionary of synonyms. There are also computer versions of such dictionaries or even mobile applications. I've been thinking on many words in this paragraph and have substituted an alternative word for some of them in parentheses ( ). One of these words was the word "to say". The dictionary in my computer offered me several versions instead of the word "to say". These are "to state, to speak, to note, to express, to pronounce, to declare, to report" .

Not all the given examples in a dictionary can mean the same action and the same word you need. Consequently, you need to cross-reference with the dictionary to make sure it means exactly what you really want to express. Try it now.

After doing this method, you can move on to the next step. Find out what type of mistakes you usually make? Do you have so-called writing habits that ruin your writing product? If you don't know how to do this, look at one of your papers, corrected by your teacher. You often make the same mistakes, don't you? You forget, skip, or confuse the articles (a, an, the), don't you? Are all your sentences of the same length? The structure of your sentences is almost always the same, and your sentences are similar to each other, aren't they? If this is the case, you will also need to look at one of the grammar books you use and underline the rules you need to follow. Make a list of such rules as a visual aid, keep it in a conspicuous place and refer to it when checking your written assignment.

The next step is to listen to your written work. While you are writing and re-reading your work, your eyes and brain are getting accustomed to the words you see. Most of the time you become too familiar with your own written work (words, phrases, word combinations) and as a result of it you miss (do not notice) those little mistakes that your eyes and brain are got used to.

In fact, *on the basis of a study carried out at one of the English universities, it was established that the order of letters in word does not matter, the only important thing is the right order of the first and the last letters. The rest of the letters can be skipped, and you still will be able to read such a word.* Are you convinced now? You managed to read and understand, without any effort, the written by me intentionally with mistakes sentences, did not you? Therefore, you need to read your paper aloud and record your voice.

After doing this, you will be able to find some of your mistakes. But the next step is even more important. While reading your written assignment play your recorder/player back and listen to it again. I am more than sure that during this process you will be able to:

- a) catch minor errors (articles, grammatical tense, grammatical rules, etc.);
- b) realize that the rhythm of your writing work is too monotonous (similar word and sentence lengths, similar sentence structure etc.);

c) find the absence of a smooth transition between thoughts and sections (absence or enumeration of conjunctions);

d) find, actually, to hear that you used the same word, expression or word combination too often or you used too simple words.

While listening, pause and make corrections and repeat this process until you are sure that you have no more errors.

Another equally important way of checking your writing assignment is to check spelling backwards. This is a very simple and easy way to do. Computers can check spelling for you, but electronic spell checkers are not always perfect. *The photo verification program on your computer can only verify those words that are similar to the words entered in the computer monument.* Is there anything strange in the last sentence? Yes, of course there is, but my computer does not think so, it thinks that I wrote everything correctly. Why? Let's take a look at the last sentence the computer spell checker provided me. I wanted to write the following: "The spell checker on your computer can only check the words that are similar to the words stored in the computer's memory," but I deliberately made those mistakes in order to see how the spell checker on my computer works. It did not react in any way, since all these words are in its memory, and they are correctly written, but I wanted to convey a completely different thought. Exactly the same can happen with your written work, so you should not completely trust the computer spell checker. To be completely sure, first do a spell check using a computer version or any application, and then do the checking yourself using a dictionary.

To avoid the problem described in the above paragraph, I suggest you to use the following method. Read your written assignment backwards. When we read, we group words in our minds. We do not read each word individually, so we may miss spelling errors or missing words made in the process of writing. Reading from the end to the beginning gives us the opportunity to concentrate on individual words, and we can much more easily identify our mistakes. Try to do it now.

The last but not the least way of checking your written assignment is as follows: before handing in your final written product to the teacher, give your paper to somebody for revising, checking your errors and correction. Find a person who could spend some time on your written work, give you some good notes, advice and, of course, some criticism. Often a peer can give you the best feedback rather than a teacher who needs to check a lot of written work. This idea was confirmed by Professor J. Frodesen, who noted that indirect feedback is more practical than direct error correction [Frodesen, 2010:164].

Conclusion. After reading this article, you can use those five main ideas-recommendations to improve the quality of your written assignment. Obviously, this adds some extra time and effort to your writing activity, but it may be the time you put in now rather than the time taken from you later by the teacher who asked you to rewrite your paper. It is better to move slowly and carefully, without making any mistakes, rather than chasing too fast and

having a huge number of mistakes. I hope that with a little diligence, you will get a high-quality final written product.



# Mistakes made in the formation of literary pronunciation habits in primary grades and ways to eliminate them

Musayeva Lala Qismet

Doctoral student of Azerbaijan Pedagogical University, teacher of the department of Azerbaijani language and its teaching technology

## ABSTRACT

The "spelling" pronunciation that occurs when reading is not at all explained by the fact that younger students do not know how to pronounce words correctly: after all, in ordinary speech, children pronounce these and similar words in accordance with the laws of the Azerbaijan phonetic system. Illiterate pronunciation is caused by the influence of the printed or written word and, no less important, is supported by the insufficient formation of the skill of fluent reading of primary school students. Thus, deviations from the phonetic laws of pronunciation disappear as the reading technique improves and its speed increases.

**Keywords:** orthoepic norms, literary pronunciation, primary school, phonetic

For successful work on the development of the sound side of students' speech, it is important to reveal the mechanisms for mastering Azerbaijan literary pronunciation by children of primary school age, to show the patterns and features of mastering orthoepic norms at the initial stage of education.

A preschool child perceives and reproduces only one form of speech - oral, while his pronunciation is always compared with the pronunciation of adults "without any consideration of the relation to the spelling, written language" [3]. With admission to school, the process of mastering pronunciation by children continues under the significant influence of writing on it. This is the specificity of mastering the norms of literary pronunciation in primary school age. At school, children begin to master two completely new types of speech activity for them: reading and writing, which include the visual analyzer in the work, which causes a significant restructuring of the previously established mechanisms in the auditory and speech-motor analyzers.

It is at primary school age that the tendency for pronunciation to become closer to spelling is actualized, which is recognized by many Soviet linguists as the leading trend in the development of the orthoepic norm today. writes: "Of course, the influence of the book has affected the pronunciation of sounds before. However, now "under the conditions of universal

literacy” , when oral speech skills are laid not only by ear, by imitating the speech of adults, but also by visual assimilation of the graphic image of the printed word, the impact of writing on pronunciation has increased immeasurably” [4]. Thus, pronunciation skills primary school students are formed and developed under the unrelenting influence of the graphic form of the word, which cannot be ignored when organizing orthoepic work in the primary grades.

In the speech of younger schoolchildren, there are various deviations from the norms of Azerbaijan literary pronunciation. It is advisable to classify all deviations from orthoepic norms according to the reasons that cause them. For Azerbaijan students, the main sources of pronunciation errors are writing, vernacular and dialect. In accordance with this, three types of orthoepic errors in the speech of children of primary school age are distinguished:

- orthoepic errors caused by the influence of the spelling of the word;
- spelling errors of colloquial nature;
- orthoepic errors of dialectal origin.

It is fundamentally important to distinguish between two spheres of influence of writing on the pronunciation of younger students. The first is the influence of the connection between the spelling of a word and its pronunciation on children's mastery of the phonetic laws of the Azerbaijan language. The second is the impact of writing on the formation of students' spelling skills. In this regard, it is necessary to distinguish between phonetic and spelling errors in children's speech. “The correct qualification of an error, - as rightly noted, is the key to successful work on its prevention and elimination” [5].

Let us consider the influence of writing on the level of phonetic development of primary school students. Observing the laws of pronunciation in ordinary oral speech, which are objective for all speakers of Azerbaijan, children violate them in the process of reading, when the literal form of the word has a direct effect on pronunciation. The following phonetic errors are typical for students reading:

- unreduced pronunciation of unstressed vowels in the words: avtomobil instead of aftamabil;
- pronunciation of paired voiced consonants at the end of a word before a pause, according to the spelling: qoruq instead of qoru[k],
- pronunciation of paired deaf before noisy voiced consonants instead of voiced;
- pronunciation of hard dental instead of soft before soft dental consonants.

Orthoepic errors of dialectal origin in the speech of urban schoolchildren are not widespread, inherent in individual students, but nevertheless certainly deserve attention. In rural schools, however, such deviations from the orthoepic norms of the Azerbaijan literary language are the rule rather than the exception in the oral speech of students. The term itself (mistake) in relation to the dialect features of pronunciation can be considered legitimate only from the point of view of the literary language, from the point of view of the native dialect of the speaker, this is the natural norm of pronunciation. The education of literary pronunciation in children in

dialect conditions is a very difficult task, because the dialect pronunciation of schoolchildren finds strong support in their speech environment. The moral, ethical aspect of the task comes to the fore. From a rural teacher, not only good linguistic and methodological training is required, but also great care, delicacy in dealing with children, since the dialect language is the native, maternal language of a child who comes to school. This language was taught to him by the closest people: mom, dad, grandmother, grandfather. Causing disrespect to the native dialect of the speaker is an ignoble and ungrateful thing. Unethicalness is hidden in the usual wording "the fight against dialectal errors in the speech of students" . After all, as the wise man said: "To attack the language of the people is to attack their heart." Children who grew up in a dialectal environment should be tactfully explained that there are two languages: the language they speak, communicate at home, and the literary language taught in school.

What conclusions does the analysis of the results of the survey of the level of pronunciation literacy of younger schoolchildren lead to?

Common to all Azerbaijan primary school students are:

- a) spelling errors due to the influence of the spelling of the word;
- b) spelling and accentological errors of a colloquial nature. Of these, the most typical for children of primary school age are mistakes made under the influence of the visual appearance of words. The task of preventing and eliminating the negative impact of spelling, as the leading cause of deviations from orthoepic norms, should occupy a central place in teaching Azerbaijan literary pronunciation.

In the light of the reforms of modern language education, one of the priority areas is teaching pronunciation.

Teaching pronunciation is of great importance, since its effectiveness largely determines success in mastering oral speech. It is known that large deviations from the norms of pronunciation lead to misunderstanding of the speech of the interlocutor, cause violations of the process of oral exchange of thoughts. One of the most important conditions for communication is the development of auditory-pronunciation skills, that is, the ability to correctly associate an audible sound with its corresponding value and produce sounds corresponding to certain values.

An analysis of domestic and foreign methodological literature shows that there are two approaches to teaching pronunciation:

- 1) imitative;
- 2) analytical and imitative.

The process of developing a pronunciation skill goes through several stages.

- 1. Perception - the creation of the correct sound (auditory) image.
- 2. Differentiation - understanding, distinguishing the signs of sound.
- 3. Imitation - fixing the speech-motor images of a speech unit.

4. Isolated reproduction - fixing articulation based on the use of the pronunciation phenomenon.

5. Combination - switching attention from one phonetic phenomenon

Sound matter is the primary element of speech, and hearing and pronunciation skills underlie all types of speech activity. Therefore, work on the pronunciation of students begins with the first lessons of the initial stage, and further extends to the entire school course of teaching a foreign language.

At the initial stage, the formation of the auditory-pronunciation base takes place; at subsequent stages, it should be strengthened, that is, each stage has its own responsible task in relation to teaching pronunciation. And here we must keep in mind the following: if at the initial stage something is missed and wrong pronunciation habits arise, then it is very difficult to correct them later.

Consider the features of the formation of phonetic skills at the initial stage of training.

One of the most important ways of getting acquainted with a phonetic phenomenon at the initial stage is to show a visual, somewhat exaggerated demonstration of its features in a sounding text. The sequence of presentation of phonetic material is dictated by its needs for communication. Therefore, from the first steps, it is sometimes necessary to introduce sounds that are the most difficult, which have no analogue in the native language.

In teaching pronunciation, the analytical-imitative method has justified itself, in which sounds subject to special training are isolated from a coherent whole and explained on the basis of an articulatory rule; this is the analytical part of the work. Then these sounds are again included in the whole, which is organized gradually: syllables, words, phrases, phrases, and are pronounced by students after the sample, imitated. Articulatory rules are approximate (close to correct) in nature. These are actually rules-instructions that tell students which organs of speech (lips, tongue) are involved in pronouncing the sound. For example, to pronounce the English sound [w], you need to round your lips and push them forward a little, pronouncing the Azerbaijan "u" .

When getting acquainted with phonetic phenomena, the explanation must necessarily be interspersed with a demonstration of the standards that students hear from the teacher or in a sound recording in order to create conditions under which students seem to "bath" in sounds at the moment when their articulation is explained to them. This is followed by intensive training of students in pronunciation, which again takes place on the basis of standards. The training includes two types of exercises: active listening to the pattern and conscious imitation. Active listening ( "listening" ) is guaranteed by preliminary tasks that help draw attention to the desired quality of sound, intonation; it stimulates the selection from the stream of words of a particular sound to be mastered. By raising a hand or a signal card, the student shows the teacher how he recognized the sound. Simple imitation without awareness of the features of a

foreign language sound is considered insufficiently effective, since students tend to perceive foreign sounds through the prism of the pronunciation base of their native language.

Conducting the teacher contributes to the improvement of the quality of conscious imitation. At the same time, students should be taught certain symbolism of gestures so that they can "read" them. Longitude is represented by a horizontal movement of the hand, brevity - by a quick arcuate. Conducting is especially important when teaching intonation: the stress is demonstrated by an energetic wave of the hand from top to bottom, the rise in tone corresponds to a smooth movement of the hand up, its decrease - down.

Conducting a teacher is an important visual support for students at the stage of formation of auditory-pronunciation and rhythmic-intonation skills.

Let's take simulation exercises as an example; awareness of imitation is guaranteed by indicating what you need to pay attention to:

- Say sounds after me, paying attention to longitude (shortness).
- Say the words paying attention to the stress.
- Say sentences paying attention to the melody.
- Say sentences paying attention to pauses.

The subject of training exercises are, as we see, sounds and sound combinations placed in ever larger units: from a syllable - through a word - to a phrase and to a text. Work on pronunciation in this case goes from listening to the text spoken by the teacher to the text created by the students.

Also, at the initial stage, it is peculiar to use such methods: performing phonetic charging; development of the phonetic side of the new lexical and grammatical material; work on pronunciation by reading aloud.

Phonetic exercise is also the main way to form pronunciation skills and is a special pronunciation training exercise that prevents forgetting phonetic material and prevents deautomatization of skills. Several goals should not be associated with phonetic exercises, as is often the case in practice, when the teacher includes grammatical and lexical phenomena in phonetic exercises for repetition. The attention of students is scattered, and this affects the thoroughness of working out the phonetic side. Of course, the lexico-grammatical material is somehow included in the phonetic exercise, but only its phonetic side should be emphasized. For example: "Let's repeat the main forms of strong conjugation verbs, paying attention to the quality of the root vowel" or "Repeat words that mean a profession, paying attention to their stress" and so on.

The material of phonetic charging can be individual sounds, sound combinations, words, sentences and small texts containing phonetic phenomena that need constant "inventory" . Usually, phonetic charging is built in a graduated way: from smaller units (the subject of training) to larger ones, where these units appear in various combinations.

It is important to find out the place of phonetic charging in the lesson. It is often performed at the beginning of the lesson, introducing students to its atmosphere, neutralizing the influence of the sound environment in their native language. It is possible, however, to carry it out immediately before exercises in oral speech or reading as a phonetic exercise, causing "vigilance" to the pronunciation of vocabulary units that will then be used in speech. Phonetic charging may precede reading, then it occurs on the material of the text for reading, from which phonetic difficulties are singled out, grouped accordingly and then offered to students for conscious imitation. The improvement of pronunciation skills also occurs in connection with the work on new vocabulary and grammatical material. Introducing students to new lexico-grammatical phenomena, one should not lose sight of the pronunciation difficulties contained in them. As a result, any portion of words and grammatical phenomena can become an occasion for improving pronunciation skills at an advanced ethane. It is important to emphasize the following: the teacher should not again explain the articulation and rhythmic-intonation rules, the main thing is to encourage students to remember the rule and bring a new language unit under it. The effectiveness of this approach also lies in the fact that it involves the assimilation of the new in close connection with the old, the constant updating of all learned material.

Working on reading aloud at the initial stage also provides an opportunity to strengthen the phonetic base of students. One should not, however, encourage students to read aloud without phonetic exercises; the analytical and simulation stage is obligatory.

The work on the formation of phonetic skills of students at the initial stage of education allowed us to conclude that the process of forming phonetic skills will proceed more successfully if the methods of forming phonetic skills are correctly selected; age characteristics of children are taken into account; the algorithm for the formation of phonetic skills is observed.

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## Technical Sciences

# EFFICIENCY OF LEARNING USING VR TECHNOLOGIES TO IMPROVE KNOWLEDGE AND SKILLS IN THE FIELD OF OCCUPATIONAL SAFETY

Baigenzhinov K.A.

Master of Technical Sciences, Republican Research Institute for Labor Protection, Nur-Sultan, Republic of Kazakhstan

**Abstract.** The field of informatics puts a lot of effort into the development of virtual reality technologies (VR technologies), especially in the field of occupational health and safety. VR technologies open up many new opportunities in education and upbringing, are widely used in educational institutions, especially in the field of computer science and mechatronics and robotics. Virtual reality technologies help save time, money and other resources in contrast to the traditional approach to learning. In this article, we present the results of a study on the use of virtual reality tools to train employees in occupational health and safety.

**Keywords:** VR technologies, labor protection, employee training, occupational health.

**Introduction.** In modern conditions, manufacturing industries are strategically striving to reduce the time and cost of training [1]. In terms of training activities, engineers require a certain amount of time to plan and present training materials to employees, which prevents them from achieving the desired cycle time and cost reductions. The human factor has always been an integral part of production systems, playing an even more important role in the intelligent systems of the industry that are developed and used.

In addition, the smart technologies used in production systems are changing and evolving rapidly compared to previous years, and employees must respond quickly to such changes [2]. In addition, from year to year the process of globalization is becoming more intense, every year more and more new technologies and developments are being introduced into various spheres of human life. This paradigm is shifting from the old legacy paradigm to the application of the latest technology. This paradigm requires greater flexibility as well as innovative approaches to new systems that can quickly adapt to changes in their lives, new technologies, product changes, etc. For this reason, employees in any field must be easily and effectively trained to adapt to this new era, using innovative tools to facilitate this action.

To do this, new training methods should be used compared to more traditional ones, so that employees are informed and motivated to acquire new skills and solve new problems.



Relying on knowledge from an institute or a few seminars with an assessment at the end would not be enough for a new industrial paradigm. Employees must be trained in several aspects of the workplace and must be attractive and efficient [3].

**Research results.** A simulation is a model, usually implemented with computer software, that simulates the operation of a system. This model takes as input a set of decision variables, such as the design of the system being modeled, the workload to be performed, and the operational policy to be followed in order to fulfill its workload. The result of this model, provided as output, can be any information, depending on what is being investigated or how it is used. Some performance indicators as an example of simulation results can be productivity, average volume of work in progress, average lateness, etc. [4].

The advantage of using simulation is that manufacturing systems are very complex, have many different components to interact with, and are also very dynamic, trying to adapt to specific manufacturing requirements. In addition, like many engineering systems, they are influenced by both external factors such as market needs and internal factors such as performance requirements. Both types of factors are often difficult to meet due to their complexity and inconsistency. Such a complex system is difficult to describe using convenient formulas or simple equations, and for this reason computer simulations are used to quickly and efficiently navigate these aspects.

The applications where simulation can be used are numerous, especially in manufacturing. It can be used to explore a process such as the exchange of tools between robots, to operations such as assembly by a mobile robot, even in a production network at the shop floor level, or to teach specific activity [5].

On the other hand, virtual reality (VR) is a technology that allows people to intuitively visualize, process and interact with complex PC data. In other words, virtual reality embraces the digital world in which the user appears, having the ability to intuitively interact with its components using their senses, such as sight, hearing and touch. Key Components Used in VR.

Applications fall into two groups, namely sensors that track human activity and input data into the virtual reality application, and visualization tools that serve as the application's output.

As for the hardware to use, for simplicity, you should use a Windows PC and an Android device such as a smartphone or smart glasses. A PC is required to run the simulation environment and an Android device is required for the VR app. Both devices must be connected to the same network to facilitate communication and data exchange between the two applications.

**Conclusion.** The benefits of using VR apps are numerous and vary from case to case. In general, virtual reality is considered one of the most immersive technologies ever created, giving the user a realistic experience. In addition, among digital interfaces, it offers the most intuitive interaction with the digital world, minimizing the cognitive load when learning a new



idiosyncratic digital interface that does not provide such a realistic feel. The latter advantage can help all types of users to get trained by interacting with virtual objects, test new technologies, learn how to remotely and safely manage the system.

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# ADVANCED TECHNOLOGIES OF PERSONAL RESPIRATORY PROTECTION EQUIPMENT

**Алибек Байкенов**

Senior Researcher «Republican Research Institute for Labor Protection of the Ministry of Health and Safety of the Republic of Kazakhstan» Astana, Republic of Kazakhstan

## **Abstract**

In this article, we will consider the use of a Smart Mask platform aimed at preventing and controlling the spread of COVID-19 and other respiratory viruses. The integration of sensors, materials, artificial intelligence, wireless communications, the Internet and software will help to collect health-related data in real time from the user, as well as from his environment. On a broader scale, data analysis can predict and reduce medical costs with accurate diagnoses and treatment plans, where comparing personal data with large-scale publicly available data will allow you to create a personal health plan.

**Keywords:** COVID-19, respiratory organs, personal protective equipment, digitalization.

**Research objectives.** Integration of modern technologies into personal respiratory protection equipment.

## **Research methods.**

Smart healthcare uses modern technologies such as the Internet of Things, artificial intelligence, as well as advanced and cloud computing to make digital healthcare more accessible, convenient, efficient and personalized. At the same time, the use of wearable medical technologies has gone beyond practitioners and is becoming increasingly popular among ordinary consumers as a means of improving well-being. Smart masks, with various technical capabilities in addition to the usual mask functions, have been developed for various purposes over the years. While smart masks can be a combination of many different technologies, in general, smart masks are able to provide advanced protection capabilities by optimizing various building materials, filtration mechanisms, embedded sensors and other technologies. Monitoring and measurement functions provide various feedback to the user, allowing other authorized third parties, such as medical professionals, to monitor the situation remotely. In addition, one of the main advantages of intelligent masks is their reusability [32].

## **Introduction.**

The Covid-19 pandemic has dramatically changed the world since its outbreak in late 2019. To date, more than 184 million people have been infected, 3.98 million people have died worldwide [1]. Despite the recent development of vaccines that remain skeptical about preventing infections and the occurrence of side effects, the most effective way to slow the

spread of the Covid-19 coronavirus is to wear personal protective equipment., which includes not only face masks and shields for ordinary people, but also protective clothing and glasses for medical workers. surrounded by a high concentration of coronavirus. In this context, the research of personal protective equipment has received a big boom. According to a Web of Science search, the literature on PPE has increased dramatically from 357 in 2019 to 1,734 in 2020, indicating unprecedented enthusiasm in this field among the scientific community. In addition, the production of PPE is also an industry worth billions of dollars [2].

As the respiratory protection markets are steadily growing, all players have attractive opportunities. The need for multipurpose respiratory protection equipment has been identified [3].

### **The results of the study.**

Digitalization of masks ensures personal security in the era of connected IT (Internet of Things) and AI (artificial intelligence). ICT (information and communication technologies) brings the security of protective physical equipment and a complete digital package of sensors, analytics and online services - a new business category in the smart wearable devices market. The Smart Mask concept, a digital wearable protection that will provide improved protection against infections spread through aerosol or respiratory droplets, with built-in real-time data analysis to enhance the immediate safety of users. In addition to protecting users, Smart Mask will collect data about the health and well-being of the user. This allows you to create a personal history of health and well-being. Aggregate data combined with advanced large-scale data analytics offer new tools for predictive and preventive healthcare. With Smart Mask, the integration of sensors, materials, artificial intelligence, wireless communications, IT and software will provide unprecedented service benefits. This will help people collect health data in real time, as well as data from the environment. Thanks to data based on various external data sources, we can offer something that has not yet existed in the markets of additional services. An important part of the Smart Mask concept are related applications and services that can be provided and open up several new business opportunities [4].

### **Conclusion.**

The respiratory tract PPE markets are growing, and there is a demand for various respirators for consumer markets, as well as for industrial and medical applications. Some smart defenses are already available that provide various functions. People are already demanding "advanced masks" without ICT (such as Razer or LG PuriCare). Users also want differentiation — masks are increasingly perceived as a tribute to fashion, while remaining safe — offers can be branched into fashion, sports, the elderly, medical and so on. In addition, pricing models for Smart Mask and related service packages (from a simple mask to a mask with a full set of services) should be studied. Consequently, smart masks not only provide a solution to the problem of a shortage of masks during a pandemic, but also help solve the problem of

increased plastic pollution due to the very widespread use of disposable plastics as part of personal protective equipment in such situations.

The scientific work was created during the implementation of a scientific and technical program within the framework of program-targeted funding for applied scientific research in the field of occupational safety for 2021-2023 under the subprogram "Risk-oriented organizational and economic mechanisms for ensuring safe work in modern Kazakhstan" (IRN OR11865833-OT-21) within the framework of program-targeted research funding Of the Republican Research Institute for Labor Protection of the Ministry of Health of the Republic of Kazakhstan.

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## Biological Sciences

### Taxonomic structure and pathogenic activity of mycobiota formed in livestock complexes

Aliyev I.A.

The Institute of Microbiology of ANAS

Gasimova G.A.

The Institute of Microbiology of ANAS

The presented work is devoted to the protection of the structural organization and pathogenic activity of mycobiota formed in livestock complexes. It has become known that 59 species of fungi belonging to 14 genera are involved in the structural organization of mycobiota formed in livestock complexes. *It has been found out that Aspergillus, Fusarium and Penicillium make up 49.2% of the total mycobiota, showing a dominant position within the mycobiota formed in livestock complexes. The imbalance of ecological factors in livestock premises leads to a significant activation of the potential pathogenic content of mycobiota, which has led to a violation of the mycological safety of kept animals and working people.*

**Keywords:** a livestock complex, mycobiota, humans, animals, ecological phactor, pathogenic activity.

In modern world the rapid growth of the world's population increases their demand for food, which leads to a global problem such as food shortages. That is why the UN FAO has identified the development of livestock, one of the most important sectors of agriculture, and increasing productivity in various areas as strategic targets in the national policy of the world. It should be noted that the history of animal husbandry in our country is very old and has certain specific traditions. Therefore, the State Program on Agriculture adopted in our country, especially the development of livestock on the basis of historical national traditions using modern technologies, is taken as a basis and clearly stated in the "Road Map" [10;17;19].

At present, there are a large number of modern livestock complexes built in the Republic on the basis of up-to-date technologies, and as a result of the hard work of experienced farm workers, both meat and dairy cattle breeds are raised here. However, the recent increase in anthropogenic impact on the environment has led to the disruption of the bioecological balance, which has led to the activation of the heterotrophic block, including fungi, especially opportunistic representatives.

Activated opportunistic representatives of microscopic fungi, which migrate to the internal environment of livestock complexes in various ways, endogenously or exogenously infect kept animal organisms, become the causative agents of various mycotic pathologies and cause a significant decrease in productivity [1;2;7;11;15 ].

The aerodispersed air system in the premises of livestock complexes makes unavoidable constant infection with microscopic fungi, including opportunistic ones, not only animals, but also people working here. As a result, dermatological mycoses of various origins, allergic diseases and a number of secondary pathologies are observed in animals kept in livestock complexes, as well as in people working here. Therefore, the study of microscopic fungi in livestock complexes as a risk factor in the lives of both animals and humans has become the main subject of research in this area.

The main purpose of the research is studying the structural organization of mycobiota formed in livestock complexes, the diversity of species and the protection of the mycological safety of kept animals and people working there. [8; 12;13].

### **Materials and methods**

Bilasovar and Jalilabad regions were selected as research areas, and the livestock complexes built for keeping both buffaloes and cattle and the stables belonging to private farm owners were analyzed from a mycological aspect. Both sedimentation and application methods were used to determine the mycobiota formed in livestock buildings. Standard Chapek, Saburo and Suslo-agar media were used for the inoculation of fungal spores.

Petri dishes are placed at a height of 1-1.5 m above the ground for 15-40 minutes for sedimentation of bioaerosol particles formed from micromycet spores in the air of farm premises. However, using the application method, pathological material is removed from the skin or hair of infected animals and humans and inoculated into appropriate food media. Counting of formed colonies is realized after 7 days. Carrying out experiments in 4-6 repetitions leads to the acquisition of pure culture, which allowed to identify fungi and to determine the species group on the basis of cultural-morphological and ecological-physiological features [8; 12; 13].

The incidence of fungi is expressed by a 100-fold increase in the ratio of the studied species to the total number of mycobiota [9; 14;16].

### **Results and their discussion**

It was determined that 59 species of fungi belonging to 14 genera are involved in the structural organization of mycobiota formed in livestock complexes (Table 1). The comparative characteristics of the mycobiota in terms of sex composition clearly show that 3 genera, including *Fusarium*, *Aspergillus* and *Penicillium*, dominate. Thus, 11 species or 18.6% of the genus *Fusarium*, 9 species or 30.6% of the genus *Aspergillus* and *Penicillium* each account for 49.2% of the total mycobiota. *Microsporium*, *Mucor*, *Rhizopus* and *Trichaphyton* are

represented within mycobiota by 4 species each and a total of 27.2%, *Alternaria* and *Trichoderma* each by 3 species or 10.2%. The remaining genera, with 1 or 2 species, make up 13.4% of the total mycobiota. The most common fungi in livestock complexes are *Aspergillus flavus*, *A. niger*, *A. clavatus*, *Penicillium cyclopium*, *P. viuidicatum*, *P. clariforme*, *Fusarium axenaceum*, *F. moniliforme*, *F. oxysporium*, *F. graminearum*, *Alternaria tenuissima*, *Mucor pusillus*, *Stachybotrys alternans*, *Rhizopus stolonifer*, *Trichoderma lignorum*, *Trichophyton mentagrophytes*, *T. verrucosum*, *Ustilago tritici*, *Microsporium gipseum*, *M. canis* and others. It has become known that the location of the livestock complex, the

**Genus composition and species diversity  
of mycobiota formed in livestock complexes**

Table 1

| №  | Fungi genera              | Fungi species                                                                                                                                                                                                                                                                                                |
|----|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | <i>Aspergillus</i> 1/9    | <i>Aspergillus flavus</i> Lnk.: Fr; <i>A. fumigatus</i> Fresen; <i>A. candidus</i> Link.; <i>A. clavatus</i> Desm; <i>A. niger</i> Tiegh; <i>A. nidulans</i> G. Winter; <i>A. glaucus</i> Link; <i>A. ochraceus</i> K. Wilh; <i>A. terreus</i> Thom.                                                         |
| 2  | <i>Alternaria</i> (1/3)   | <i>Alternaria alternata</i> Keissl; <i>A. brassicae</i> Link; <i>A. tenuissima</i> Wiltshire.                                                                                                                                                                                                                |
| 3  | <i>Cladosporium</i> (1/2) | <i>Cladosporium cladosporioides</i> de Vries; <i>C. herbarum</i> (Pers.) Link.                                                                                                                                                                                                                               |
| 4  | <i>Claviceps</i> (1/2)    | <i>Claviceps paspali</i> Hel; <i>C. purpurea</i> Stev. Tul.                                                                                                                                                                                                                                                  |
| 5  | <i>Fusarium</i> (1/11)    | <i>Fusarium avenaceum</i> Link; <i>F. agrillaceum</i> Link; <i>F. graminearum</i> Schw; <i>F. culmorum</i> Sacc; <i>F. lansetiae</i> Fuck; <i>F. moniliforme</i> Sheld; <i>F. nivale</i> Ges.; <i>F. solani</i> Bilai; <i>F. sporotrichiella</i> Bilai; <i>F. oxysporium</i> Sace; <i>F. javanicum</i> Fuck. |
| 6  | <i>Microsporium</i> (1/4) | <i>Microsporium gipseum</i> Bodin; <i>M. canis</i> Grub; <i>M. eguinum</i> Grub; <i>M. lanosum</i> Sabourand.                                                                                                                                                                                                |
| 7  | <i>Mucor</i> (1/4)        | <i>Mucor circinelloides</i> Tiegh; <i>M. mucedo</i> Fresen; <i>M. hiemalis</i> Wehmer; <i>M. racemosus</i> Fresen.                                                                                                                                                                                           |
| 8  | <i>Penicillium</i> (1/9)  | <i>Penicillium citrinum</i> Thom; <i>P. cyclopium</i> WestIng; <i>P. claviforme</i> Thom; <i>P. chrysogenum</i> Thom; <i>P. expansum</i> Lnk; <i>P. notatum</i> West.; <i>P. rubrum</i> Stoll; <i>P. viridicatum</i> Dierckx; <i>Purticae</i> Thom.                                                          |
| 9  | <i>Stachybotrys</i> (1/1) | <i>Stachybotrys alternans</i> C. Jens.                                                                                                                                                                                                                                                                       |
| 10 | <i>Rhizopus</i> (1/4)     | <i>Rhizopus nigricans</i> Ehrenb ; <i>R. microspores</i> Tiegh; <i>R. oryzae</i> Went et Pringle; <i>R. stolonifer</i> Ehrenb.                                                                                                                                                                               |

|    |                    |                                                                                         |
|----|--------------------|-----------------------------------------------------------------------------------------|
| 11 | Trichoderma (1/3)  | Trichoderma lignorum Bonard; T. koningii Oudem; T. viride Pres.: Fr.                    |
| 12 | Trichopyton (1/4)  | Trichopyton album Link; Tr. eguinum Malm; Tr. mentagrophytes Malm; Tr. verrucosum Malm. |
| 13 | Ustilago (1/2)     | Ustilago tritici Pers.: Jens; U. zeae Jens.                                             |
| 14 | Verticillium (1/1) | Verticillium dahliae Klebahn.                                                           |

geographical location and climatic features of this region play a key role in the composition and structural organization of the mycobiota formed in farm buildings. At the same time, the maintaining stable environmental conditions inside the farm building, in other words, strict control of humidity and temperature factors also has a direct impact on the quantitative and qualitative characteristics of the formed mycobiota. Thus, as a result of the imbalance of ecological parameters in the internal environment of the livestock complex, the potential pathogenic composition of the mycobiota is activated, and after some period it leads to the manifestation of either exogenous or endogenous mycotic pathologies in one form or another. It should be noted that if the ecological imbalance persists in the farm building for a long time, then the possibility of migration of opportunistic fungi into the dominant nucleus of mycobiota increases and creates a real basis for the emergence of potential foci of infection.

The following potential pathogenic fungi have been identified as the main causative agents of the pathologies recorded in the course of the study. Thus, it has been experimentally proven that *Penicillium chrysogenum* is a major cause of systemic mycoses in both animals and humans, *Fusarium moniliforme* -mycotoxicosis, *Aspergillus fumigatus*, *A. niger*, *A. ochraceus* - aspergillosis, *Mucor circinelloides* - dermatic mycoses, *Alternaria alternata* and *A. tenuissima* - dermatophytosis, *Trichoderma reiride* - dermatitis, *Rhizopus nigricans* and *R. oryzae* - mucoromycosis, *Claviceps purpurea* - ergotism, *Claviceps paspali* tremor toxicosis, *Trichophyton mentagrophytes* and *T. verrucosum* - herpes, *Microsporium gypseum* and *M. canis* are the main causes of hair loss or baldness.

Thus, both animals kept in livestock complexes and people working there become infected with pathogens of mycotic origin, either directly or indirectly, and become mycotic carriers. It has become known that the pathogenic activity of these fungi in microflora is quite high. Therefore, the vector of radial spread of these mycotic pathologies can be quite large and become a very serious medical and social epidemiological problem.



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## Philological sciences

# TRADITION AND INNOVATION IN MODERN KAZAKH CHILDREN'S POETRY

Gulzhakhan Orda Zhumaberdiyzy

Doctor of Philology, senior researcher of the M.O.Auezov Institute of Literature and Art

Zhansulu Sarsenbayeva Badenkyzy

PhD, researcher at the Institute of Literature and Art named after M.O.Auezov

**Abstract:** The article presents such genres as lullaby, fetters cutting, counting-out rhyme, tongue twister, riddle, blessing, aitys, which roots deep in folklore and traditionally continued in the modern Kazakh poetry. The article resumed based on lullabies for children by K. Adis, fetters cutting poems by N. Kalka, Sh. Zhubatova, traditional continuation of today's counting-out rhyme by K. Kunipiyaully, J. Shakenuly, K. Adis, Y. Duysen, riddles by K. Yelemess, S. Khassan, K. Adis, tongue twisters by K. Yelemess, blessings by B. Alimjanov, aitys genre by S. Kaliev "Zhemis-zhidekterdin aitysy (Aitys between fruits and vegetables)", A. Tilegen "Instagram and Tik Tok".

The content and novelty of the modern children's poetry is reflected in the analysis of saucy poems, dialogue poems, ethnographic poems, metagrams by A. Kairan, M. Asan, S. Khassan, O. Kasymdar, M. Kart's.

The article was prepared within the framework of the grant project of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan AP08855695 "Trends in the development of modern Kazakh children's literature" (1991-2021).

**Keywords:** counting-out rhyme, tongue twister, riddle, blessing, aitys, metagram, interpretation.

**Introduction:** Children play a huge role in the society. Our children are our future. Therefore, as we know from history that all nations pay special attention to the upbringing of children. In Kazakhstan, the state pays great attention in responding to the children upbringing and 2021 was declared "The year of children" and 2022 is "The year of children's literature". During The Year of Children there was published a collection which includes works by more than forty poets and writers of preschool and school age children. In addition, "The anthology of children's poetry" and "The anthology of children's stories" collections were published.

Through their fiction works the children's writers cultivate feelings and thoughts, enrich life experiences, educate children, and foster kindness in them. Children's literature plays a key role in the life, education and humanisation of the younger generation. Children's literature

should inspire young people with noble dreams and grandiose fantasies, civic moral qualities, lofty ideas and high feelings, brotherhood and friendship. It's known that all these are attainable with struggles, demands and hard work. Children struggle against pride, arrogance, bigotry, being jealous, selfishness, but become a new person who is sociable, friendly, hard-working, business-minded.

There are many works for children that root deep in folklore and continues in modern literature. As known from the history of literature that all outstanding writers treated children's literature with great attention. The special attention of Kazakh writers to the upbringing of children is shown in their works. We summarize the traditions and innovations in modern Kazakh children's poetry with an analysis of the works by individual poets.

**Literature review:** In the long history of Kazakh literature special attention has always been paid to children's literature. Such scientists as Sh. Akhmetov (Sh.Akhmetov, 1974: 176), B. Ibraimov (B. Ibraimov, 1998: 50), K. Yergobekov (K. Yergobekov, 2003: 368) have studied the problems of content, genre searches, traditions and innovations in literature based on oral literature and modern children's literature samples. Currently, the works of individual children's writers are under study. Many articles, reviews, and scientific articles published in periodicals show that the study of children's literature has not been neglected.

In the XX century along with Kazakh children's literature, Russian children's literature was thoroughly studied. It can be seen in the research works of such scientists as J. Hillman, P. Nodelman, D. Raddom. The works by P. Antonino (P. Antonino, 1948: 9), B. Hellman (B. Hellman, 2016: 560) who studied the "The history of Russian children's literature" show that children's literature was given a special attention in different epochs.

**Methodology:** For the study of the topic and to achieve the expected results hermeneutic and artistic analysis of science, historical-functional, historical-comparative, system-structural methods were effectively used. Reviews on children's literature by the literary scholars as M. Gabdullin, Sh. Akhmetov, M. Bazarbayev, S. Kirabayev, S. Kaskabassov, K. Yergobek, B. Ibraimov were used as a guidance during the work course.

Modern methods in literary criticism, advanced trends in the field of humanities are widely used in the study of children's works written by Kazakh children's poets as A. Yestenov, B. Koshim-Nogai, B. Alimzhanov, B. Ussenbayev, A. Kairan, Sh.Zhubatova, A. Zhakiyanova, K. Yelemes, N. Kalka, Zh.Shakenuly, S. Kaliyev, K. Adis, M. Asan, S. Khasan, O. Kassym, M. Kart, A. Tilegen.

**Results:** The continuation of traditions in modern Kazakh children's poetry is confirmed by the examples of small genres in modern poetry, namely lullaby, fetters cutting, counting-out rhyme, tongue twister, riddle, blessing, aitys, which roots deep and originally comes from folklore. The innovation is reflected and observed in the interpretation of samples of oral folk literature and the works by Abay Kunanbayuly. The content richness of children's literature can

be demonstrated by samples of saucy poems, poems based on dialogue (dialogue poem), ethnographic poems, and metograms.

Currently, in their works poets use social networks and technical devices that are familiar to children, which shows that children's literature is enriched in content. Regarding the traditions and innovations in literature, M. Bazarbayev stated: "Traditions and innovations, i.e. the national character are inherent not only to a certain period, but to all epochs of the development of literature and are organically intertwined with it" (M. Bazarbayev, 2005: 11). According to the scientist the continuation of traditions between folklore and modern literature is directly related to the life way of the nation.

**Discussion:** The Kazakh people pay attention to the upbringing of their children from the cradle. All the noble dreams of people have been passed down from sire to son through art. These art works narrated that the child would become a hero who would protect the country and the land in the future. It is known that fiction develops children's thinking and increases vocabulary. M. Gorkiy stated followings about the art of oratory: "The word is the main material of literature. It is the thing that helps to shape all our impressions, feelings and thoughts in the artistic form" (M. Gorky, 1954: 49).

One of the oldest genres in children's literature, which representing development and did not lost its traditional continuity is **lullaby**. This tradition continues steadily in modern Kazakh poetry. In folklore the "Besik zhyry" starts with "Aldi, aldi, ak bopem, Ak besikke jat bopem – Rock-a-bye my sweet baby, rock-a-bye, Lie down to your soft cradle, my baby", but in the "Besik zhyry" version by K. Adis starts with hopes for the future of the child:

Rock-a-bye my baby,  
When will you be a helpful ally?  
Grow up fast my teeny  
and be helpmate to your mom!  
Let your father be proud of you,  
And your nation pointed at you as example (Anthology of children's poetry, 2021: 175).

The main goals and objectives of lullabies in folklore and modern literature have not changed. In both of them, the child in the cradle is supposed to be a hero or an orator leading the group. The people realizing the power of words brought up their children on good words while they were in the cradle.

One of the oldest genres that roots deep in folklore is **fetters cutting**. The poem "Tusau keser" by N. Kalkan is a traditional continuation of the fetter cutting genre. The poet quotes in the folklore "Kaz-kaz, balam, kaz, balam, Kadam bassan maz bolam":

Make your first step, my baby, make the first step,  
Spread out your steps, my son.  
Your fetters I will cut,

And will be happy, if you step forward example (Anthology of children's poetry, 2021: 172).

In poems on fetters cutting a hope prevails at every step of the child. One of the oldest genres is **blessing**, and poet's works as "Ak Bata – The pure blessing", "Tauday bol (Grew big as a mountain)!" fall into this series. The poet's sincere desire is reflected in the poem, which encourages a small child don't hurt anyone and be careful of others, be kind and gentle.

Sh.Zhubatova's poem "Alga kadam basamyn (Making steps forward)" is a traditional continuation of the fetters cutting in folklore, which also begins with "Kaz-kaz balam". It is intended to wish good luck to a child with new steps and hope for his/her future. He added as a wish to a child who steps one by one:

I step forward,  
A high mountain I climb.  
I learn goodness,

And stand aback from evil ... example (Anthology of children's poetry, 2021: 75). It is natural that parents who expect good from every step of the child should wish them all the best.

One of the oldest genres for children is **counting-out rhyme**. Familiarizing children with their five fingers stretch back to folklore. Nowadays, poets develop this tradition with innovation. Each finger has its own name. There are many types of counting about five fingers - the thumb, the forefinger, the middle finger, the ring finger, and the little finger.

A. Tabyldiyev stated followings on counting-out rhyme: "Counting-out rhymes arose among the nation mainly for the purpose of teaching numbers to children. Counting-out rhymes help to teach numbers, reveal the world, and develop the child's logical and mathematical thinking. There are many types of counting rhymes and they develop every time" (A. Tabyldiyev, 1992:15). K. Kunipiyaulu focused on describing each finger in its own way in his poem "Sanamak":

Your thumb is your main finger,  
Cares for everyone.  
It does not want being lazy,  
And become you a shirker example (Anthology of children's poetry,

2021: 93).

By Zh. Shakenuly:

I mean "one" – is the knowledge,  
You should study, my brother example (Anthology of children's poetry, 2021: 135).

By K. Adis:

I mean one – is the moose,

This animal is similar to a deer example (Anthology of children's poetry, 2021: 180).

By Y. Dyusen:

One is unity,

And the blessed life example (Anthology of children's poetry, 2021: 304-305). In Kazakh language each number hidden in two syllables starting with the same letter of described word (one-bir, knowledge-bilim). The two-lined poem composed using simple words and easy rhyme is easy for children to recite. In this way, the poets aimed to teach children to count to ten. Children who recite a simple poem learn to count to ten quickly. Counting-out rhyme is a genre formed in the Kazakh children's literature, and nowadays poets develop it with innovations.

N. Kalka composed his poem about five fingers, which continues from folklore in a different way. The poet explains it with child's close relatives and friends "Your thumb is your parents", "Your forefinger is your sibling", "Your middle finger is your uncle (relatives by mother)", "Your ring finger is your friend", "And the little finger is your knowledge". "Five fingers are your happiness, They are your blessing. If you put your five fingers together, you will not waste your time" – these lines explain that if keep together fingers, one can overcome many heights.

K.Kunypiyaul's poems "Apta- A week", "Bes kushik - Five puppies" can be included to the counting rhyme. In the poem "A week" he describes the seven days of the week by enumerating them. By focusing on the main features of the seven days and naming the first and the second day and so on, the author numerated weekdays. Even in the poem "Five puppies" the features of the five puppies are given by counting.

One of the oldest genres in children's literature that roots deep in folklore and continues nowadays is **riddles**. Among children's poets K.Yelemes, S.Khassan, A.Tilegen compose riddles by puzzling only peculiarities of things familiar to children. For example, two poets composed two different riddles about teeth.

By K.Yelemes:

Around the tongue formed,

as white corals listed example (Anthology of children's poetry, 2021: 109).

(Teeth)

By S.Khassan:

Thirty heroes vigilant,

lives in your mouth example (Anthology of children's poetry, 2021: 264).

(Teeth)

By puzzling familiar things that the child sees every day, they lead them to think and ingenuity.

There are many riddles about household items by K.Adis. The poet paid attention by puzzling familiar things that children encounter in everyday life. Namely:

When you enter the house,  
It meets you bending down,  
Wears your coat until you leave.

(a cloth hanger)

It comes out only at night,

A small sun source example (Anthology of children's poetry, 2021: 181).

(an electric lamp)

This series is complemented by the poet's riddles about animals, birds, and vegetables. The poet A. Tilegen described Kazakhstan cities by puzzling, namely Turkestan, Semey, Almaty, Taraz, Zhanaozen, Nur-Sultan, Atyrau, Oral, Pavlodar, Arkalyk, Baikonur, Ulytau in his work "Mysterious Cities", narrated about each city by one rhyme. Since the main features of each city are listed there, it will not be difficult for children to find them out. According to A. Lototskaya: "Modern children's poems, stories and tales are easily read and understandable even to the youngest readers. On the basis of such works, as well as in the past lies folklore» (A. Lototskaya, 2017: 2).

The poets continued the genre that teaches children to speak clearly and quickly. This genre is **tongue twister** and is an old genre of folklore. The poet K.Yelemes composed tongue twisters using simple words and in an easy way to think.

In a spreading white spring,  
The goose is white or the swan is white?

\*\*\*

If water turn into air?

Or if air turn into water? example (Anthology of children's poetry, 2021: 108).

There are enough tongue twisters to confuse a child by substituting similar words. The poet intended to confuse children by substituting words. M. Gabdullin stated followings on tongue twisters: "Words used to compose tongue twisters are difficult to pronounce, they often consisting of voiced and voiceless consonants. Every word of the tongue twister must be pronounced in a hurry and hastily... Every word of the tongue twister must be uttered quickly, but in rhyme with speech and no missing the tune" (M. Gabdullin, 1958: 42). According to the scientist the tongue twisters play a great role in training children's language and quickly distinguishing similar words. A child who pronounces quickly without confusing similar words will know the place of each word and will use it correctly.

One of the genres of folklore representing development in children's literature is **blessings**. Kazakh people believe in the magic of words and have respect for words. There is a saying about it: "Blessing influences on well-being of the nation." There are many blessing



versions among the nation passed down from sire to son. At the same time, any elderly person should improvise and compose own blessing. This is a sample for the extraordinary improvisational art of Kazakh people. Poets also pay special attention to this genre and compose and wish their blessings to growing children, which is the well-established tradition. Blessings by the poet B.Alimzhanov consists of six stanzas:

Be healthy and move always forward.  
Fly high and freely like the eagle,  
May the God bless you!  
And wish a long life to you example (Anthology of children's poetry, 2021: 30).

Blessings provide for hope for the child's future, be the sky's the limit, being well-educated, conscientious adherence to parents and the country. Since the Kazakh people are Muslim, who pray for Allah for their dreams come true the poets pray also the Creator to help them fulfill their wishes.

**Aitys** is one of the oldest genres in children's poetry. In the oral literature the mutual aitys of animals, fruits and berries were the basis of many works. This series is complemented with "Aitys between fruits and vegetables" by S. Kaliyev. Fruits such as apples, grapes, apricots, currants, blueberries, raspberries, pears, cherries started a competition aitys and compete with each other telling about their uniqueness and benefits to mankind. According to the aitys rules one of the participants' should win, but in this case all tasty, useful and are highly valued.

Aitys "Instagram & Tick-Tock" by A. Tilegen is composed and dedicated for today's modern social networks. Both boys and girls can participate in aitys during educational classes at school. The author writes followings about it: "It is preferable a boy and a girl to participate in aitys. A boy wears a profile picture of Instagram and a girl wears a profile picture of Tick-Tock. They can play the dombra for a single click and continue aitys" [1, 299]. Both participants compete by being proud of their achievements and at the end of the speech the author urged children not to waste their free time on Tick-Tock and Instagram and call them for education and do science.

**Instagram:**

Let's roll up the sleeves,  
As a living dead is an ignorant one.  
Let's promote from now on,  
The science and education!

**Tik-Tok:**

I'll join you on this point,  
And follow in steps.  
Let's protect the children,

And avoid them to take tricky way! example (Anthology of children's poetry, 2021: 301).

The novelty of modern Kazakh children's poetry is reflected in the poets' metagrams, saucy poems, dialogue poems, ethnographic poems. The next genre that appears in poets' works is **saucy poem**. In poem "Competition about colors" by A.Yestenov, five children choose red, yellow, green, white and blue colors and introduce them by distinguishing with samples. Children recite saucy poems and state the peculiarities of the colors they are describing. The poem "Our toy" is a sample of such saucy poems. In the saucy poem boys and girls are divided into two groups and present their toys. While two girls tell about their dolls that do not eat, do not cry, do not walk, three boys tell about the specifics of rocket, airplane, helicopter, and in the future they dream of becoming cosmonauts like Toktar, Talgat. Tokhtar Aubakirov and Talgat Musabayev are the first cosmonauts of the independent Kazakhstan. It is reasonable for boys to want to conquer the space, just like their astronaut brothers. The saucy poems are the new content of children's games, which roots deep in folklore.

The poem "Zheti septik – The seven cases" by the children's poet B. Koshim-Nogai serves to supplement the knowledge of primary school students. The child, who taught the Kazakh language and learned subjective, genitive, dative, accusative, ablative, instrumental cases develops and strengthens this knowledge through this poem genre. Following sample explains that each case has own question:

The subjective answer to

"Who? What?" questions:

"Whose? Of what?"

Genitive owns to learn example (Anthology of children's poetry, 2021: 17).

The following poems are dialogue poems for children. The dialogue-poem "Yedige and domestic animals" was based on the dialogue between Yedige and his joeys, namely the colt, foal, lamb, yearling. "Yedige and domestic animals" by B. Koshym-Nogai's has following dialogue between Yedige and the lamb:

*Yedige:*

- I call you "My lamb, oh my lamb"

You are bleating staying tethered.

Please show some more patience,

Your mother is coming back from pasture...

*The lamb:*

– Darkness increases worry in the soul.

You're also waiting,

Your mum to back from work to home! example (Anthology of children's poetry, 2021: 22).

As can be seen from the dialogue both human and animal children are pampered, defenseless, and small. Yedige tried to reveal their identity by asking questions to the colt, foal, lamb, and goat. The yearling improves and firms its hooves by jumping from stone to stone, the foal would become a racehorse, so Yedige could participate at horse races.

The next poem genre that occupy a significance place in the poetry is a **metagram**. Metagrams create new words by replacing the single letter of a word with other letters. You can solve two or three puzzles by hiding one letter in metagrams.

It' s an adjective,  
Defining the mixed colors.  
Add one "K" letter in front,  
You will get the place name.

If you' ve added "K", now delete one of it,  
This is the instrument, that master takes to hand.  
Every house in the city  
Was built with it example (Anthology of children's poetry, 2021: 24).

(Ala - kala – kalak – mottled – city - float)

Depending on the subject metagrams can be divided into types according topics as family, profession, specialty, household. For example, the poet was puzzling here a color and a concrete thing. There are some other similar metagrams: hiding the letter "T" can compose a poem for "tuzak-uzak" or hiding a letter "K" can puzzle "karmak-karma".

Among the poems for children in the collection "Capital letters praise" by A.Karipzhan there are 18 riddles concerning 36 letters of the alphabet.

"A" is a man's miracle,  
"A' - ә" will list one by one.  
(alyp-a' rip / giant - letter)

"O" means abyss,  
"O' " is too high example (Anthology of children's poetry, 2021: 111).  
(Or – ör / abyss-high)

**Ethnographic poems** occupy a significant place in Kazakh children's poetry. There are many ethnographic poems in the works by A. Kairan, M. Asan, S. Khassan, O. Kasymdar, M. Karttar. Since the main industries of Kazakh people is animal husbandry the poets' works are

often folk poems about domestic animals. In his poem "My joes" the children's poet A. Yestenov states followings:

A colt is a baby of a camel,

A foal is a baby of a mare.

I know it as a "meek" -

The lamb which is a child of a sheep example (Anthology of children's poetry, 2021: 4).

The Kazakh people treat their kids nicely "botam", "kulynym", "lagym", "koshakanym" after the joeys of camel, horse, goat, and sheep. Each domestic animal has its own peculiarities and parents who saw this peculiarity in their children pamper them with the same name, it's a tradition that roots deep in folklore. In the poem "My grandfather is a horse trainer" a boy who is proud of his grandfather's job, also wants to become a horse trainer like his grandfather when he grew up. There is a proverb among Kazakh people with deep meaning "The son takes a pattern by his father" .

One of the poems that stand out by A.Kairan is "Atbeginin alippesi - Alphabet of the horse trainer". The poet's poems have a rich cognitive function, he gives a lot of information about horses. The poems "Zhylyky zhyry", "Atbegi", "Saigulik" place attention to the main features of the horse trainer, horse, racer horse. In his poem "Horse coat colors" he pays attention to the different color of the horse coat, such as dull-black, light, black, dark-grey (charcoal grey), chestnut, bay, light-bay, pale, dark-bay, light-grey, dark-grey, pale, light-pale, dappled, mottled, piebald, and states "If one cannot distinguish the horse coat color, then he shouldn't say "I'm Kazakh" . Those children who have learned to ride a horse from their childhood should grow up to be skilful, brave and courageous. Therefore, they need to know not only the color of the horse coat, but also a lot of information about it. The poem "Yer-turman atauly" focuses on naming and describing almost all horse equipment. Obviously, children do not know most of the equipment, so this poem serves has a cognitive function. The names of horses vary depending on their age. A one-year-old horse is yearling, a six-year-old horse, and an old horse. The stallion is described as follows:

How can a poet describe so simple,

The horse is saint and has a charm.

Folds the herd by own,

There is a sacred stallion ... example (Anthology of children's poetry, 2021: 66).

The poem "At zharatu – To train a horse" describes difficulty in training racehorses. Kazakh people use horses for riding, it's milk as a drink, and meat for food. Since lifestyle is closely connected with horses there are many proverbs about horses, which have many meanings. The proverb "A racehorse cannot win the race, but if trained – always is the win" shows that only a

trained horse can ride for a long distance, and the proverb "A horse is a man's wing" shows that a horse serves as a means of transport for the man. The man owning a horse never stayed outside, as the horse flew like a bird and took to the right place. In the poem "Atsaiys – A horse racing" we will learn about a number of equestrian games. The games played on horseback as kokpar-goat dragging game, audaryspak-strike down, kyz kuu-chasing a girl by riding, tenge alu-picking up money by galloping teach the boys to be smart, agile, fast, brave, courageous. The translator, candidate of philological sciences L.O Askar shared his opinion as follows: "The history of the nation is reflected in the language, one could say that every page has the imprint of time, but this book includes special texts revealing the uniqueness of the people. For example, Kazakh people's attitude to domestic animals. The horse is especially revered. Among the many assignments on this theme was also included "Tai zharys", the author of which is the linguist Akhmet Baitursynov" (L. Askar, 2021: 22).

A. Kairan's poems about horses have a great cognitive and educational function. He described in detail everything, starting the mare born the foal, how to name them by age, harness names, and training the horse. S.Kaliev's poems "Bayge", "Tay" complement the series of works on horses among domestic animals. Poems promoting national games and national values have a rich ethnographic color. This is a meaningful research works in modern children's poetry.

Following ethnographic poems for children are insightful with history and describe our national values in detail: "Kymyz", "Saigulik", "Kamshy", "Besik", "Koshakan", "Asyk", "Tymak", "Shapan", "Takiya" by M.Asan, "Zheti shelppek", "Basire", "Bauyrsak", "Oyular" by S. Hasan, "Andatu", "Zhugen", "Tokym", "Yer-tokym", "Ayil" , "Khanzhyga" , "Uzengi" , "Omildirik" , "Tebingi" , "Khuiyskan" by O.Kassym.

The next group of works, which occupies a significant place in children's poetry are poems related to kinship. In the poems included in the series "Kinship names" by S.Kaliyev given a lot of information about how relatives by father and mother are called, for example naghashy is a relative by mother, quda is a matchmaker, a nephew, a brother-in-law, an abysyn is two brothers' wives. Kazakhs people don't marry each other if there is any relative match until their seven grandfathers. Children learn to memorize the kinship names up to seven grandfathers, as well as used to know their seven grandfathers.

One of the most important poems in modern children's poetry is about **a traffic light**. Following poems by K. Mukametkali "Baghdarsham men balakay", A. Zhakiyanova "Baghdarsham", S. Kaliev "Baghdarsham", Y. Seydakhmet "Baghdarsham" join works of this line. The poets enriched children's language skills by depicting traffic lights in clear, easy language and simple words familiar to children. Now a new word "traffic light" will be added to the children's language fund. Sh. Akhmetov said: "The language of children's literature should be playful, light and artistic, concise and understandable, clear, precise and impressive. The

language of children's literature is the only tool that helps to enrich their vocabulary "(Akhmetov, 1974: 10)

A great place in Kazakh children's literature occupies poems on topic choosing a profession: **"What do I want to be when I grew up?"** For children "My first book", "My favorite alphabet", "My first acquaintance", "What do I want to be?", "The saint heritage", "Domestic animals", "Fruits", "Vegetables", "The secret of numbers", "Journey to the world of letters" are included in the collection "What do I want to be!" by S. Kamshiger and guides schoolchildren in choosing a profession. In addition to the professions that are familiar to children there are new professions that meet the needs of society in the age of information technology. Among the two stanzas poems about well-known professions as doctor, pilot, astronaut, entrepreneur, teacher there is detailed information about modern professions that are required in society life, namely "IT specialist", "SMM specialist", "Marketing specialist", "Robot constructor".

Among the poems about the profession and specialty we can name the work by Y.Seidakhmet "Kim kaida?". The poet describes the work performed by each profession as follows:

In search of valuable ore,  
Geologist travels the steppe.  
Keeping in hand the shovel,

The gardener works always in the garden example (Anthology of children's poetry, 2021: 221).

The poets by introducing different professions warn children that first of all they should become a full-fledged one (complete man) as Abay spoke about. In this regard, V.G. Belinsky stated followings: "Children should be educated first to be a human (to humanity), not to be officials, poets, craftsmen, and only then to be taught for other things."

Poems about the **seasons** occupy a huge place among poems for children. Zh.Shakenuly in his poem "Tort mausym – The four seasons" focused on seasons of the year, namely the spring, summer, autumn, and winter. In the poem "Seasons" he describes twelve months and shows the peculiarities of each month. In the poem "Saur (April)", B. Aitmukayeva compares the April month of the spring with the loving and beautiful swan, saying: "Come April, you are my beauty, as the loving swan". S. Namazshamova in her poems "Koktem (The spring)", "Koktemning syiy (Gift of the spring)" describes the connection of the revival of life with spring.

The line "If there is a wonderful birds' sing, it is the spring's song" shows that all living beings will be in a wonderful mood when spring comes. Along with the seasons, there are many poems about Nauryz – Kazakh people align it as the beginning of the year. In the poems "Nauryz meiramy" by Sh. Zhubatova, "Nauryz" by K. Yelemes, "Nauryz toy" by K. Adis, S "Nauryz Kozhe", "Nauryz tioli" by S. Namazshamova the meaning of the essence of Nauryz is

revealed in detail when the blue stone of Samarkand melts, day and night are equal, thick becomes thin, etc.

Poems about the **native land, Motherland, and country** occupy a large place in children's poetry. Following poems "Otan-Ana", "Otandy suyu erge syn" by B. Usenbayev, "Kazakhstanym menin!" by A. Kairbekov, "Aynalayyn yelim!" by Sh. Zhubatova, "Menin Otany" by K. Adis, "Otandy jaksy koremin", "Otanymnyn bayligi", by S. Namazshamova, "Birlik zhyry", "Aynaldim sennen, azattyk", "Almatym", "Turkestan kesenesi", "Zhumbaktas", "Kolsai" by S. Kamshyger, "Aulieagash", "Torysh aymagi", "Zheke batyr tau", "Anshikum", "Kayyndy koli", "Rakhman kaynary", "Mynzhylky kudigi" by O. Kasym show that the Motherland is hotter than fire.

The poets are proud of the riches of the Kazakh land, including mountains, rocks, water, streams, deserts and sands. Equating the homeland with Paradise is a literary tradition in the long history of literature, and poets in their poems for children about the native land and The Motherland refer the native land as Mecca and worship its power.

The following poems that stand out from children's poetry are an **interpretation** of Abay's poetry. In their works for children many Kazakh poets reinterpret Abay's poem "Gylym tuppai maktanba". K. Shagyr in his poem "Abay sozi – aikyn soz" analyzes the five noble and five enemies mentioned by the poet in his own way. He criticises gossipers, saying "Don't gossip, don't slander anyone!" and speaks of the damage that lies, arrogance, laziness and slander do to mankind. S. Kaskabasov on the concept of "complete man" (full-fledged) by Abay stated follows: "By emphasizing the noble qualities of man, first introducing the concept of "complete man" and saying that "the superiority of one over others is only through geniuses, knowledge, science, conscience and good character" and ignoring power and wealth, paying attention to the power of the humanity and the power of love were born from above mentioned benefits of that period (S. Kaskabasov, 2021: 3). The lyrical character, who glorified the five nobles and aimed to avoid the five enemies makes conclusion as follows: "The noble sayings by Abay are the light that leading you everywhere!"

Taught children not to torture and be satisfied, explaining with sample not to ask for "to get iPhone or the Moon". In today's world of information technology both adult and child are stick to the telephone. Every year a new brand of mobile phone is released and the price rises sharply. Therefore, every child should learn if his/her parents can afford and be satisfied with the situation of parents. It is obvious that a child who has accumulated five noble qualities through real-life examples will grow up motivated, hardworking, educated, satisfied, compassionate.

The poem "I am a little boy" by Y. Zhenisuly interprets the song "A little boy", which begins with lines "I am a little boy, I'm tractable and well-behaved". The poet updated the poem with topics about electronic devices such as tablet computer, smartphones and social networks, YouTube, minecraft:

I am a little boy,

I'm little, but very smart.  
If they give me a tablet,  
I will stay home without crying.

I' ll not open the wardrobes,  
I' ll not through about clothes.  
You-Tube channel I' ll open,

And start an interesting game example (Anthology of children's poetry, 2021: 191).

As per the poet the children of the modern technology years are always hang out in social networks and stick on a smartphone everywhere. From this point of view, it is a harsh and colorless reality of life.

**Conclusion:** In their works, the above-mentioned children's poets use life stories, artistically reflected realities of society as an example for the younger generation. In order to planting seeds of goodness to the younger generation the poets transformed the genres of folk songs, lullabies, fetters cutting, counting-out rhymes, tongue twisters, riddles, blessings, and aitys into the society life. The ability to use genres which have been passed down orally from sire to son for centuries and use them according to the demands of modernity is a continuation of the tradition of Kazakh literature.

The novelty of the content and genre in modern children's literature is reflected in metagrams, interpreted poems, saucy poems, dialogue poems, while works depicting and artistically reflecting the life experience of the nation are an indicator of the flourishing in the new era literature.

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# ҚОҒАМ ҚАЙРАТКЕРІ Ш.К.БЕРКІМБАЕВАНЫҢ ТІЛДІК ТҰЛҒАСЫ ТУРАЛЫ

**Сатбекова А.А.**

педагогика ғылымдарының докторы, профессор, «ЖОО үздік оқытушысы», мемлекеттік грантының иегері, Қазақ Ұлттық ҚызПУ, Алматы

**Советбай Ә.**

1-курс магистранты, Қазақ Ұлттық ҚызПУ, Алматы

**Аннотация:** Статья посвящена исследованию языковой личности видного государственного и общественного деятеля Ш.К.Беркимбаевой. Антропологический подход к изучению говорящей личности (homo logins) продолжает привлекать казахстанских исследователей.

Изучение системного описания конкретной языковой личности на основе созданных ею текстов демонстрирует динамичность и открытость, а тем самым – плодотворность и перспективность теории Ю.Н.Караулова.

Государственный и общественной деятель Беркимбаева Шамша Копбаевна – это интеллектуально одаренная личность, обладающая высоким потенциалом коммуникативной компетенции.

**Ключевые слова:** казахский язык, языковая личность, национально-духовные ценности, ораторское искусство

Тілдік тұлға теориясының толық және жүйелі түрде қарастырылуы Ю.Н.Карауловтың еңбектерінде қалыптасқан. Ғалым «Русский язык и языковая личность» атты еңбегінде былай деп жазады: «Языковая личность — это углубление, развитие, насыщение дополнительным содержанием понятия личности вообще. Последнее соткано из противоречий между стабильностью и изменчивостью, устойчивостью мотивационных предрасположений и способностью поддаваться внешним воздействиям и самовоздействию, трансформируя их результаты в перестройке отношений элементов на каждом из уровней — семантическом, когнитивном и мотивационном; между своим существованием в реальном времени и "нерелевантностью" временного параметра для идентификации личности» [1]. Атап айтқанда, зерттелуші тілдік тұлғаның дискурсын анықтау жеке тілдік қолданыстың вербалды-семантикалық, когнитивті және прагматикалық деңгейлерін талдау арқылы іске асырылады.

Профессор Жамал Манкееваның пікіріне жүгінсек: «Қазіргі заманда тілдің қызметі жалаң коммуникативтік құрал ретінде емес, ойды білдіріп қана қоймай, тілдік санада ойды түзетін, құратын, сақтайтын, жеткізетін таным тетігі, ел тарихын сақтаған мәдени-құжаттық қор деп тұжырымдалады. Осы қағидаға сәйкес тілді зерттеу оны тұтынушымен тығыз байланыста зерттейтін антропоэлектік (адамтанымдық) бағыт өріс алуда, яғни мұнда сөз иесінің болмысына (тұлғасына) ерекше мән беріледі. Бұл арада мұндай зерттеулерге нысан болатын — тіл арқылы ұлттың болмысы мен мәдениетін дәйектейтін ел тұлғаларының ісі мен сөзі, рухани шығармашылық мұрасы» [2].

Қазақ тіл білімінде тілдік тұлға мәселесін көтерген келелі зерттеулер де баршылық. Айталық, ғалым Г. Мұратова «Абайдың тілдік тұлғасы: дискурстық талдау мен концептуалды жүйесі» атты зерттеу еңбегінде: «Қазақ тіл біліміндегі тілдік тұлғаның классикалық үлгісін ұлы Абайдың қазақ әдеби тіліндегі орнын саралау арқылы айқын көруге болады. Тілдік тұлға дегеніміз — ұлт тілі мен мәдениетінен толық ақпарат меңгерген тілдік мәдени құзірет иесі. Ол ұлттық, аймақтық, әлемдік мәдениет ақпаратын меңгеруіне байланысты деңгейлерден тұрады», — дейді. [3].

Тілші-ғалым Ж.Ермекова «М.Жұмабаевтың тілдік тұлғасы» зерттеу еңбегінде М.Жұмабаевтың тілдік тұлғасының лингвокогнитивтік және прагматикалық ерекшеліктерін көрсететін концептілерді, тілдік құралдарды, жеке дүниетанымындағы көркемдік-эстетикалық, рухани құндылықтарды көркем дискурсы арқылы көрсетуді мақсат етеді. [4].

Тілдік тұлғаның қалыптасуына мынадай алғышарттар болуы тиіс:

- ұлттық тәрбие (отбасылық тәрбие);
- ұлттық тілдегі өлшемдер (қабылданған, қабылданбаған құндылықтар);

- мәдени ақпарат (салт-дәстүр, әдет-ғұрып);
- рухани сана (дін қағидалары);
- үлгі тұтатын тұлғалар (Абай, Шоқан т.б.);
- озық білім жүйесі;
- тектілік интеллектісі.

Міне, осы қасиеттерді бойына жинаған индивид, саналы адам дәрежесінен тұлға, одан әрі тілдік тұлға дәрежесіне көтеріле алады. Тілдік тұлғаның өзінің болмысына сәйкес қалыптастырған, енгізген сөз саптауы, көзқарасы эталондық сипат дәрежесіне көшеді де, оның тілі зерттеу арқауы бола бастайды. Бұл көбіне тілдік тұлғаның вербалды-семантикалық деңгейінде байқалады. [5].

Философия докторы (PhD) Елшібаева Қ. З. «Шаршы сөз дискурсының лингвопрагматикалық аспектісі» атты диссертациялық жұмысында: «Мәтінде де, дискурста да тілдік тұлға мәселесі басты орын алатыны сөзсіз. Кез келген мәтінді тілдік тұлға жазады. Дискурста да тілдік тұлға түседі. Кейінгі кездері зерттеу жұмыстарына негіз болып келген тілдік тұлға ұғымы кейіпкер мен жазушы тілдік тұлғасы, автор мен аудармашы тілдік тұлғасы арасындағы айырмашылығы мен толық шешілмеген мәселелері бар қарама-қайшылықты құбылыс. Антропоэлекті бағытта ұлттық мәдени құндылық ретіндегі ұлттық ділді, ұлттық тілдік мұраны, ұлттық психологияны терең меңгерген жеке тұлғаны зерттеу арқылы әлемнің тілдік бейнесін ашуда түрлі тұжырым жасауға мүмкіндік туады», - дейді. [6].

Тілдік тұлға дегеніміз – мәтіндерді тудыру және қабылдай алу қабілетін иеленген адам. Ол қабілеті құрылымдық-тілдік күрделілік деңгейімен, шындықты бейнелеудің тереңдігі және дәлдігімен, нақты мақсатқа бағытталушылығымен ерекшеленеді. Тілдік тұлға ұғымына кең ғылыми мағына берген Ю.Н.Карауловтың пікірінше: «Думаю, не требует специальных доказательств то положение, что языковая личность как объект лингвистического изучения позволяет на систематической основе рассматривать как взаимодействующие все четыре фундаментальных языковых свойства. Во-первых, потому, что личность есть средоточие и результат социальных законов; во-вторых, потому, что она есть продукт исторического развития этноса; в-третьих, по причине принадлежности ее мотивационных предрасположений, возникающих из взаимодействия биологических побуждений с социальными и физическими условиями, - к психической сфере; наконец, в-четвертых, в силу того, что личность есть создатель и пользователь знаковых, т.е. системно-структурных по своей природе, образований. В итоге известная метафора "Стиль-это человек" расшифровывается как двуплановая формула, которая включает представление о личности, реализующей определенный стиль жизни, отражаемый в стиле употребления языка, т.е. соединяет социально-поведенческий контекст с речевым». Яғни ғалым: «Тілдік тұлға – тілді зерттеудің барлық аспектілерін қамти отырып, адамды оның тілінен тыс қарастыратын пәндер арасындағы шекараны бұзып өтетін, ауыспайтын, алмаспайтын идея», - дейді. [1].

Көрсетілген деңгейлердегі жеке тұлғаның ұлттық болмысын ашудың маңыздылығы туралы ғалым Ж.А.Манкееваның пікірлеріне жүгінсек: «Аталған деңгейлердің дамуының белгілі бір тілдік тұлғада көрініс табуы әртүрлі дәрежеде өрістеп, түрлі сипатта көрінеді. Оның шығармашылық-танымдық мазмұны дүниетанымдық, мәдени құндылықтар жүйесінен тұрады. Сондықтан тілдік тұлғаны алдымен ұлттық тілдік тұлға ретінде түсінеміз. Себебі тілдік тұлғаның табиғаты тұлғаның ұлттық мәдени сатысымен тікелей байланысты» [7, 282-283] болып шығады.

Адамды тілден тысқары зерттеу мүмкін болмайды, тілді жасаушы, қолданушы, пайдаланушы адамға назар аудармай, тілдің шегінен аспай, тілдің өзін тану мүмкін емес. Себебі, адамның бір ауыз сөзін естімейінше, оның қандай адам екені жайлы мәлімет алу мүмкін емес.

Белгілі социолінгвист ғалым Б.Хасанов «Мемлекеттік қызметшінің тілдік тұлғасы және тілдік орта» атты еңбегінде «Мемлекеттік қызметшінің тілдік тұлғасы – нақты білім мен түсінік жиынтығын меңгерген, мемлекеттік қызметте өзін сөйлеу іс-әрекетімен танытатын тұлға» деп атап көрсетеді [8].

Қазақ әдебиетінің классигі М.О.Әуезов айтқандай: «Ақ дегені алғыс, қара дегені қарғыс» болатын жақсылардың сөзі көптің көзінде мінсіз, толық болуы шарт. Көлденең кісі мін таба алмайтындай, қорғасындай ауыр, оқтай жұмыр, өтімді болуы керек» - деп келетін талабы саяси тұлғаларға тікелей қатысты. Сол себепті, мейлі мемлекеттік шара, мерекелік жиын, жұмыс бабына қатысты жиналыс, саяси мәлімдеме немесе жеке адамдардың той-томалағы, асы болсын лауазымды тұлғалар мен мемлекеттік қызметшілердің босаңсуына, артық-ауыс сөз айтуына қақысы жоқ. Қандай жағдай болса да, жан-жақты дайын болуы қажет. Тәуелсіздіктің алғашқы жылдары мемлекеттік қызметте қазақ сөзінің қадір-қасиетін тереңінен білетін С.Зиманов, Ә.Кекілбаев, М.Жолдасбеков,

С.Қасқабасов, Т.Әбдіков, Қ.Сұлтанов, Ш.К.Беркімбаева, Ә.Асқаров сынды азаматтардың болуы ұлттық идеологияның дұрыс арнаға түсуіне оң ықпал етті. [6]. Осы тұлғалардың арасынан Парламент Сенатының депутаты, ҚР Білім және ғылым министрі, Қазақ ұлттық қыздар педагогикалық университетінің ректоры қызметтерін абыроймен атқарған көрнекті мемлекет және қоғам қайраткері Ш.К. Беркімбаеваның тілдік тұлғасы ерекшеленеді.

Қазақтың парасатты қызы Шәмша Көпбайқызы өзінің өнегелі өмірінде екі мәселеге қатты көңіл бөлді. Ол, біріншіден, ана тілінің тағдыры, екіншіден, қазақ мектебінің тағдыры. Мемлекетіміздің халықаралық беделінің өсу алғышарттарының бірі – мемлекеттік тілінің қай салада да салтанат құруын қатты қадағалаған ұлтшыл ұстаз қайда еңбек етсе де, ана тілінің абыройын алға қойды. Ана тілінің жанашыры, ұлағатты ұстаз Ш.Беркімбаеваның қоғамның көптеген салаларына қатысты айтқан сөздері тарихи танымға, терең талдауға құрылуымен ерекшеленді. Айталық, әл-Фараби атындағы Қазақ Ұлттық университетінде көптеген шет елдерден келген ғалымдар, ҚР Білім және ғылым министрі қатысқан халықаралық деңгейдегі ірі жиында бірде – бір ғалым қазақ тілінде баяндама жасамаған, сөз де сөйлемеген екен. Сонда өзі сөз сұрап алған Шәмша Көпбайқызы: *«Бүгін бірнеше ірі мемлекеттерден қадірлі меймандар, ғалымдар келіпті. Өте қуаныштымыз. Енді осы қонақтарымыз қазақ деген ел, ұлт бар екендігін, олардың өз тілі, тарихы, мәдениеті, әдебиеті, салт-дәстүрі т.б рухани құндылықтары бар екендігін біліп кетсін деген тілекпен, қазақ тілінің өзіндік әуені, мақамы барлығын құлақтарына құйып кетсін деген ниетпен мемлекеттік тілде сөйлеймін»* – деген еді.

Ұлт тілі мен ділінің жанашыры Ш.К.Беркімбаева «Қазақ мектебі–қазақ ұлтының ұясы» тақырыбындағы баяндамасында көпшілік назарын жаһандану аясында ұлт ретінде жойылып кетуге апарып соқтыруы мүмкін рухани мәңгүрттіктен сақтанудың, қазақ тілінің шын мәнінде мемлекеттік тіл деңгейіне көтерілуінің басты алғышарты – қазақ мектебінің нағыз ұлттық мектеп болып қалыптасуы қажеттігіне аударғаны көпшіліктің есінде.

Жоғары мінберден ауыл мектебі мәселесін көтерген, оның проблемаларын шешуде пәрменді іс атқарған тұлға ретінде халық санасынан лайықты орнын алған Шәмша Көпбайқызы: *«Бізде оқып білім алып жатқандар, негізінен, ауыл баласы. Ауылдағы ең қажетті, әрі қасиетті шаңырақ, бар қазақтың алтын бесігі – мектеп. Сондықтан да қазақ халқының алтын бесігі – ұлттық мектептерге Президент міндеттеген жаңа формациядағы педагог дайындау - біздің ұжым үшін өрелі, әрі қастерлі міндет»*.

Филология ғылымдарының докторы, профессор Т.Ермекова «Парасат мектебінің мәртебелі мұғалимасы еді» деген мақаласында былай дейді: «Білім стандарты мен төл оқулықтардың сапасы күні бүгінге дейін күн тәртібінен түсе қоймағаны белгілі. Осы мәселелердің жоғары деңгейде көтерілуі Ш. К. Беркімбаеваның кезеңінен бастау алды десек қателеспейміз. Мұны бас мұғалиманың сол кезде «Түркістан» (11.04.2002 ж.) газетіне берген сұхбаты айқындайды: *«Бүгінгі күнге дейін жаңа буын оқулықтарын әзірлеу, басып шығару, сынақтан өткізу және енгізудің нақты жүйесі жоқ. Сондықтан қазір біздің алдымызда әрбір пән бойынша жан-жақты ойластырылған, ғылыми тұрғыдан дау туғызбайтын стандарттар жасау мәселесі тұр. Ол үшін мемлекеттік білім стандарты болуға тиісті. Бұрын оның барлығын Мәскеуге қарап жасайтынбыз. Ол стандарт сол кездегі коммунистік идеологияға бағышталған болатын. Енді стандартты қайтадан жасау мақсаты тұр алдымызда... орыс класы болсын, қазақ класы болсын және де басқа тілді мектептер үшін де біз бастауыш кластарға арналған оқулықтарды міндетті түрде өзіміз жазуымыз керек. Себебі, уызынан жарымаған бала ары қарай да ой-санасын дамыта алмайды. Сонан соң жоғары қарай барлық гуманитарлық пәндердің оқулықтарын өзіміз дайындаймыз. Бұл жерде басқа жақтан ешқандай әдебиет келуге тиіс емес»*.

Тіл мәселесі Шәмша Көпбайқызының азаматтық позициясының ең бастысы да қадірлісі. Орыс тілін бір кісідей жетік білетін лауазымды тұлғаның қандай биіктен болсын қазақ тілінде сөйлеуі, өзі сөйлеп қана қоймай, қандай қызметте жүрсе де мемлекеттік тілдің кеңінен қанат жаюына аянбай тер төгуі оның өз халқының шын мәніндегі патриоты екенін дәлелдей түседі. Өз сөзімен айтар болсақ, *«егер бала ана тілінде оқып, ана тілінде білім алған болса, міндетті түрде, елінің, халқының тарихына үңіледі, әдебиетін іздейді. Өнерін меңгеруге тырысады. Әйтеуір, халқымен етене жақын болуға деген талпынысы оянады. Егер, ол өз тілінде оқымаған болса, мұның барлығына немқұрайды қарайды. Тілдің құдыреті деген осы. Жетпіс жыл бойы біз орыс тілін үйренсе ғана жақсы қызметкер бола алады, өмірден өз жолын таба алады деген тәрбиемен келдік қой. Құлдық*

психология – буын-буынымызды жайлап алған. Барлық жақсы нәрсе өзге мемлекетте деп ойлаймыз. Ал, халқымыздың өзіне тән өркениеті болғандығын, мәдениеті, қайталанбас өнері барлығын, ешкімге ұқсамайтын болмысы бар дегенді баланың санасына құя беру керек. Сонда ғана ұлттық рух пайда болады. Біз сол жетпіс жылда ұлттық рухтан ажырап қалдық. Ұлттық рух пайда болмай, балада ұлтына деген ерекше сезім пайда болмайды. Сондықтан, ұлттық рухты жаңғырту керек». Немесе министрліктердегі қазақ тілінің қолданылу деңгейін сынай келіп, «Мемлекеттік тілдің халықаралық деңгейдегі мәртебесін көтеру – Қазақстан Республикасының егемендігі мен тәуелсіздігін нығайту. Жеріміз бен еліміздің тұтастығының кепілдігі – мемлекеттік тілімізде. Мемлекеттік тілдің халықаралық қарым-қатынаста қолдану аясын кеңейтуге Парламенттің, оның Аппаратының тікелей қатысы бары сөзсіз», – деп халық қалаулылары мен аппарат қызметкерлеріне салмақты ой тастаса, Президент жанындағы Әйелдер істері және отбасылық-демографиялық саясат жөніндегі ұлттық комиссияның құрылғанына он жыл толуына орай өткізілген конференцияда орыс тілінде баяндама жасаған билік пен іс басындағы замандас сіңілілеріне қарата айтылған: «Түрік халқы «ата тіл», славян халқы «туған тіл» деп атайтын ұғымды қазақ халқы «ана тілі» деп атаймыз. Бұған қоса өзімізге ең қадірлі, қасиетті ұғымдарды ана атымен байланыстырамыз. Ендеше қоғамның рухани саясатын жасауға тікелей араласып жүрген әйелдер өз ана тілінде сөйлеуге неге құлықсыз? Апаларына қарап, өсіп келе жатқан сіңілілері не ойлар екен деп жүрегім сыздады», – деген уәжді сөзге тоқтамаған адам кемде-кем». [9].

Шәмша Көпбайқызының Қыздар университетіне басшылық жылдары осы қарашаңырақтың 60 жылдығы мен 65 жылдық мерейтойларына тұра келді. Университеттің 60 жылдық мерейтойында сөйлеген сөзінде: «Жас талды аялап-мәпелесең, бәйтерек болып өседі. Түзу өседі. Қыздар тәрбиесі де сол іспетті. Ана тілі, ұлттық ерекшелік балаға ана сүтімен баратындықтан, яғни әйел ұлт тәрбиелейтіндіктен, бүкіл халық, қоғам, мемлекет болып қыз балаға, болашақ анаға ерекше қамқорлық жасауға тиіс. Ал біздің институттың оқытушылар ұжымы педагог қыздардың саналы да тәрбиелі болып өсуіне, терең білім алуына бар білім, қажыр-қайратын жұмсап, жоғарыда айтылған өрелі міндет биігінен көрінеріне сеніңіздер» - деген сөздерінен тек профессор-оқытушылар қауымы ғана емес, бүкіл қауым қыз балаға деген жауапкершілікті ерекше сезінгендей болды. Осы жиындағы: «Бүгінде қазақ қызының табиғаты өзгеріп барады деген әңгіме баспасөз бетінде көп айтылады. Шынында көңілге қаяу салар жағдай жоқ емес. Бірақ сол мақалалардың бәрінде біржақты тек қыздарды кіналау басым. Ер азаматтардың еш нәрсеге қатысы жоқ сияқты. Меніңше, абыройлы әкесі, арқа тұтар ағасы, іздер-сұрар інісі болса, еш уақытта қыз бала жаман нәрсеге бармайды. Бабаларымыздан қалған «Қарындастың қамы үшін» деген сөздің мағынасына зер салсақ, «қарындас» сөзі «ел» мағынасында қолданылып тұр. «Қарындастың» қамын ойлау – Сіздердің міндеттеріңіз, құрметті азаматтар. Атаға лағынет дегізбеу, тегімізге тіл тигізбеу ұлтымыздың ортақ міндеті болғандықтан, ер-азаматтарымыз кесек мінезді, намысты, еліне ес, әулетіне бас бола білсе екен дейміз», - деген сөзі қазақ қыздарына деген көзқарасқа түбегейлі бетбұрыс жасады. Сапалы білім, сындарлы тәрбие алған студент қыздардың ұлағатты ұстаз болуына мұндай аса қамқорлық көрсетудің түпкі мақсаты – халқымыздың алтын бесігі мектептердің деңгейін өсіріп, ұрпақ тәрбиелеу арқылы ұлттың сапасын арттырып, тұлғасын сомдау. [10].

«Менің жан дүниесі таңғы шықтай таза, аққудың көгілдіріндей әдемі қыздарымнан аяулы жар, қасиетті ана, сүйікті әже, көпшіліктің құрметіне бөленетін белгілі тұлғалар шықса екен деп тілеймін», - деген Шәмша апайдың ақ тілегі қазақ қыздарын ақжолға жетелеп тұрғандай.

Мемлекеттік мәртебеге ие болған ана тіліміздің мәселесі тіл білімімен шектелмей, ұлттық болмысты танытатын, қоғамдық-әлеуметтік қызметімен қозғаушы күш ретінде арқау болуда. Сондықтан тілдік тұлға мазмұнына ғалымдардың көрсетуінше, мынадай компоненттер енеді: 1) құндылықтық (аксиологиялық), дүниетанымдық жүйе, тәрбие мазмұны; 2) тілге деген қызығушылықтың тиімді құралы ретінде мәдениетті игеру деңгейі; 3) жеке тұлғалық (адамдық, терең жекелік) қасиеттер. Тілдік тұлғаның қалыптасу үрдісі адамның жалпы интеллектуалдық деңгейінен, парасат биігінен бастау алып, оның тұлғалық мінезінің құрылымын, саяси, қоғамдық, психологиялық және т.б. ерекшеліктері түзеді. Бәрінің негізін тұлғаның ұлттық болмыс-бітімін, ұлттық-рухани құндылығын, ұлтжанды сезімін, қоғамдық ой биігін сипаттайтын рухани қажеттілік құрайды. Екінші

бір қажеттіліктің бірі – ұлттық тәрбие арқау болған отбасылық тәрбие үрдістері, тектілік ұғымының ана сүтімен санаға сіңірілуі.[2].

Жалпы, тілдік тұлға дегеніміздің өзі ұлттық тіл ортасында, ұлттық құндылықтар арасында тәрбиеленген, ұлттық рух пен ұлттық тілді толық меңгерген жеке адам, бүкіл ұлттық болмысты бойына жинақтаған индивид.

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# THE ROLE OF ITALIAN LEXICON IN ENRICHING THE INVENTORY OF THE SEMASIOLOGY OF THE AZERBAIJANI LANGUAGE

G.M.Bayramova

Azerbaijan University of Languages, Senior lecturer, Ph.D., Azerbaijan, Baku

**Аннотация:** Человеческое общество постоянно развивается при наличии внешнего вмешательства. В связи с этим было бы неуместно говорить о развитии какого-либо языка в отрыве от мировых событий и тенденций. Нет необходимости в длительном сосуществовании или интенсивном вмешательстве, чтобы лексический уровень языка подвергался воздействию того или иного уровня вмешательства. Во многих случаях освоение азербайджанским языком слов итальянского происхождения не было результатом прямого языкового контакта. Слова, заимствованные из итальянского языка, иногда подвержены смысловому расширению из-за влияния лексико-семантической среды.

**Ключевые слова:** лексика, заимствование, приобретение, семантика, доминанта, расширение.

It is known that no language, just like no human society, can exist and develop without external interference. So, if we consider the world as a whole, a living organism, then it is inappropriate to talk about the evolution and development of society and its main means of communication, i.e. a language in isolation from global events and trends, from socio-historical processes, from scientific and technological progress. Because no company, nation or country can take the initiative and possess innovations in all areas of life, society and science. In this case, in general, the only way for the evolution of human society is through healthy and beneficial mutual cooperation under the conditions of maintaining national self-awareness and specificity. Such cooperation, as its logical continuation, makes it possible to acquire important information and concepts related to the experiences and achievements of those different societies. On the other hand, in a bilingual or polylinguistic language environment, the mutual and intensive one-way interactions and interventions of languages do not leave the language system unaffected [1].

According to the prevailing and almost indisputable opinion in linguistics, the lexical layer can be considered the most dynamic linguistic layer, that is, the least closed to changes. Long-term coexistence or intense intervention conditions are not necessary for the lexical level of a language to suffer one level of interference or another. However, as it is known, for the implementation of fundamental intervention in the grammatical structure of the language, it is necessary to have such long-term intensive influence opportunities and conditions [2]. In this regard, we can note that the group of acquired lexical units included in the analysis in the presented study did not benefit from the conditions made possible by those intensive interventions. These are the adoption of Italian origin, which has served to increase the diversity of the inventory of the semasiological groups of the Azerbaijani language and, above all, has enriched our language and culture as a whole with new concepts and terms.

When talking about the introduction of words of Italian origin into the Azerbaijani language, we should first note that the borrowings from this language were not obtained due to direct language contact in many cases. It should be remembered that borrowings from other languages can enter any language in two ways: 1) directly or 2) through a second (transit) language. Due to the fact that the Italian language, the people who are carriers of this language, are far from the common geographical sharing with us and have a different ethno-cultural value system, it lacks the possibility of direct influence of it on the Azerbaijani language. The ability of this language to influence Azerbaijan and, in general, any other non-neighboring language, is simply conditioned by its informative load carrying capacity. In the study of the acquisition of various concepts and "labels" from the Italian language into Azerbaijani language, we can note that the borrowings from this language entered our language through the transit of the Russian language. The massification of borrowings from the Italian language in the other European languages

coincides with the period after the 14th-15th century, i.e., the time period parallel to the flourishing period of the Italian Renaissance. It was during those times that new concepts and terminology, which were the inevitable continuation and consequences of the Italian renaissance, began to be adopted by other European nations [3].

Synonymous components of Italian origin in our language include professional-art lexicon and terminology covering architecture, art, sports, transport, finance-accounting and other fields. While in many cases those words brought with them entirely new concepts or semantics reflecting different shades of meaning of known concepts, some entered and continued to function as alternative naming of known concepts. In some cases, the lexicon of Italian origin acts as a lexical "label" of new concepts, while in some cases it performs the function of naming known concepts as synonyms. For example: most of the terms of music, finance, architecture are words that once entered our language as neologisms: *sonore* 'sonor', *mosaico* 'mozaika' (*şəbəkə, rəngli qurama*), *banca* 'bank', *corridoio* 'korridor' (*dəhliz*), *balcone* 'balkon' (*eyvan*), *terrazza* 'terras' (*eyvan, səki*). In some cases, the synonymous component of Italian origin has a dominant position, but in most cases, Azerbaijani words of Turkic origin or Arabian or Persian origin, which have been acquired earlier, but have gained citizenship, are in a dominant position. For example, the word *koridor*, like most of the borrowings from the Italian language, entered our language through the Russian language. For this it would be appropriate to trace the trajectory of the word *koridor* to the borders of Azerbaijan on the basis of Russian etymological dictionaries. It is interesting that there are different opinions on this. Thus, in Krylov's etymological dictionary, it is noted that this word is taken from the German language, and its original basis is the Latin verb *currere* 'qaçmaq' (to run away) [4]. In the Fasmer dictionary, it was noted that this word, which began to be used in Russian since 1710, was adopted from the Provence languages through the transit of French or German languages [5]. Arakin noted that the mentioned term was formed in the conditions of assimilation of the Italian word *corridore* (< *correra*) [6, p. 296].

We would not be wrong if we said that the word *koridor* in the Azerbaijani literary language has little functionality, and its use is not much appreciated compared to the word *dəhliz* (corridor), which has gained nationality status. But this does not mean that borrowing of Eastern origin completely supplanted the appropriation of European origin. Thus, despite the weakening of its position as an architectural-constructive term in our literary language, the Italian acquisition we are talking about has "turned" to political terminology under the dictates of the sad reality of recent years. We are talking about the idea of "Lachin Corridor", which was created as a result of ominous events. It should also be noted that although the word *dəhliz* (corridor) is used in this position, it cannot be ignored that it shows a lower frequency of use in the mentioned position. Let's follow the conditions of parallel development of *koridor* and *dəhliz* (corridor) synonyms based on examples:

*Koridorda təhlükəsizlik işçisi tərəfindən qovulan bala ayının sorağı bir sinifdən gəldi* ('The voice of the bear cub, which the guard was chasing down the corridor, came from the classroom.') [7].

*Bu dəfə biz Cənub Qaz Dəhlizinin uğurla tamamlanması haqqında məlumat verə bilərik* ('This time we can report on the successful completion of the Southern Gas Corridor')[8].

*Gəncədən başlayacaq olan bir avtoyol Qarabağdan, Laçın koridorundan, Ermənistandan, Naxçıvandan keçəcək və Türkiyədə Karsa qədər gəlib oradan Avropaya bağlanacaq* ('A highway that will start from Ganja will pass through Karabakh, Lachin Corridor, Armenia, Nakhchivan and will reach Kars in Turkey and connect to Europe.') [9].

Sometimes the words borrowed from the Italian language are subject to expansion of meaning with the lexico-semantic promotion in the Azerbaijani language. At this time, it is possible to follow cases of representation of the same word in different synonymous lines. In addition, the lexicon of Italian origin also participates in the enrichment of the homonymic order of the Azerbaijani language. In this regard, it is necessary to remember the factors of riappropriation [1, p.137-141].

The above-mentioned facts of synonymy shed light on some aspects of the "behavior" of the Italian lexemes in the "space" of the semasiological word groups of the Azerbaijani language. Even these limited groups of words can create an idea about the degree to which the lexicon of Italian origin was assimilated and assimilated by the lexical layer of our language.



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# Emotional expressiveness of speech in spoken English

Aliyeva Gunel Ilham

ASPU, CFL, English teacher

**Key words:** strategies, skills, priority, aspects, communication

Speaking strategies: An important part of language learning strategy training is speaking strategies. Verbal strategies are referred to in the literature as communication strategies, conversational skills, or oral communication strategies; for the purpose of this research, students to solve any communication problem while speaking in English use speaking strategies. Speaking strategies are very important because they help foreign language learners negotiate the meaning of language structures or sociolinguistic rules that are not shared between a second language learner and a native speaker of the target language.

One goal of language learners is the chance to speak a foreign language with a different oral exchange and eventually become a competent speaker. A competent speaker knows how to use speaking strategies. These strategies occur when students cannot express what they want to say because they do not have the proper resources to say it. These are verbal and non-verbal strategies. (e.g. clarification, non-verbal mimicry, gestures, etc.) Can be used to compensate for communication breakdowns or unfamiliar words or topics and is aimed at increasing effectiveness.

Speaking strategies are important because they provide foreign language learners with valuable tools to communicate in the target language in a variety of situations. However, there is disagreement as to whether or not speaking strategies should be taught. Students believe that they can naturally transfer these strategies from their native language to their target language. On the other hand, learners should be shown how such a strategy can be applied in the second language, and learners should be encouraged and given opportunities to use such strategies. Because L1 (first language) skills do not necessarily transfer to L2 (second language), students need to be taught this in language classes. In a previous study

It is argued that learners tend to be silent or rely on the teacher to compensate for unknown vocabulary or grammatical structures. In the same study, when students were audio-recorded performing speaking tasks before training, only two students were able to use speaking strategies, indicating that students could not always transfer their L1 knowledge to L2. Another study found that students and even teachers are less willing to deal with less pleasant

communication exchanges, including rudeness, disrespect, and impoliteness. Although this approach may be considered as an unrelated topic, it implies that students should be taught conversational strategies so that they can communicate effectively while interacting in English.

### **Priority aspects of negotiation strategies**

My scientific research work on negotiation strategies combines 3 aspects.

The first study I will present is a ten-week English for Academic Purposes semester program at a university there in 2008, which prepared students for the International English Language Testing System (IELTS) speaking test. This preparation consisted of three aspects: 1) developing students' confidence by focusing on reducing test anxiety and offering test practice, 2) providing students with IELTS rules, thereby better informing students of what the speaking test entails, and 3) students' preparation for the IELTS test. to inform them about the marking criteria and to help them adjust their speaking performance to these criteria. 35 students participated in this course; however, only 13 people took the IELTS test because the other 22 people had already entered the respective universities. The results showed that the strategic performance education of these students helped them pass the test with the necessary scores for university admission. Although the sample was small, students' preparation to use strategies made them perform better on foreign language learning tasks. Encouraging students to use different perspectives can also encourage them to study independently and consider different theoretical positions. This aspect of student preparation is important because one of the desired goals of education is to help learners think critically to guide the learning process.

The second study analyzed interviewed 84 EFL (English as a Foreign Language) users in Mexico to identify problems experienced by Mexican students and teachers. According to the results of the research, active activities of students were observed.

Strategy training has been proposed as a tool to better prepare students for real-life conversational interactions.

The third study applied a questionnaire to obtain information on students' beliefs about speaking a foreign language. The students who took part in the survey were in their final year at a university in South East England and studying German. The questionnaire consisted of statements with a rating scale from one to five (one being 'strongly disagree' and five being 'strongly agree'). Students had to determine how much they agreed or disagreed with the statements. Students were asked to answer open-ended questions in order to learn the strategies used when speaking a foreign language. The three strategies most used by students were practicing at home after revision, correcting, and repeating. Although the results were obtained from a small number of participants, they revealed that the participants used strategies when speaking in a foreign language. An interesting feature of the findings was that students perceived failure to be due to individual factors related to their actions, efforts, and feelings.

Two main themes emerging from this study are: students' awareness of strategy use and the role of affective factors such as self-confidence, mood and anxiety in foreign language speaking. Students have indicated that practice and revision are the most important activities to successfully speak a foreign language. Although these two strategies are metacognitive and important, the main point in my research was the need for teaching them to use speaking strategies to help them improve their performance when interacting in English. The following research questions were developed to find out what communication strategies were used by students in general during the study:

1. What communication strategies do students use the most?
2. What communication strategies do university students use to overcome problems when speaking English?

The first stage of research

This work consisted of two main stages. In the first phase, students had to answer an open-ended question about the strategies they use when they encounter four specific constraints when speaking English

- unknown vocabulary or structures,
- words or phrases that cannot be heard clearly,
- take time to think and
- not understanding the received message.

After deeper analysis and discussion among these surveys, the following 14 English speaking strategies were identified:

1. If I don't know how to say a word or phrase, I ask a classmate or my teacher.
2. I use the dictionary to prepare a role-play or communicative activity in class.
3. If I don't know how to say a word, I use a synonym or describe what I want to say.
4. If I don't know how to say a word in English, I say it in mother tongue.
5. If I don't know how to say a word or phrase, I use gestures and my hands.
6. I ask my speaking partner to repeat a word or phrase if I do not hear it clearly.
7. If I do not hear a word or phrase clearly, I relate it to the part of the conversation that I understood.
8. I use known words and phrases when I don't know how to say something.
9. I structure some ideas in my mind before speaking.
10. To gain time, I use fillers such as: and, well, etc.
11. I repeat the last word or phrase I said to gain time.
12. I don't think too much before speaking so that ideas can flow in English.
13. I ask my speaking partner to repeat or explain in different words what I did not understand.
14. I tell my speaking partner when I don't understand something

These 14 strategies were eventually included in the Strategic Language Learning Questionnaire.

Why do students so often cite listening and speaking as their biggest problems? Partly because of the demands of listening and speaking, it has become a tradition to teach speaking more often. In general, language practice activities (discussions, information gap activities, etc.) are used to practice a particular grammar rule. But what can we do in the classroom to prepare students for authentic interaction?

- What do students need?
- Practical suggestions
- What language should I teach?
- How do I get students to use a new language
- Further reading

What do students need?

- Don't use L1 (native language) strategies that they don't transfer automatically.
- Communication in formal/informal language and practice of choosing appropriate language for different situations.
- Awareness that informal spoken language is less complex than written language. Avoid using shorter sentences, less organization and more 'vague' or non-specific language.
- Exposure to different types of spoken text.
- Ability to handle different listening situations
- Be proficient in both "message-oriented" and operational language and interaction language, language to maintain social relationships.
- Have intelligible pronunciation and cope with speech flows.

Practical suggestions

- Transfer of L1 (Language 1-mother tongue) strategies

In preparing for a speaking task, to inform students of relevant L1 strategies that can help them to successfully complete the task. For example, 'rewording' if someone doesn't understand what you mean.

- Formal / informal language

Give students one or more short dialogues, either formal or informal, by a speaker to show how messy their informal speech is.

- vague language

Focusing on ambiguous language patterns using tape recordings of informal speech.

- Different types of spoken text

Teaching language for each text type by making a list of spoken text types according to audience level.

- Interactive listening

Developing interactive listening exercises. Practice face-to-face listening

- Transaction and interaction language

To raise students' awareness using dialogue that involves both.

The interaction can be analyzed as follows:

A: What did you do last night? (Initiate- Start)

B: Went to the cinema (Respond)

A: Oh really? (Follow-up)

What did you see? (Initiate- Start)

B: Lord of the Rings (Respond- Answer)

Have you been yet? (Initiate- Start)

A: No it's difficult with the kids (Respond- Answer)

B: Yeah of course (follow-up)

**What to do to understand** how to speak English?

After the listening exercise, students are given a tape recording. Using some of this, students mark and group the stressed words (tone units). It is possible to use phone numbers to introduce the concept of tone units. The length of a tone unit depends on the type of spoken text. His speech is compared to an informal conversation. In the same lesson or in subsequent listening lessons, attention should be paid to reductions in spoken speech, such as linking, elision, and assimilation.

### **Preparation and training**

Before a speaking task, students are given some preparation and practice time. Students will need guidance on how to use it. A leaflet with simple instructions is effective.

Real life tasks

It is possible to use real-life tasks as part of training.

**What language should** the teacher teach?

Spoken language is both interactive and transactional, but what should teachers focus on in the classroom? The following are offered here:

- When teaching spoken language, care should be taken to teach longer operational turns. This is because native speakers have difficulty and this requires students to be able to communicate information effectively, whether in their home country or in a native speaking country.

Teaching reciprocal language using a consciousness-raising approach.

How can students use the new language?

## SUMMARY

Our research on task-based learning shows that giving students preparation time significantly increases the level of language used on task, while language accuracy is not as pronounced. If this is the case, it seems logical to provide a preparation period when encouraging students to use new languages.

- Imagine that you are working on a language that would be useful for the following task: Talking to a stranger on public transport. You are now at the stage where you want the students to complete the task. Instead of giving students 10 minutes to prepare and practice the task, they should be given some preparation time.

As a simple preparation guide for the assignment, a few key questions might be:

How will you start the conversation?

What topics are you going to talk about?

How are you going to move from one topic to another?

How are you going to end the conversation?

# A cognitive view of style

Gasanova Shahla Natig

ASPU, CFL, English teacher

**Key words:** cognitive, style, diversity, linguistic, development

There is no unified view of the meaning of the concept of style, the means of expression, or even its existence. This can be explained by the fact that the level of style development and the forms of expression in the languages of the world are radically different in a number of cases.

If the meaning of style is whether the action ends or not, it is finite or non-finite, etc. if it is meant, style exists in all languages, and the means of expression of this meaning can be the most diverse. This means that putting an equal sign between the linguistic phenomenon of style and the grammatical category of style creates diversity of opinion about style and does not allow researchers to take a unified position. Let's clarify our point. When talking about the grammatical category of style in Russian, it refers to the formal indicators of verbs in their initial form (infinitive) and shades of meaning (exhaustion of action), etc. if it is possible to determine whether it belongs to finished and unfinished styles, for example, it is not possible to do this in Turkish languages. This calls into question the existence of the grammatical category of style in our language in the morphological approach. In this approach, even in English, it is not possible to detect pairs of verbs in their original form. This allows us to question the existence of the grammatical category of style in the English language in the same approach.

If, in distinguishing the categories of the verb, we proceed from the set of means that create them, i.e. "formal" indicators, then this criterion should be applied to all categories. Thus, if the category of time is formed by tense suffixes, and the category of person is formed by means of personal suffixes, then it is necessary to justify those who take the position that there are grammatical means that also form the category of style. If there are no such means and the meaning of style is created by lexical and syntactical means and does not have formal indicators, then we can talk about the meaning of the phenomenon of style rather than the category of style.

Commenting on the position of the third group of scientists, R. Rajabova writes: "This group of Turkologists, which mainly includes Azerbaijani linguists, claims that there must be systematic grammatical tools to create any grammatical category. By grammatical means, they mean only suffixes. So, according to them, a system of suffixes must be formed in order to create a grammatical category for a certain linguistic phenomenon. Also, these suffixes should be universal in nature, can be used in all cases, and when applied to verb styles, they should have the ability to attach to all verb roots or bases, without exception, to create the concept of



style in verbs.

Style is often interpreted as the relation of the action to its internal limit, whether the action ends or not in the semantics of the verb. This shows that style is an event related to action. But as we know, style is not the only thing connected with movement.

Each action can be characterized both in itself and in relation to the moment of speech. These characterizations of movement are based on closely related meanings of manner and time.

Like the semantic categories of the verb, the mood and tense categories are universal. The concrete implementation of these categories in language is quite diverse. It is noted that "In some languages, there are extensive grammatical tools for distinguishing styles, and there are languages that do not have any tools for understanding the style feature of a verb. Even languages that do not have formal means of expressing the concept of style have the opportunity to express the concept of style with other means, for example, adverbs, word combinations, repetition of the verb and other ways. The categories of style and time are either clearly manifested, for example, like the contrast between long and short tenses in English, or they are closely intertwined. There is a third possibility. For example, the grammatical category of time has developed in the German grammatical system, and some elements of grammaticalization are observed in the style. Interpenetration of the meanings of manner and time in the Russian language is a characteristic feature of the Russian verb and is characteristic of all its forms - personal and impersonal. They are independent categories of style and time, they have different content and means of expression. In the Russian language, the grammatical category of style indicates the specific, distinctive features of the verb - the nature of the course of the action in relation to its internal limit, result, duration, repetition. The category of style is not a modifier. As a result of the transformation of one form into another, the original meaning of the verb does not change, but the relation of its form to the limit or result of the course of action changes.

When we say style, first of all, issues related to how the event unfolds in time are meant. Z. Budagova states that "the style of the verb means the nature of the process, i.e. its final limit, result, duration, repetition, etc. the grammatical category (distinction is ours) which expresses the attitude towards such signs is understood". Thus, events occur in time, whether events end, repeat once or repeatedly, etc. "fact" is conveyed and this "act" is reflected in certain lexical and grammatical means. G. Kazimov expresses the same idea in a more concise way. He writes: "verb patterns in a broad sense indicate the nature of the state of execution of the work, the quantity of execution of the work." Continuing this idea, the scientist shows: "Generally speaking, the category of style is a category that shows the change in the quantitative form of the movement. The basis of the style category is whether the action is completed or not, whether it ends or begins.

As we have seen, both experts talk about style as a grammatical category. But is this

enough to give a tired characterization of the style? Let's approach the issue from a slightly different angle. Usually two types of style are distinguished, finished and unfinished. A finished style refers to an action at any time of execution, limited to a certain limit. In the course of the unfinished style movement, it expresses its limit, without reaching its limit. This division can be applied to all languages as a whole. In all existing languages, movement is indicated, and the above-mentioned points in the expression of this movement by means of language (whether the movement ends or not, one-timeness or repetition, etc.) are conveyed by one or another means and method. Thus, it is more correct to consider the style as a concept consisting of a dual event - "meaning" and "form", where "meaning" means the concept of a concrete action in the mind, and "form" means the methods and means of delivering that concept (when talking about the grammatical category it is this point that is highlighted) is meant. In this approach, it is possible to clarify the concept of style and draw parallels between languages. So, the concepts indicating style (i.e., the state of action, manner, etc.) can be taken to be basically identical or similar, close to all language speakers (regardless of national and language affiliations). But their means of expression, ways and methods are definitely different.

This and a number of similar "facts of meaning" (concepts) exist in all languages. The ways and means of their formation are different even in related languages. In some languages style is conveyed by extensive grammatical means, in others there are no grammatical means at all. For example, in Russian there is a grammatical category of mood, in which there are even pairs of finished and unfinished moods of the verb. These are the most obvious examples of style. However, even in the Russian language, there is no unified view of the finished and unfinished meaning capacity of the style. What has been said makes it necessary to pay special attention to one issue, or rather to distinguish between the meaning (concept) of style and the language means that convey that meaning (concept) and to study the problem of style based on this.

The field approach to the study of style category is more productive. In this approach, style is considered as a component of the field of aspectuality, as a micro-field. In order to clarify this issue, it is necessary to pay attention to the meaning capacity and scope of the concepts of style and aspect, to determine their proportions, no matter how difficult it may be, because sometimes puts an equal sign between the concepts of style and aspect, they are used as synonyms. For example, it is noted that aspect (style) represents how the event unfolds in the direction of time. For example, we can say that in the English sentences I swim and I am swimming, both present was expressed in time, and their difference is the difference of aspect. By aspect, we mean the manner expressed by morphological means. As we can see, at the beginning of the quote, the concepts of aspect and style are used as synonyms. Indeed, one of the dictionary meanings of aspect in English is style.

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# Ahmad Javad as a patriotic poet

Sevinj Asadova

ASPU, CFL, English teacher

Ahmad Javad is one of the wordsmiths who has an exceptional position in the history of Azerbaijan's literary and artistic thought, distinguished by his unique handwriting as a poet of independence. The creativity of the artist, who remained faithful to the ideals of independence of his native people, to whom he was attached with all his heart, was woven from the national ideology, rich in motives of freedom. The works of the poet, who glorifies Azerbaijan's national symbols with high poetry, instilling love for independent statehood, are an amazing poetic expression of deep patriotic feelings. Ahmad Javad was always at the hot spots of social and political events, among the bright personalities of the time, he was subjected to severe repressions in the 1930s and became a victim of Soviet totalitarianism.

He was interested in poetry for the first time while studying in Ganja. Starting from 1910, he appeared in various newspapers and magazines with lyrical poems and critical articles. The samples he wrote on this eve mainly consist of ghazals and verses rich in Arabic-Persian words. The poet used Aruz verse only in the first periods of his work. A. A 34-page manuscript titled "Falek dil kabab..." is stored in Javad's archive. Most of this collection of poems was written by the poet during his studies at the madrasa. Most of them are full of Arabic-Persian words and compositions. These poems are written in classical rubai and ghazal forms. Among them there are also examples based on relatively vernacular language, ashik creativity. The poet preferred couplets and rhymes more than all weights and forms of poetry. A. In Javad's creativity, realistic works are also found. So, the realistic style was developed in parallel with the romantic style. "My summer!" "You came to my dream", "Love is inseparable from the soul", etc. "Morning-morning" and "Olmaz" stales and similes, which he added as vows to his love poems, attract more attention. When the war against Ottoman Turkey started around the Balkan Peninsula in 1912, a special Caucasian volunteer group, consisting mainly of Azerbaijanis, went to the front, joined operations by Turkey and took part in military operations against the Bulgarians. Ahmet Javad is part of that volunteer group, along with his friends I. He participated together with Akhundzade, Isa Alizade, Ali Asadulla. Javad was 20 years old at that time. Regarding Ahmed Javad's participation in the Balkan War, Huseyn Baykara wrote in his book "The History of Azerbaijan's Independence Struggle": Ahmad Javad, who came to literature as a romantic poet, became more inclined towards realism and realistic depictions in connection with his participation in the First World War. In the end, realism became the leading position in his work, and in the following years he mainly wrote his works in a realistic style. Ahmad Javad published the articles he wrote during the war in the Baku press. The poet was a special correspondent of

many newspapers published in Baku. Javad's speeches and articles were mainly related to such media outlets as "Iqbal", "Yeni Iqbal", "Shalala", "Açık soz", "Azerbaijan", "Education and culture", "Ari", "Maarif worker". In that period, in addition to badat and publicism, his work included news, reports, essays, feuilletons, documentary stories, etc. the tendency to create prose examples has strengthened. He also wrote historical essays, ethnographic studies, informative articles, memoirs, and memoirs. Since 1914, Adib worked as a reporter for "Achiq Soz" newspaper. His works were published by Muhammad Amin A., the editor of "Achiq soz" newspaper at that time. Rasulzade was helping. Many of his interesting writings, journalistic articles and poems have been published in this newspaper. "Açık Soz" newspaper was the organ of the "Musavat" party and was published under the leadership of the brothers Mohammad Amin Rasulzadeh and Mohammad Ali Rasulzadeh. Muhammad Amin's special closeness with Rasulzadeh, attachment to national ideals. One of its most active correspondents brought the answer to this newspaper.

During the war years, Ahmad Javad engaged in practical activities, charity work, helping the victims, writing various and series of articles on this topic, and continued to write poetry. Most of such poems were about war tragedies and people's life. His "Sheirima" (1913), "Harbzadalara", "Imdad", "What I saw", "Hope", "Derdim" (1917, March, Chagva), "Iraq", "Evenings" (1916, Gudaud), "Mayis" (1916, Sukhumi), "Martyr Captive", "Where are you?..." (1916, Batum), "Wake up", "Poor", "Kuropatkina" (1917, Chagva), "Lover's Sorrow" (1919, Kutaisi), "Beshik" (1917, July, Chagva), "Of, this way" and other poems are among such works.

The poet's poem "Mourning Turk" was sent to the group of teachers of "Saadat", which was not published. Despite this, the lament poem was not left out of print, "Iqbal" newspaper published the poem in its March 24, 1915 issue. The poem "What I saw" which consists of seven stanzas and is included in the garayli form has the same content. The poet's poem "Evenings" was published for the first time in the April 6, 1916, issue of the "Achiq Soz" newspaper. The poem "Evenings" has the same content. Another article by Ahmet Javad published in the July 4, 1917 issue of "Achiq soz" newspaper reveals that he also visited Riza and Trabzon regions in those years.

In 1916, the poet's story "Two Enemies" was published in the newspaper "Açığ soz". This prose work was his first story. The story of "Two Enemies" written during the war years is interesting from the point of view of promotion of human and higher emotions. The story of Javad, who connected the friendliness and sincerity of the Ottoman and Russian soldiers who met on the rear front with the purity of heart and generosity of the nations they belong to, is written by A. He ends with Huseynzade's famous poem "Awe", or "An Angel's Address to the People".

In 1917, poems, stories and articles written by Azerbaijani writers and poets in Baku under the line of "Community-Charity" on the sufferings of Turkey during World War I were collected in the book "Brotherly Help". In that book, Muhammad Amin Rasulzadeh, H. Javid, A. Shaiq, A. Sahhat, F. Kocherli, A. Hagverdiyev, M. S. Ordubadi, Mammad Yusif Jafarov, Khosrov bey

Sultanov, J. Jabbarli, etc. works of authors (37 people in total) are included. A. Javad's short story "Khuda teyna naka" (May God accept you) and the poem "Poor" are among the works included in the collection. The journalistic style story "Marriage Accepted by God" was written based on the incident witnessed by Javad. The book "Brother's Help" was received with sympathy due to its nature of calling for help to the soldiers. Professor Yavuz Akpinar, an outstanding researcher of Azerbaijani literature, writes about that book:

During the First World War, Ahmad Javad was the official representative and deputy of Khosrov Pasha Sultanov's lawyer on the frontline of "Baku Muslim Society Charity", which provided aid to the population affected by the Russian-Turkish war on the Caucasus front. In 1915, Javad returned to Turkey for the second time and engaged in charity work in Sukhumi, Kars, Chagva, Ardahan, Sarigamish, Trabzon, Erzurum, Anatolia, Istanbul, as well as in the western regions of Georgia, with Batumi as the main stop. At that time, the poet compiled lists in Batumi, where most of the victims of the war were gathered, registered the poor and the disabled, using the opportunities of the society he represented, he provided all kinds of material and moral assistance to the refugees and the families of the soldiers who died in the conflict. A. Javad mainly carried out his activities in two directions. The first was to help the victims, the second was to open schools in Batumi itself, as well as in settlements close to Batumi, in other districts, in Dagestan, to ask for help from Baku for these schools to continue their work, and on the other hand, to collect donations and take the initiative to create new associations. Several Azerbaijani millionaires, especially H. Z. Taghiyev, Aghabala Guliyev, M. Mukhtarov, S. Bejanidze from Batumi and others helped him in these works. They were one of the main pillars of society in Baku. Ahmet Javad personally helped the Ottoman soldiers. Therefore, during the revolution, captured Turkish soldiers were sent to Siberia, but they returned from exile not to Istanbul, but to Ganja-Ahmed Java to give thanks. Only after that they returned to their homeland.

The poet specially added a poem about this and that poem was published in the newspaper "Kardash Yardimi". The help given to the Ottomans under Javad's leadership through "Community-Charity" in Ganja was not forgotten for a long time. All these are reflected in the poet's article "Help of Ganjali to Ottoman soldiers".

# ГИБРИДНЫЙ ФОРМАТ ОБУЧЕНИЯ СТУДЕНТОВ ДЕЛОВОМУ АНГЛИЙСКОМУ ЯЗЫКУ ДЛЯ НЕЯЗЫКОВЫХ СПЕЦИАЛЬНОСТЕЙ

Гусейнова Гюнель

АГПУ, ЦИЯ, учительница английского языка

Прогрессивные университеты мира давно применяют практику внедрения интернета, электронного контента в качестве дополнительной образовательной инициативы. Такая практика позволяет создать условия активного взаимоотношения студентов между собой и учителями, а также вывести обучение на новый уровень.

Гибридный формат обучения позволяет студентам самостоятельно проектировать свой образовательный маршрут, контролировать время, место и темп выполнения заданий, а также интеграцию опыта за счет практико-ориентированной деятельности. Онлайн-аспект, предполагающий автономную деятельность студентов, формирует мотивацию, а также обеспечивает индивидуализацию в образовательном процессе, которая необходима для усвоения материала.

В настоящий момент существует множество платформ, где можно работать с онлайн-досками, с применением Google Drive для совместной работы студентов над проектами, в режиме видеоконференции, Google Classroom, You Tube, Zoom, Telegram, What' s App, Peardeck и т.д. Так, одно из главных достоинств смешанного типа обучения – возможность использовать разнообразные платформы с различными наборами инструментов, позволяющими сделать процесс обучения мотивирующим, интересным и доступным. Помимо этого, преподаватель находится в непрерывном контакте со студентами, имеет возможность отслеживать их успеваемость онлайн, что помогает сделать образовательный процесс индивидуализированным или ориентированным на студента (student-centered).

Сегодня университеты всего мира предлагают три варианта обучения: онлайн, аудиторное или смешанное. И как показывают экспериментальные исследования в этой области, последний тип выходит на лидирующую позицию

Среди минусов многие преподаватели отмечают факт, что такой формат обучения подходит не всем студентам, в связи с низким уровнем сформированности навыков грамотного планирования и распределения времени, что характерно для студентов.

Несмотря на то, что смешанное обучение появилось в начале 2000-х гг., использование его в преподавании иностранных языков в целом и делового английского

языка в частности у студентов не имеет долгой традиции. Кроме того, вопрос об эффективности применения такой образовательной модели остается открытым. Проведенный эксперимент показывает, что, в отличие от традиционной методики преподавания, где преподаватель преподносит весь контент, а студенты часто становятся пассивными слушателями, внедрение перевернутого обучения способствует улучшению языковых навыков студентов

Успешная подготовка будущих специалистов в много национальной группе зависит от многих факторов. В частности, требуются значительные педагогические усилия для поддержания целевого направления обучения, тщательной координации групповой деятельности и координации учебного процесса студенческого коллектива, учитывая его многонациональный характер. Все это актуализирует поиск эффективных форм, средств, методов и технологий для успешного совместного обучения студентов разных национальностей.

Пандемия Covid-19 также способствовала быстрому развитию цифровых образовательных технологий. Университеты, колледжи и школы начали использовать нестандартные методы и формы обучения. В 2020 г. сотни учебных заведений по всему миру были вынуждены перейти на дистанционное обучение. Этот формат обучения пред полагал, что иностранные студенты из-за распространения угрозы коронавируса должны оставаться дома и учиться удаленно (через электронную почту, электронные курсы, блоги, подкасты, скринкасты) или онлайн (через мессенджеры, социальные сети, электронные курсы, программы организации видеоконференций). Образовательный процесс стал полностью удаленным. Сочетание интерактивного образовательного формата и гибридного формата обучения, а также взаимодействие студентов в многонациональных группах позволило нам достичь нашей цели по повышению их уровня профессионально-ориентированного английского языка. Во время обучения мы активно вовлекали студентов в онлайн-обучение, помогая им взаимодействовать, сотрудничать и обмениваться знаниями, необходимой информацией и идеями. Все это способствовало установлению эмоциональных контактов, сотрудничеству, созиданию, развитию толерантности, умению работать в команде и т. д.



## **Geological and mineralogical sciences**

# MOBILE METHODS OF FREQUENCY-RESONANCE PROCESSING OF SATELLITE IMAGES AND PHOTO IMAGES: RESULTS OF TESTING ON OFFSHORE DRILLING SITES

**Mykola Yakymchuk**

doctor of physics and mathematics, professor, Institute of Applied Problems of Ecology, Geophysics and Geochemistry, Kyiv, Ukraine

**Ignat Korchagin**

doctor of physics and mathematics, professor, Institute of Geophysics, NAS of Ukraine, Kyiv, Ukraine,

### **Annotation**

Experimental studies using direct-prospecting methods have been carried out in various regions of the oceans with the aim of demonstrating their performance, efficiency and potential when conducting prospecting for oil and gas. The low-cost technology being developed includes modified methods for frequency-resonance processing and decoding of satellite images and photo images, vertical electric-resonance sounding of a cross-section, as well as a method for integrated assessment of the prospects of oil and gas potential and ore content of prospecting blocks and local areas. Studies at oil and gas offshore drilling sites have confirmed the feasibility of additional work using direct-prospecting methods when selecting sites for their laying. Within deep channels (volcanoes), filled with sedimentary rocks of 1-6 groups, signals (responses) are almost always recorded at the resonant frequencies of hydrocarbons and, in many cases, amber. Signals at the frequencies of oil, condensate and gas are also recorded quite often in volcanoes, filled with limestone. In volcanic complexes, filled with sedimentary rocks of 8–10 groups (dolomites, marls, siliceous rocks), responses at frequencies of oil, condensate, and gas have never been recorded. The results of the work testify to the prospects of the deep horizons of cross-section for oil and gas. In many areas of the survey, the existence of a border at a depth of 57 km was confirmed, in the region of which there is a synthesis of oil, condensate, gas and amber from hydrogen and carbon migrating from below. Data have also been obtained that indicate of water synthesis at a depth of 69 km in volcanic complexes of a certain type.

The results of the studies indicate the efficiency, effectiveness and feasibility of practical application of frequency-resonance methods for satellite images processing in the search and exploration of ore and combustible minerals. The practical application of direct-prospecting technologies will help accelerate and optimize the oil and gas exploration process.

**Keywords:** direct searches, degassing, vertical channel, volcano, deep structure, cross-section, oil, gas, hydrogen, amber, chemical elements, well, satellite data, mobile technology, remote sensing data processing, interpretation, vertical sounding.

## Introduction

For many years, research has been purposefully carried out within the framework of the problem of developing mobile and low-cost methods and technologies for "direct" prospecting and exploration of ore and combustible minerals, as well as aquifers [7-9, 13]. In 2018, testing started of modified frequency-resonance methods of satellite images and photographs processing, as well as the methodology developed on their basis for the operational integral assessment of the prospects for oil and gas potential (ore content, water content) of large prospecting blocks and local areas [14-21]. These mobile direct-prospecting methods have been widely tested during geophysical research in the Ukrainian Marine Antarctic Expedition in November-December 2018 [14]. The results obtained during the expedition demonstrated their operability and efficiency, as well as the possibility (and expediency) of using them in solving various geological-geophysical, hydrological and engineering-geological problems. In 2019-2020 approbation of the developed mobile methods purposefully continued (and continues) in various regions of the globe.

To demonstrate the potential of mobile direct-prospecting methods, a survey of local areas was repeatedly carried out, where prospecting and exploration wells were drilled (they were in the process of drilling or were being prepared for drilling). The results of this kind of demonstration research have been published in articles and conference proceedings, including [9]. Approbation of the direct-prospecting frequency-resonance technology was also carried out at the site of drilling an exploratory well on the Lebanese shelf in 2019.

At the end of April 2020, official information about the "negative" results of drilling this well was published. This information was one of the reasons for this article preparation. Another, and more important, reason for working on the article should be considered the crisis situation in the global economy that has developed in 2020, caused by the coronavirus pandemic, a sharp drop in oil prices, and the price "war" on oil. In this situation, the problem of optimizing and accelerating the search process for hydrocarbons is extremely relevant. More active use in the search process of low-cost, mobile direct-prospecting methods and technologies can help solve this urgent problem. In this article, the expediency of using direct-

prospecting technologies is demonstrated by materials, obtained in the process of their testing in local areas of drilling exploratory wells for oil and gas in various regions of the World Ocean.

### Research methods.

Experimental reconnaissance studies on well drilling sites and some areas were carried out using the technology of satellite images and photographs frequency-resonance processing and decoding and method of integral assessment of the oil and gas potential of local areas and large blocks [14-15]. In the modified methods of this technology, bases (sets, collections) of chemical elements, minerals, oil and condensate samples, as well as sedimentary, igneous and metamorphic rocks are purposefully used, the resonant frequencies of which are used during the satellite images processing. The collection of oil samples in the database used includes 117 samples, gas condensate - 15 samples (Fig. 1).

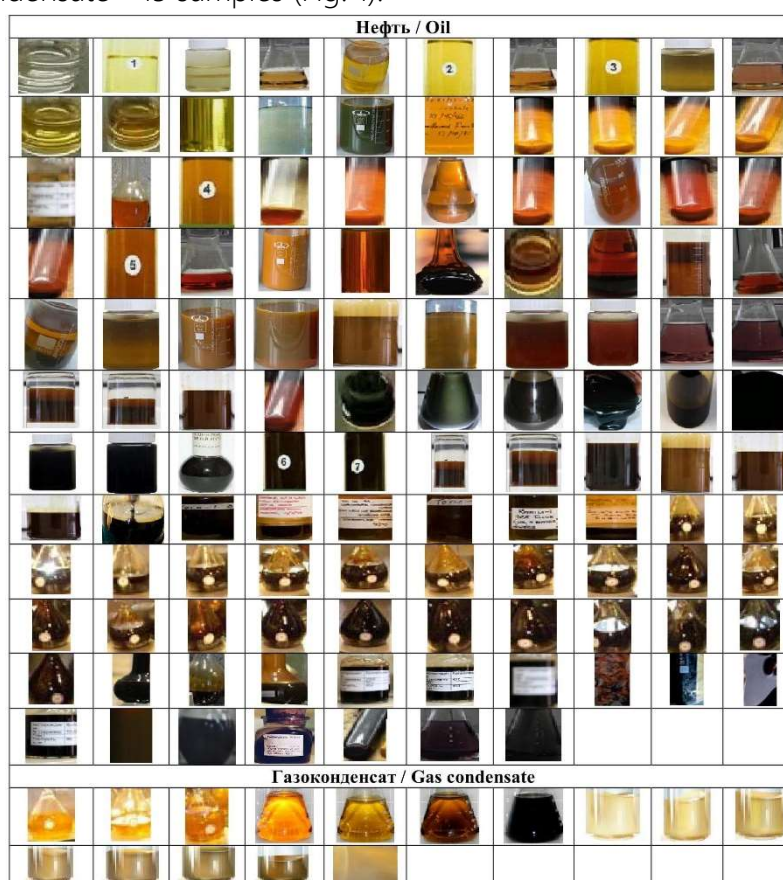


Fig. 1. Photographs of oil and gas condensate samples.

The base of sedimentary rocks consists of 11 groups: 1) psephites, monomineral conglomerates (22 samples); 2) psammities (18); 3) silts, mudstones, clays (6); 4) kaolinite mudstones (6); 5) kaolinite clays (10); 6) sedimentary-volcaniclastic rocks (9); 7) limestones (24); 8) dolomites (11); 9) marls (10); 10) siliceous rocks (13); 11) salt (3).

The collection of photographs of igneous and metamorphic rocks includes 17 groups: 1) granites and rhyolites (29 samples); 2) granodiorites and dacites (7); 3) syenites and trachytes (18); 4) diorites and andesites (14); 5) lamprophyres (14); 6) gabbro and basalts (32); 7) feldspar ultramafic rocks (20); 8) feldspathoid syenites and phonolites (23); 9) feldspathoid gabbroids

and basaltoids (6); 10) feldspar-free ultramafic and mafic rocks (10); 11) kimberlites and lamproites (20); 12) non-silicate carbonatites (8); 13) metamorphic granulites (10); 14) metamorphic gneisses (26); 15) metamorphic crystalline schists (44); 16) metamorphic microcrystalline schists (phyllites) (11); 17) metamorphosed slates (2). The photographs of the listed sets of samples of sedimentary, metamorphic and igneous rocks are borrowed from the electronic document on the website <http://rockref.vsegei.ru/petro/>.

Some results obtained using the mobile direct-prospecting methods are presented in publications [14-21].

When conducting numerous studies using the described direct-prospecting methods in 2019-2020, the optimal procedure (processing graph, sequence of actions) has been worked out, which is used during the work within the areas and sites of the survey. The used processing graph for a separate satellite image (or its local fragment) includes the following sequence of actions (steps).

1. Fixation from the surface of the presence (absence) of responses (signals) from the following set of minerals: oil, condensate, gas, amber, oil shale, argillite breccia, gas hydrates, ice, coal, anthracite, hydrogen, water (deep), diamonds, brown coal, iron ore, potassium-magnesium salt, sodium chloride salt (simply salt).

2. Registration of responses from the groups of sedimentary, metamorphic and igneous rocks that make up the cross-section.

3. Establishing the presence of deep channels (volcanoes), filled with various groups of rocks in the survey area; determination of the depths of the roots of volcanoes location.

5. Determination of groups of rocks (or individual samples of groups) from which signals are recorded at the frequencies of oil, condensate, gas and water (deep).

6. Establishing the presence (absence) of responses from oil, condensate, gas and amber on the surface (depth) of 57 km - the predicted boundary of hydrocarbons and amber synthesis in deep channels (volcanoes), filled with certain groups of rocks.

7. Establishing the presence (absence) of responses from water (deep) at the surface (depth) of 69 km - the predicted boundary of water synthesis in volcanoes of a certain type.

8. Scanning a cross-section with different steps from the surface up to 15 km, depth intervals are determined, within which responses are recorded at the frequencies of oil, condensate, and gas. Refinement of the depths of the most promising intervals with hydrocarbons location in cross-section during additional scanning with a finer step.

9. In case of detection of responses from the 6th group of igneous rocks (basalts) on the surveyed area, an assessment is made of the depth of the upper boundary (edge) of basalts, as well as the depths of the fixation of responses beginning at resonant frequencies of hydrogen and water from basalts.

10. When determining the presence of signals from the 11th group of igneous rocks (kimberlites) in the survey area, the depth of the upper edge of the kimberlites is determined, as well as the depth interval within which responses are recorded at diamond frequencies.

Given the reconnaissance nature of the studies performed, the described set of separate procedures for processing satellite images in full at all survey sites was not implemented.

A fundamentally important feature of direct-prospecting frequency-resonance methods is that, unlike classical geophysical methods, they provide a real opportunity to fill the studied cross-section with the corresponding complexes of sedimentary, metamorphic and igneous rocks, as well as to determine the intervals of cross-section, that are promising for the detection of combustible and ore minerals immediately, in the process of measurements (registration of signals) by the developed instrumentation and measuring devices (i.e. without additional stages of modeling and geological interpretation of the geophysical measurements results). In this article, as well as in other published materials [14-21], the measurement results are presented and analyzed exclusively!

It is expedient to start the presentation of the materials of direct-prospecting methods approbation in the areas of drilling wells in offshore from the Lebanese shelf, the results of research on which served as one of the reasons for this article preparing.

#### **Byblos 16/1 well drilling site offshore Lebanon**

***Lebanese shelf.*** The position of Block 4 and the exploration well within it are shown in Fig. 2. In the course of the research, the satellite image of the entire block was processed, as well as a fragment of the image (Fig. 3) of the local area with project well location.

During frequency-resonance processing of images, signals at oil frequencies were received with a long delay. Responses at the condensate and gas frequencies were not recorded.

There were no signals from salt and sedimentary rocks.

Responses from the 7th group of igneous (ultramafic) rocks were recorded. The root of the channel (volcano), filled with these rocks, was determined at a depth of 723 km.



**Fig. 2.** Map of the licensed Block-4 on the Lebanon offshore and the position of the Byblos 16/1 well within it [<https://www.facebook.com/opeslb/>].



**Fig. 3.** A satellite image of the local area of the project well location within Block 4 on the Lebanon offshore.

A weak oil signal was recorded on the surface of 57 km, no responses from condensate and gas were received. Water signals were traced from 10 km to 69 km.

A weak signal from hydrogen was recorded at the surface of 69 km, and no responses from hydrogen were received at a depth of 60 km. Signals from "dead" water were recorded from the surface, as well as at depths of 60 and 69 km.

The results of operational reconnaissance studies led to the conclusion that the **probability of commercial fluid inflows obtaining in the project well within Block 4 on the Lebanese shelf is close to zero.**

To the above, it is advisable to add the following.

1. In the absence of responses (intense) at the frequencies of oil, condensate and gas within the blocks (areas) of the survey, there is no point in further studies of a detailed nature.

2. In this situation, a certain number of experiments was carried out in order to determine the possible reasons for the absence of signals at the condensate and gas frequencies in the surveyed area. Such interest is due to the fact that in the Atlantic Ocean, within a deep channel (volcano) filled with igneous rocks of the 7th group, intense responses were recorded at the frequencies of oil, condensate, and gas. The situation within Block 4 on the Lebanese shelf at this stage can be "commented" as follows.

A) Volcano (or volcanoes), filled with the 7th group of igneous (ultramafic) rocks, formed structural uplifts within Block 4, which were discovered and mapped by seismic surveys (Fig. 2). Using the structural principle for laying the first exploration well, the most promising structure was identified.

B) Using direct-prospecting methods, it has been established that the synthesis of oil, condensate and gas occurs on the surface of 57 km from hydrogen and carbon migrating from below.



C) Water synthesis occurs on the surface of 69 km. This process also involves hydrogen coming from below.

D) The facts of detecting weak signals from hydrogen on the surface of 69 km and their absence at a depth of 60 km can be interpreted as follows: the hydrogen flow from below is relatively weak and almost all of it at the boundary of 69 km goes to form water. The insufficient amount of hydrogen is also evidenced by the responses from the "dead" water, obtained at the surface, as well as at depths of 60 and 69 km.

3. To study (clarify) the conditions under which water synthesis is carried out in the surface area (depth) of 69 km, as well as the synthesis of oil, condensate and gas in the surface area of 57 km, it is advisable to conduct detailed studies in the range of indicated depths. For comparison, detailed work should also be carried out within the location of other channels (volcanoes), filled with ultramafic rocks.

***Local area within the Leviathan gas field.*** The obtained results (generally "negative" ) of processing satellite images in the Block-4 distributions on the Lebanese shelf necessitated additional research in this region in order to confirm (or refute) the conclusions drawn. In the current situation, it was quite expedient to decide to carry out work of a similar nature within the known hydrocarbon deposit.

Known hydrocarbon deposits (including the Leviathan gas field) in the eastern Mediterranean Sea are shown in Fig. 4. On the satellite image of this region (Fig. 5), a small rectangular contour marks a local area within the Leviathan gas field. The label in this rectangle indicates the point, the coordinates of which are borrowed from the site [37]. In the course of the research, frequency-resonance processing of a local fragment of a satellite image in Fig. 5, indicated by a rectangular outline, was performed.

When processing the image from the surface, responses of oil, condensate and gas were recorded. Signals from amber, oil shale, gas hydrates, coal, hydrogen were not received.

Responses from sedimentary rocks and salt are also not registered.

Signals of the 7th, 8th and 9th groups of igneous rocks were recorded from the surface. By fixing the responses at depths of 50, 150, 250, 350, 450, 550, 650, 722, 723 km, the root of the channel (volcano), filled with the 7th group of igneous (ultramafic) rocks, was determined at a depth of 723 km.

There were no responses from water and "dead" water at depths of 56 and 68 km.

On the surface of 56 km, responses from oil, condensate and gas were received (intense).

The following comments may be added to these results.

1. During frequency-resonance processing of a satellite image over the known Leviathan field, responses at the frequencies of oil, condensate and gas were registered. This circumstance testified in favor of the reliability of the earlier conclusions on the site of drilling an exploratory well within Block-4 on the Lebanese shelf.

2. The Leviathan field is also located within a channel (volcano), filled with ultramafic rocks with a root at a depth of 723 km.

3. Within this channel (volcano) at depths of 56 and 68 km, no responses from deep water and “dead” water were recorded. In this situation, it can be assumed that in this channel (volcano) in the area of the surface of 69 km there are no conditions for water synthesis. And hydrogen and carbon migrating from below on the surface of 57 km fall into conditions under which oil, condensate and gas are synthesized.

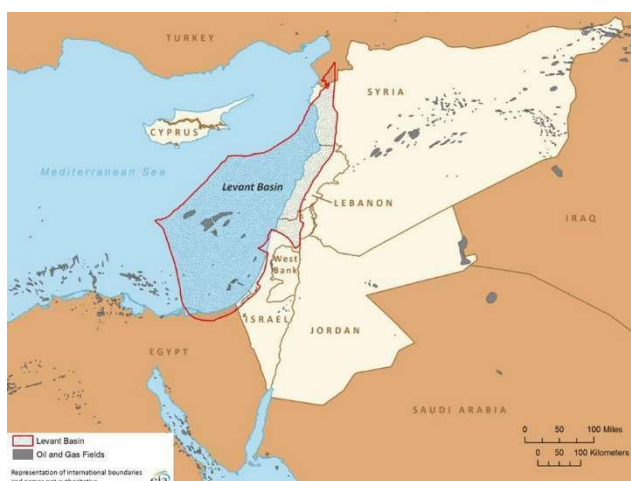


Fig. 4. Sketch-map of hydrocarbon deposits in the eastern part of the Mediterranean Sea [37].



Fig. 5. Satellite image of the eastern part of the Mediterranean Sea. A label in a rectangular outline indicates a point within the Leviathan gas field on the Israel offshore.

4. Commercial gas production started at the Leviathan field.

**Drilling results.** At the end of April 2020, information appeared [36, 52] about the “disappointing” results of the Byblos 16/1 well drilling – no gas accumulations were found in commercial volumes at the well drilling site! The results of research and forecast are confirmed by drilling. According to information from the website [32], the approximate cost of well drilling is \$56 million.

#### "Maria-1" well (West-Chernomorsky area, Black Sea)

The satellite image of the local section of the well location was processed using the frequency-resonance method of interpretation during its drilling. The results obtained (in the form of extended abstracts) were presented in 2018 at marine research conferences in Odessa and Moscow, as well as in Essentuki (in the form of a computer presentation).

An anomalous zone of the “condensate” type was discovered and mapped in the local area of the well location, in the central part of which an anomalous zone of smaller sizes



of the "condensate + oil" type was recorded. The results obtained allowed the authors to conclude that the well is located in the optimal site and the probability of fluid inflows receiving after completion of drilling is very high.

However, in official releases (information reports) on the results of drilling [11], it is reported that no fluid inflows were obtained in the well. It also follows from this information that the "Maria-1" well has not been drilled to the design depth of 6125 m (the bottom of the well is at a depth of 5265 m).

To clarify the causes of the existing discrepancy in the local well drilling area in November 2018, an additional amount of research was performed.

To study the structure of cross-section in the area of the well from the satellite image in Fig. 6, a small fragment is highlighted, with the use of which all subsequent operations of frequency-resonance processing and interpretation of images were subsequently performed. In this case, the following steps were taken during the work.

1) Using the resonant frequencies of sedimentary rock samples, the groups of rocks present in cross-section in the area of the exploration well were determined. As a result, within the surveyed area, the presence of the following groups of sedimentary rocks was established: 6th, 7th, 8th, 9th, 10th. It should be noted that two different images were used to determine the types of rocks in cross-section in order to increase the reliability of the results obtained.

In the information report on the results of Maria-1 well drilling, it is mentioned that the well discovered a fairly thick carbonate reservoir. In this regard, using the resonant frequencies of carbonate rocks (group 7), the presence of these rocks was established in cross-section and the intervals of their occurrence were determined (estimated): 1) 4881-5198 m; 2) 5944 - 6335 m.

By scanning these intervals using the resonant frequencies of oil, anomalous responses (signals) were obtained from the depth interval 5944 - 6398 m. This indicates the possible presence of oil in this interval, as well as its absence in the first interval (4881 - 5198 m) of carbonate rocks. Unfortunately, the "Maria-1" well to the second interval of carbonate rocks is underdrilled.

By scanning cross-section up to 20 km using resonant frequencies of oil, three more intervals of anomalous responses (signals), promising for the of oil accumulations detection, were identified: 2) 7390 - 9500 m; 3) 11380 -12350 m; 4) 14123 - 14507 m.

At the next stage of the experiments, actions were performed aimed at determining the types of reservoirs in three depth intervals of cross-section, in which responses were obtained at the resonant frequencies of oil.

First, from the intervals 3 and 4 discovered above, which are promising for oil, responses (signals) were obtained at resonant frequencies of clastic rock from group 2 (psammities). In the region of the third perspective horizon, the responses (signals) at the resonant frequencies of

the psammites were obtained in the depth interval of 11.365-12.500 km, and in the fourth horizon, at 14.125-14.500 km.

Subsequent scanning of these intervals using the resonant frequencies of individual rock samples from this group (18 samples in total) responses (signals) recorded from the following rock samples: 1) quartz-dolomite sandstone; 2) feldspar-quartz sandstone, quartzite-like; 3) glauconite sandstone; 4) graywacke sandstone.

At the next step, in the interval of the fourth promising horizon (14.125 - 14.500 km), responses were obtained at resonant frequencies of feldspar-quartz sandstone (depths 14.123 - 14.489 km), the third (11.380 - 12.500 km) - quartz-dolomite sandstone (11.374 - 12.525 km), the second collector (7.390 - 9.590 km) is greywacke sandstone (7.377 - 9.677 km).

We also note that earlier responses (of low intensity) were recorded at the resonant frequencies of oil in the range of 3.776 – 4.018 km. In this interval of cross-section, signals were recorded at the frequency of glauconite sandstone.

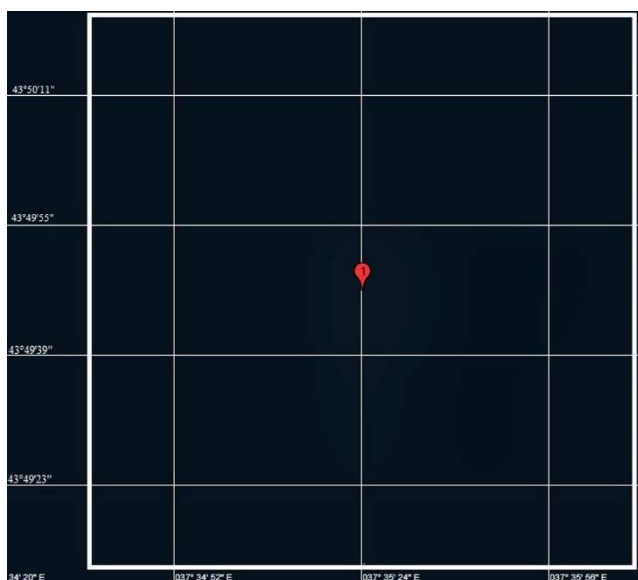


Fig. 6. Satellite image of the local drilling site of Maria-1 well. The well position is shown in the figure with a red icon.

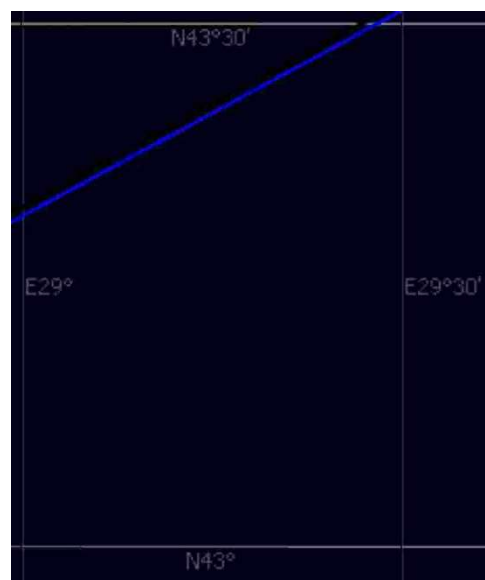


Fig. 7. Fragment of a satellite image of the Khan Asparuh block, within which the third exploratory well «Melnik-1» is located.

Due to lack of time, no further work was carried out at the local drilling site of Maria-1 well. In particular, the types of tires (clay rocks) and their position in cross-section have not been determined.

The above experimental results can be compared with the virtual well section from the monograph [2]. Geological and geophysical materials of the "Maria-1" well area location is also analyzed in the publication [27].

### Investigation within local site of "Melnik-1" well drilling

We also note that in November 2018, information messages appeared about the start of the third "Melnik-1" well drilling on the Khan Asparuh block in the Black Sea [50]. The coordinates of this well were determined from the position of the drilling vessel in the sea. In this regard, additional processing of the satellite image of the local well drilling site was carried out (Fig. 7). According to the results of processing, anomalous responses at the resonant frequencies of oil, gas and condensate were not obtained: this allowed us to conclude that no hydrocarbon inflows would be received in the drilled well.

The drilling of the well was completed at the beginning of January 2019 - the drilling ship returned from the drilling site to the port of Varna. However, no official announcement of the drilling results has been made public. The absence of such a statement can be considered a confirmation of the forecast made - information about the positive results of drilling appears in the media almost immediately. As an example, here are links to information messages on the websites [26] and [51] about the positive results of exploration wells drilling in the North Sea (Glengorm structure, license block P2215) and on the South African shelf (Brulpadda structure, block 11B/12B).

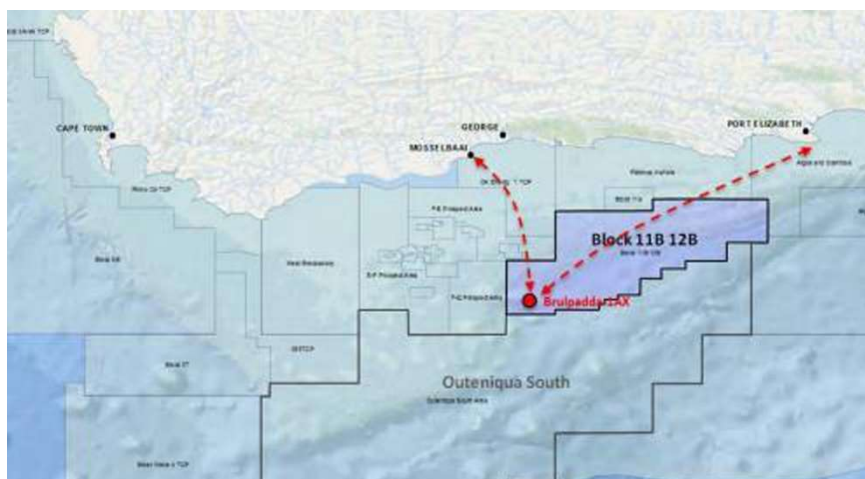
### Exploration area offshore South Africa

Approbation of the technology for the integral assessment of oil and gas potential prospects was also carried out at the Ikwezi exploration area on the southern shelf of South Africa, within which the F-O gas field is located. Responses (signals) from oil, condensate, gas, helium, oxygen, carbon, hydrogen, coal, and water were recorded in this area. Signals of gold, diamonds, amber are not registered. The presence of 2, 3, 4, 5, 7, 8 and 11 groups of sedimentary rocks and 6 and 7 groups of igneous rocks was established, and a channel of igneous rocks of 7 group was determined (by fixing responses at a depth of 250 km).

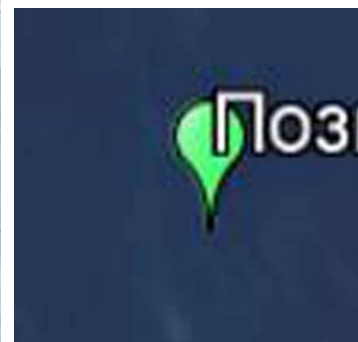
By scanning cross-section from 0 km with a step of 1 m and 10 m, the interval of responses at the frequencies of oil is 4.200-6.600 km, and gas - 1.100-2.500 km.

*Brulpadda-1AX well on the South African shelf [51].* The position of the well and its coordinates are shown in Fig. 8, processed image - in Fig. 9.

The water thickness was estimated using the refinement procedure at 1429 m.



**Fig. 8.** The position of the drilled well Brulpadda-1AX (block 11B/12B) and its coordinates: 22°44'25.28"E, 35°39'53.45"S.



**Fig. 9.** A satellite image of the local site in the area of the Brulpadda-1AX well.

Signals were recorded from the surface at the resonant frequencies of oil, condensate, gas and amber. The presence of 7 (carbonates) and 11 (salt) groups of sedimentary, as well as 11 (kimberlites) igneous rocks was established.

Kimberlite signals are recorded from 4900 m, traced only up to 195 km.

From the surface of 5000 m there are no signals from sedimentary rocks, as well as oil, condensate and gas.

By scanning cross-section with the refinement procedure, the following intervals of signals at resonant frequencies of gas condensate were established: 1) 2490-2507 m; 2) 2765-2773 m; 3) 2724-2740 m; 4) 3280-3290 m; 5) 3554-3565 m.

Corrected interval of signals at gas frequency: 2481-2486 m.

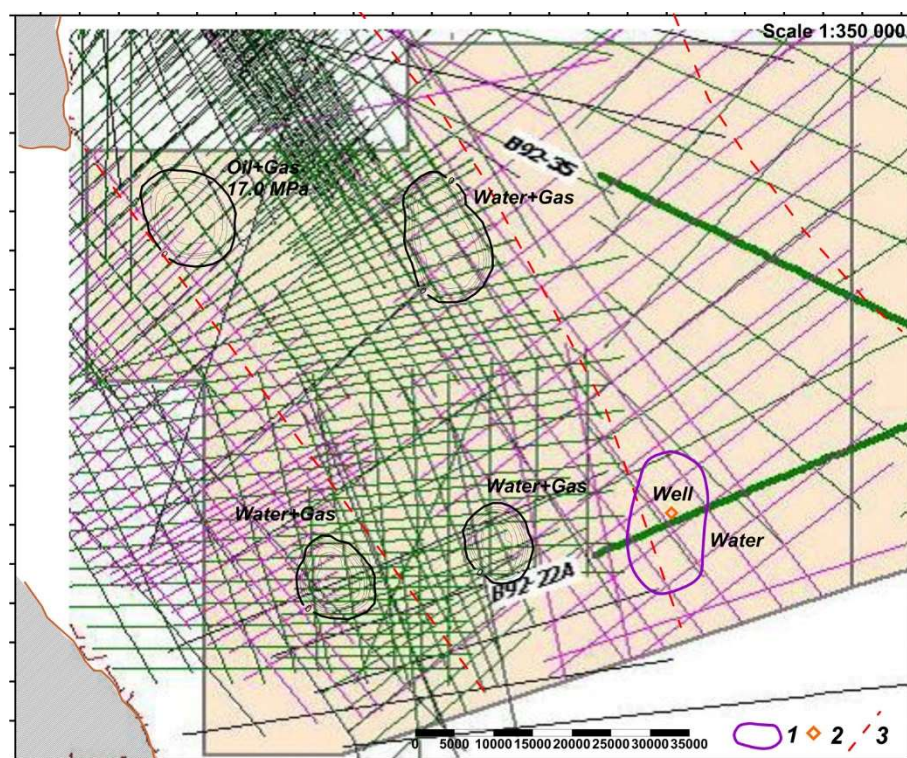
Corrected intervals of signal at the oil frequency: 1) 1835-1836 m; 2) 2405.5-2407 (1.5 m).

### Well drilling site in the Black Sea

At the beginning of April 2019, drilling of an exploratory well began on the Silistar block (1-14 Khan Kubrat) on the shelf of Bulgaria [48]. In May 2015, a frequency resonance processing of the satellite image of this block was carried out at a reconnaissance scale of 1:350,000 in order to assess the prospects for detecting hydrocarbon accumulations within it. As a result, four anomalous zones of the "Oil + Gas" type with reservoir pressures of 14.0, 30.0, 32.4 and 32.2 MPa, respectively, were found within the surveyed area [9].

After the start of the exploration well drilling and determination of its coordinates by the position of the drilling vessel, additional processing of the remote sensing data of the block was carried out. Based on the results obtained, the presence of a structure, filled with water, was established at the local drilling site. Signals at the resonant frequencies of oil, gas and condensate were not recorded. On Fig. 10, the results of frequency-resonance processing of

remote sensing data (satellite image) are shown on a map-scheme of seismic profiles [45] processed within the block.



**Fig. 10.** Anomalous zones of "oil and gas", "water and gas" and "water" type within the SILISTAR (1-14 Khan Kubrat) prospecting block on the map of seismic profiles location. 1– contour of structure with water; 2– location of drilling well; 3– zones of fracture by the results of satellite image processing. (Results of additional processing in April of 2019).

We also note that document [45] provides a seismic profile in the drilling area, from the analysis of which it follows that the well is located on a structural uplift, identified by seismic surveys.

In April, after the start of drilling, a more detailed frequency-resonance processing of the local area of the well location was also carried out. No responses at HC resonant frequencies were recorded in the surveyed local area!

The presence of only 9 group of sedimentary rocks (marls) was established in cross-section. Responses at marl frequencies were recorded in the interval 1.328-217.000 km. The lower boundary of the discovered channel (volcanic structure) is located in the zone of melting (liquid state) of rocks.

It is quite clear that younger formations are present above the marls. The resonant frequencies of the mule sample were used to estimate the thickness of these deposits. By scanning cross-section from a depth of 1328 m with a step of 1 cm upwards, the signals (responses) at the resonant frequencies of the mule were traced up to 1303 m.

In general, the results of additional studies allowed us to reasonably conclude that the probability of commercial hydrocarbon inflows obtaining in the well after completion of its



drilling is zero. The structural uplift identified by seismic surveys in the area [45] was formed by a volcanic edifice.

And let's pay attention to one more circumstance. During the frequency-resonance processing of the satellite image of the drilling area, the depth of the sea (thickness of the water column) at the drilling point was also determined. According to one of the methods used, the results of the assessment differed significantly from the values given in the information documents, as well as on the Google Maps map.

Such errors in the processing results may be due to the presence of some additional gases and (or) fluids in the water. In this regard, additional experiments were carried out on the drilling area in order to establish the presence of hydrogen sulfide in the water.

Using the resonant frequencies of hydrogen sulfide samples, anomalous signals (responses) at these frequencies were obtained in the depth range of 700-1303 m. Note, that the cross-section was scanned with a step of 10 cm and 5 cm from bottom to top.

The following may also be of interest. Since volcanoes are vertical channels for the migration of fluids, minerals and chemical elements, additional studies were carried out at the drilling site to determine the presence (or absence) of various chemical elements in the upper part of cross-section. The surface (depth) of 1400 m was taken as a reference. At this depth, responses were recorded at the resonant frequencies of chemical elements, present above 1400 m. The results of the studies show above 1400 m the following chemical elements: hydrogen, deuterium, helium, lithium, beryllium, boron, nitrogen, oxygen, fluorine, neon, sodium, aluminum, phosphorus, sulfur, chlorine, argon, cobalt, nickel, germanium, arsenic, selenium, bromine, krypton, rubidium, strontium, **yttrium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, lutetium**, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, mercury, thallium.

Chemical elements that belong to the group of rare earths (REE) are indicated in bold above. We also recall that the same kind of experimental studies were carried out in the area of large REE accumulations, discovered by Japanese geologists in the Pacific Ocean [57].

### Location of a drilled well on the shelf of Angola

The coordinates of the drilled well [22], where light oil deposits were found, were determined by the position of the drilling ship: 6°19'4.8"S, 10°53'33"E.

A fragment of the image of the drilling site, indicated in Fig. 11 by rectangular outline, was processed. Within the surveyed area, responses were recorded at the resonant frequencies of the 7th (carbonates) group of sedimentary rocks. The rocks of this group have been traced to a depth of 217 km. Signals at resonant frequencies of granites and basalts were recorded from a depth of 218 km; above, there were no responses from these rocks.

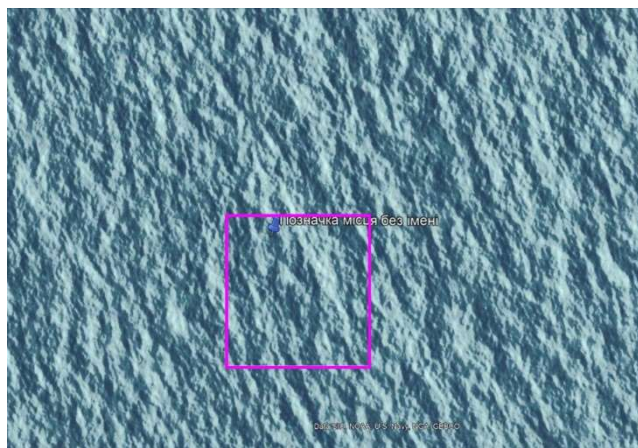


Fig. 11. Satellite image of the site of drilled well location on the Angolan offshore.

From the surface in the surveyed area, signals were recorded at the resonant frequencies of oil (with a time delay), condensate, gas and amber. From the surface (depth) of 57 km, responses at the frequencies of HC and amber were recorded from the upper part of cross-section and were absent from the lower part.

The thickness of the water column at the survey site was estimated at 1075 m.

By scanning cross-section with a step of 1 m at the resonant frequencies of the condensate, the following response intervals were established: 1) 1480-1800 m; 2) 2100-2335 m; 3) 3130-3500 m. Deeper scanning was carried out up to 20 km with a step of 5 m and another interval was set: 4) 13640-17770 m.

The same scanning procedure using the resonant frequencies of a set of oil samples the following response intervals were determined: 1) 1325-1760 m; 2) 2400-2850 m; 3) 3180-3520 m; 4) 13400-17780 m. It should be noted that the refinement of the depths of the location of the response recording intervals using a finer scanning step was not carried out.

#### Location of a drilled well offshore Pakistan

The report [33] provides information on the completion of the Kekra-1 well drilling on the shelf of Pakistan: no hydrocarbon inflows were obtained in the well.

In this regard, a survey of the local well drilling site, as well as a larger area in this region, was promptly carried out in order to additionally assess the prospects for detecting hydrocarbon accumulations in this part of the shelf. The coordinates of the well drilling ( $22^{\circ}30'17''\text{N}$ ,  $66^{\circ}6'49''\text{E}$ ) were determined from the position of the drilling vessel.

At the initial stage of the work, frequency-resonance processing of a satellite image of the local well drilling site was carried out. This fragment of the image in Fig. 12a is marked with a rectangular outline.

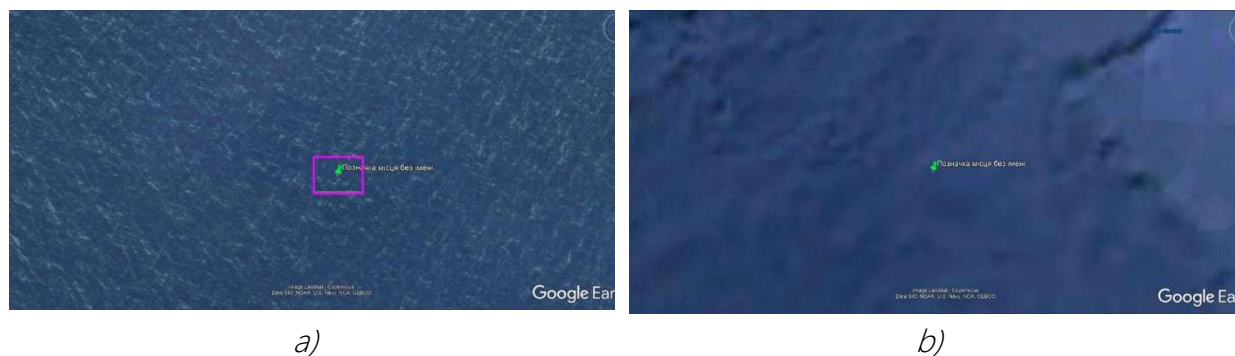


Fig. 12. Satellite images of the Kekra-1 drilled well location on Pakistan offshore of: a) local; b) large.

From the surface, signals (responses) at resonant frequencies of oil, condensate, gas and amber were not registered. From a depth (surface) of 57 km, responses at the frequencies of HC and amber were not recorded both from below and above this level.

Signals were recorded of the 7th (after 10 sec) and 11 groups of sedimentary rocks. Responses from the 7th group were also recorded at the surface 50 km from the upper part of the section. Below 150 km, no signals from the 7th group were found.

On the surveyed local fragment, responses from 1, 2, 3, 4, 5, 6 and 7 groups of igneous rocks were also established.

The results of the survey of the local area allow us to state that there are no accumulations of hydrocarbons within the entire depth interval.

It is quite natural that the following question arose before the authors of the works - are there hydrocarbon deposits in this region of the Pakistani shelf? To answer this question, the processing of satellite images of larger areas in the region of the well was carried out.

First, the frequency-resonance processing of the satellite image in Fig. 12a was conducted, but without the fragment shown in Fig. 12a with a rectangular contour. Coordinates of the lower left corner of the image: 22°25'22.76"N, 65°56'49.73"E, upper right corner: 22°35'30.65"N, 66°15'19.46"E.

At this fragment from the surface responses at frequencies 1 (weak), 2, 3, 4, 5, 6 (weak) and 7 groups of igneous rocks were recorded. From the surface of 220 km, responses from these groups were also recorded in the upper part of cross-section.

From the surface of 220 km in the upper part of the section, responses from 7, 8, 9, and 10 groups of sedimentary rocks were also recorded.

No responses were recorded from the surface at the frequencies of oil, condensate, gas, and amber. From a depth of 57 km in the upper part of cross-section, signals from hydrocarbons and amber were also not recorded.

In connection with this situation, an even larger fragment of the area was taken for examination, the satellite image of which is shown in Fig. 12b. The coordinates of the lower left corner of this area are: 21°40'07.91"N, 64°36'18.20"E; upper right: 23°23'02.68"N, 67°44'48.40"E.



During frequency-resonance processing of this image, responses were recorded at the resonant frequencies of oil, condensate, gas, amber, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 groups of sedimentary rocks, as well as 1, 2, 3, 4, 5, 6 and 7 groups of igneous rocks.

Let's pay attention to the following. In the information reports on the Kekra-1 well, it is noted that the cost of the well drilling amounted to 100 million USA dollars and another 100 million spent on cementing and drilling an additional hole to reach the design depth!

### **Search block in area of a drilled well on Mauritania offshore**

In the message [44] there was information about the drilled productive Orca-1 well on the shelf of Mauritania. The well coordinates (16°29'0.18"N 17°37'19.45"W) are determined (approximately) from information of Internet site about the position of the drilling vessel. This circumstance made it possible to prepare a satellite image of the drilling site.

At the initial stage of the research, frequency-resonance processing of a fairly large block in the Atlantic Ocean was carried out, within which the drilled productive Orca-1 well is located (large rectangular contour in Fig. 13).

Within this block, responses from oil, condensate, gas, amber, oil shale, shale gas (gas in argillite breccia), coal, anthracite, hydrogen (intense), brown coal, iron ore, and salt have been recorded.

Responses from 1-10 groups of sedimentary rocks, as well as 6, 7 (intense), 8, 9 and 10 groups of igneous rocks were recorded.

By fixing the responses on various surfaces, the depths of the roots of the following deep channels (volcanoes) were determined: 1) salt volcano - 470 km; 2) volcano of sedimentary rocks of 1-6 groups - 470 km; 3) volcanoes of sedimentary rocks of 7-10 groups - 723 km; 4) volcanoes of igneous rocks of the 6th and 7th groups - 723 km.

On the surface of 57 km, signals from oil were obtained from 1-7 groups of sedimentary rocks, as well as from the 7th group of igneous rocks; from salt, 8-10 groups of sedimentary rocks and the 6th group of igneous rocks, there were no responses from oil.



**Fig. 13.** Satellite image of a research site in the Atlantic Ocean (offshore of Mauritania). The marker indicates the position of the productive well.

At a depth of 69 km, water signals were obtained only from 8-9 groups of sedimentary rocks and the 7th group of igneous rocks.

By scanning cross-section from the surface with a step of 1 m, responses from oil were obtained from the following intervals: 1) 1330-4400 m; 2) 4620-5100 m; transition to a step of 5 m, 3) 7670-10540 m; 4) 11800-13360 m (up to 15 km traced).

When processing a local fragment of the image in the area of the well (rectangle in the upper part of Fig. 13), responses from oil, condensate, gas (intense) were obtained.

In the local area, signals were received only from the 7th group of sedimentary rocks (carbonates). On the surface of 57 km, responses from oil, condensate and gas were recorded.

By scanning cross-section from 500 m, step 1 m, gas responses were obtained from the intervals: 1) 3620-3680 m; 2) 5117-5156 m; 3) 5390-5480 m.

When scanning the first interval (3620-3680 m) with a step of 1 cm, gas signals were recorded in the interval 3642-3643 m.

By scanning from 6 km, step 1 m, responses from oil were obtained from intervals 1) 6142-6256 m; 2) 7320-7680 m; from 8.5 km - 5 m step, 3) 9300-13100 m.

In the lower part of the image prepared for processing (the rectangle in the lower part of Fig. 13) there is an elevation. During frequency-resonance processing of the image of this fragment of a large survey area, responses from oil, condensate, gas, amber, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, and salt were recorded.

Responses from 1-6 groups of sedimentary rocks were also registered; no signals were received from igneous rocks.

By fixing the responses at various depths, it was established that the roots of volcanoes (of salt and sedimentary rocks) are located at a depth of 470 km.

Signals from oil were obtained from 1-6 groups of sedimentary rocks (including those on the surface of 57 km), as well as from salt at a depth of 57 km.

By scanning the section from a depth of 1 km, step 1 m, responses from oil were obtained from the intervals: 1) 1790-3710 m; 2) 4475-5100 m; transition to a step of 5 m, 3) 14510-15800 m (tracked up to 16 km).

By scanning from 1.7 km, step 1 m, the responses of oil from salt were obtained from the intervals: 1) 1750-2160 m; 2) 2400-3740 m. When scanning from 2100 m, step 1 m, responses from oil from the 2nd group of sedimentary rocks were obtained from the interval 2100-2740 m (there was no further scanning).

*Features of the results.* Large block: 1) Responses from oil, condensate, gas, amber, oil shale, shale gas, coal, anthracite, hydrogen, water, lignite, iron ore and salt; 2) roots of volcanoes: salt and 1-6 groups of sedimentary rocks - 470 km, 7-10 groups of sedimentary and 6-7 groups of igneous - 723 km; 3) oil signals at 56.9 km from groups 1-7 of sedimentary rocks, as well as from group 7 of igneous rocks; 4) responses from oil in separate parts of the interval 1330-13360 m.

*Section with a well:* 1) Responses from oil, condensate, gas (including on the surface of 57 km); 2) signals only from the 7th group of sedimentary rocks; 3) responses from gas in the range of 3620-54300 m and oil - 6142-13100 m.

*Uplift area:* 1) Responses from oil, condensate, gas, amber, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, salt; 2) volcanoes of 1-6 groups of sedimentary rocks and salt with roots at a depth of 470 km; 3) responses from oil from the interval 1790-15800 m.

### **Survey sites offshore Brazil**

On the Brazilian shelf, oil and gas fields have already been discovered and are being developed, including those in pre-salt deposits. This circumstance determined the expediency of testing mobile direct-prospecting methods in this region of the Atlantic Ocean. Information about the large Búzios oil field (including its coordinates: 24°47'22"S 42°19'08"W) is available on the Internet site [25]. This information provided an opportunity to process a satellite image of this field location.

A satellite image of the area, within which Búzios oil field is located, is shown in Fig. 14. During its processing, signals from oil, condensate (intense), gas, amber, oil shale, argillic breccia, gas hydrates, ice, coal, anthracite were recorded.

Responses from 1, 2, 3, 4, 5 and 6 groups of sedimentary rocks, as well as the 7th group of igneous rocks, were registered. By fixing the responses at different depths, the root of the channel (volcano) of sedimentary rocks of 1-6 groups was determined at a depth of 470 km.

Signals from oil were also received at depths up to 57 km.

On the surface of 50 km, responses from the 7th group of igneous rocks were not received. Potassium salts also belong to this group of rocks. When using a sample of potassium-magnesium salt, responses on the surface were recorded. By fixing the responses at different depths, it was found that such salt is located in the interval from 2 to 3 km. By scanning from 2 km, with a step of 1 m, this interval was refined: 2160-2940 m.

From the surface of 2940 m, oil signals from 1-6 groups of sedimentary rocks from the upper part of cross-section were not received, but from the 7th group of igneous rocks were recorded.

By scanning the section from 3 km, step 1 m, responses of oil from sedimentary rocks were obtained from the intervals: 1) 3997-5210 m; transition to a step of 5 m, 2) 9060-14800 m (up to 15 km tracked).

To the north of field location, a group of uplifts in the relief of seabed is visible on satellite image (Fig. 15). When processing a fragment of this area image with uplifts (rectangular contour in Fig. 15), responses from oil, condensate, gas, amber, oil shale, argillic breccia, gas hydrates, ice, coal, anthracite, hydrogen (intense), water (intensive), brown coal, iron ore, diamonds and potassium-magnesium salt were fixed. No responses were received from salt.



**Fig. 14.** Satellite image of a research site in Atlantic Ocean (offshore Brazil). The marker indicates position (coordinates) of Búzios field.



**Fig. 15.** Satellite image of a research site in the Atlantic Ocean (offshore Brazil, an area of a chain of uplifts).

Responses from 1-7 groups of sedimentary rocks, as well as 6, 7 and 11 groups of igneous rocks were recorded.

Signals from the potassium-magnesium salt were obtained at the surfaces of 20, 30, 40, 50, 60, and 69 km; below, there were no responses from this salt. It can be assumed that on the surface of 69 km in the 7th group of igneous rocks there is a synthesis of salt and water (salty).

By fixing the responses at different depths, the roots of the following channels (volcanoes) were determined: 1) sedimentary rocks of 1-6 groups - 470 km; 2) sedimentary rocks of the 7th group (carbonates) - 723 km; 3) igneous rocks of 6, 7 and 11 groups - 723 km.

By scanning the section from a depth of 1 km, step 1 m, responses from oil were obtained from the intervals: 1) 1830-2560 m; 2) 2670-5030 m; transition to a step of 5 m, 2) 8940-14500 m (tracked up to 15 km).

*Features of the results.* Field area: 1) signals from oil, condensate, gas, amber, oil shale, gas hydrates, ice, coal, anthracite; 2) the root of the volcano 1-6 groups of sedimentary rocks - 470 km; 3) signals from potassium-magnesium salt from the interval 2160-2940 m; 3) responses of oil from the interval 3997-14800 m.

Uplift area: 1) responses from oil, condensate, gas, amber, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, water, brown coal, iron ore, diamonds and potassium-magnesium salt; 2) volcano roots: sedimentary rocks of 1-6 groups - 470 km; sedimentary rocks of the 7th group and igneous rocks of the 6th, 7th and 11th groups - 723 km; 3) responses of oil from the interval 1830-14500 m.

### The most expensive well on the shelf of Alaska

Information about the most expensive "dry" exploratory well in the history of the oil industry Mukluk on the shelf of Alaska is given in many documents and articles, including [12, 49].

A satellite image of the North Slope of Alaska is shown in Fig. 16. The marker with the M symbol shows the position of the Mukluk well (point coordinates: 70.683342° N, 150.919968° W or 70°41'0.031" N, 150°55'11.885" W). Markers with the symbols K and R indicate points within the Kuparuk River and Prudhoe Bay oilfields. The coordinates of these points are taken from the Wikipedia sites.

In the course of the research, frequency-resonance processing of satellite images of local areas of the territory, the centers of which are indicated by markers, was performed (Fig. 17).



Fig. 16. Satellite image of the northern slope of Alaska. Markers indicate (from left to right) the centers of the following local processing areas: M) Mukluk wells; K) the Kuparuk River oil field; P) the Pradkho Bay (Prudhoe Bay) oil field.

**Area of Mukluk well location.** During frequency-resonance processing of the satellite image of the Mukluk well site (Fig. 17a), **no responses (signals) at the frequencies of hydrocarbons (oil, condensate and gas) were recorded.** No responses were received from amber, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, deep water, dead water, potassium-magnesium salt, sodium chloride salt.

Responses from 9 and 10 groups of sedimentary rocks were recorded from the surface; no signals were received from all groups of igneous rocks.

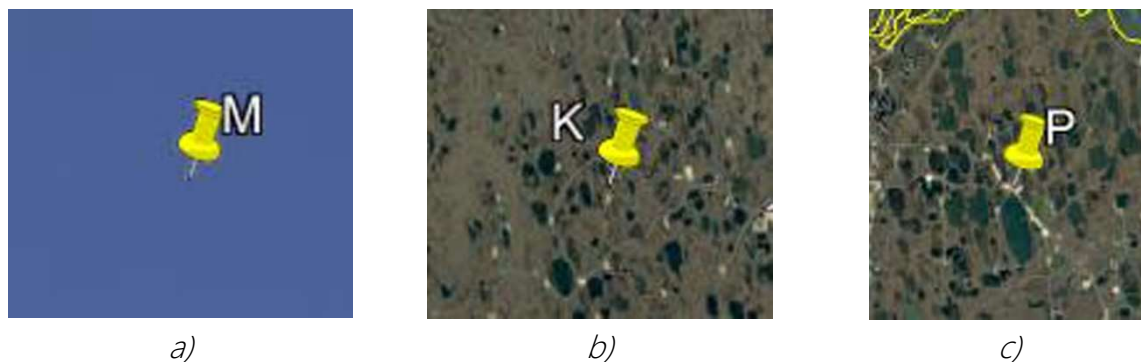
On the surface of 50 km, responses were received from the lower part of the section only from the 10th group of sedimentary rocks (siliceous rocks). By fixing the responses at different depths (50, 150, 250, 350, 450, 550, 470 km), the root of the channel (volcano), filled with rocks of the 10th group, was established at a depth of 470 km.

We note once again that in volcanic structures, filled with rocks of this type (siliceous), responses at HC frequencies have never been recorded before.



***A section of the Kuparuk River oil field.*** When processing a satellite image of a local area of the field (Fig. 17b) from the surface, responses were recorded at the resonant frequencies of oil, condensate (very weak intensity), gas (low intensity) and amber. Responses from oil shale, gas hydrates, ice, coal, anthracite, hydrogen, water, "dead" water, potassium-magnesium salt, sodium chloride salt were not received.

Signals were recorded from 1 (weak intensity), 2 (weak), 3, 4, 5 (weak intensity), 6 (weak intensity) and 10 groups of sedimentary rocks, as well as 1 (granites) and 11 (kimberlites) igneous groups. There were no responses from diamonds.



**Fig. 17.** Satellite image of the local site of the Mukluk well location (a), Kuparuk River oil field (b) and Pradkho Bay (Prudhoe Bay) oil field (c).

On the surfaces of 5, 6, 10, and 50 km, there were no responses from the lower part of the section from 1-5 groups of sedimentary rocks. Signals from these rock groups were recorded on the surface 5 km from the upper part of the section. Responses from the 10th group of sedimentary rocks are recorded from the interval of 4-5 km to the interval of 20-21 km. Signals from the 1st group of igneous rocks were recorded from 20-21 km to 23-24 km. Responses from the 11th group of igneous rocks were traced in the interval 23-24 km - 195-196 km.

The survey site in Fig. 17b is located outside the central part of the volcano, filled with sedimentary rocks. In volcanic complexes, filled with sedimentary rocks of groups 1-6, signals are almost always recorded at the frequencies of hydrocarbons (oil, gas, condensate) and amber.

***A section of the Prudhoe Bay oil field.*** During processing a satellite image of a local section of the field (Fig. 17c), responses were recorded from the surface at the resonant frequencies of oil, condensate, and gas. Responses from amber, oil shale, gas hydrates, ice, coal, anthracite, hydrogen, deep water, "dead" water, potassium-magnesium salt, sodium chloride salt were not received.

Responses from 7 and 10 groups of sedimentary rocks, as well as 1 and 11 groups of igneous rocks, were recorded from the surface. Responses from the 7th group of sedimentary

rocks (carbonates, limestones) were recorded to depths of 4-5 km, the tenth group - in the range of 5-18 km.

The signals from the 1st group of igneous rocks were obtained from the depth interval of 19-25 km, and the 11th group - from the interval of 26-195 km.

The survey site in Fig. 17c is located outside the central part of the volcano, filled with sedimentary rocks of the 7th group (carbonates, limestones). In volcanic complexes, filled with limestone, signals are almost always recorded at the frequencies of hydrocarbons (oil, gas, condensate); there are no responses from amber within such channels (volcanoes).

*Main conclusions:* in volcanoes, filled with sedimentary rocks of the 10th group (siliceous rocks), signals at HC frequencies have never been recorded. In volcanoes of sedimentary rocks of 1-6 groups, as well as 7 group (limestones), signals at HC frequencies are almost always recorded.

### Area of well drilling offshore Peru

Information about the Marina-1 exploratory well drilling within Block Z-38 (Fig. 18) on the shelf of Peru is given in the document on the website [28]. The position of the well within Block Z-38 is shown in Fig. 19 [54]. The well coordinates (points in Fig. 19) – 3°36'56.988" S, 81°0'47.988" W – were determined from the position of the drilling vessel.

We note first that the experimental studies at the site were carried out before the completion of the well drilling.

At the first stage of the work, frequency-resonant processing of a local site in the area of the drilling point, indicated in Fig. 19 by rectangular outline, was conducted. No responses (signals) at the frequencies of oil, condensate and gas were recorded from the surface during processing of this fragment of the image! Signals from amber, oil shale, gas hydrates, ice, deep water, "dead water", coal, hydrogen, potassium-magnesium salt, sodium chloride salt, brown coal, anthracite were also not received.

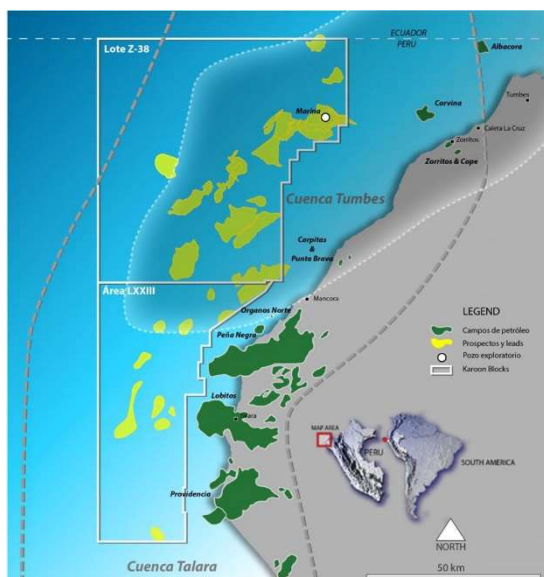
Responses were recorded only from the 10th group of sedimentary rocks (siliceous rocks). Signals from all groups of igneous rocks were not recorded.

By fixing the responses at different depths (50, 150, 250, 350, 450, 550, 470 km), the root of a channel (volcano), filled with siliceous rocks, was determined at a depth of 470 km.

Rapidly conducted studies (measurements of signals at HC frequencies) led to the conclusion that the **probability of obtaining commercial oil, condensate and gas inflows in the Marina-1 well after drilling is close to zero!**

At the second stage of the work, an integral assessment of the prospects of oil and gas potential of a larger block was performed - a satellite image in Fig. 19.





**Fig. 18.** Schematic map of the of Block Z-38 and Marina-1exploratory well location within the Tumbes Basin of Peru offshore [54].



**Fig. 19.** Satellite images of the drilling site of the exploratory well Marina-1 (Block Z-38) on the Peru offshore. The position of the well is indicated by a marker.

When processing this image from the surface, responses from oil (very weak intensity), condensate (more intense), gas (more intense), amber, and oil shale were recorded. No signals were received from argillite breccia, gas hydrates, ice, coal, brown coal, anthracite, hydrogen, water, "dead" water, iron ore, diamonds, potassium-magnesium salt, sodium chloride salt.

Responses were recorded from 1 (low intensity), 2, 3, 4, 5, 7 and 10 groups of sedimentary rocks. Signals from all groups of igneous rocks were not received.

Signals from the 2nd group of sedimentary rocks were recorded on the surface of 4 km, and there were no signals on the surface of 5 km.

On the surface of 5 km from the upper part of the section, responses from 1-5 groups of sedimentary rocks were recorded; no signals were received from 6-7 groups.

Responses from the 7th group of sedimentary rocks (limestones) were recorded from the lower part of the section at the surfaces of 5, 7, 9 and 10 km, at depths of 11 and 12 km there were no signals.

By fixing the responses at different depths (50, 150, 250, 350, 450, 550, 470 km), the root of a channel (volcano), filled with siliceous rocks, was determined at a depth of 470 km.

No further research has been carried out within Block Z-38.

Official information about the results of the Marina-1 well drilling appeared on the Internet sites on February 17, 2020 [42]. Commercial fluid inflows in the well were not obtained – the forecast, based on the results of frequency-resonance processing of the satellite image of the drilling site, was confirmed by drilling.

## Search blocks on the shelf of Angola

Information about the planned drilling of two exploratory wells within blocks 48 and 32 on the shelf of Angola is presented in the document [53]. We also note that the well within block 48 will be the deepest in the world.

Using a map-scheme of the licensed block's location on the shelf of Angola (Fig. 20), satellite images of two blocks were prepared for further processing (Fig. 21).

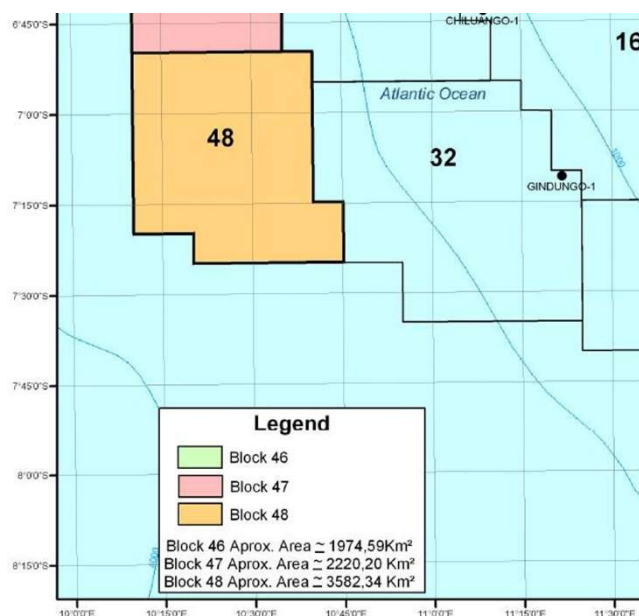


Fig. 20. A map showing the location of search Blocks 48 and 32 on the Angola offshore.



a)



b)

Fig. 21. Satellite images of search Blocks 48 (a) and 32 (b) on the Angola offshore.

*Block 48.* No responses from hydrocarbons (oil, condensate, gas), hydrogen, dead water, potassium-magnesium salts were recorded from the surface during frequency-resonance processing of the block image (Fig. 21a); signals were received from water and salt.

An intense signal was recorded only from the 8th group of sedimentary rocks (dolomites), no responses from igneous rocks were recorded.

At the surface of 5 km, the salt responses were obtained from the upper part of the section; there were no signals from the lower part.

By fixing the responses at different depths (5, 50, 150, 250, 350, 450, 550, 400, 470 km), the root of the channel (volcano), filled with dolomites, was determined at a depth of 470 km.

*Block 32.* When processing the image of the block (Fig. 21b), signals from the surface were recorded of oil (low intensity), condensate, gas, amber, oil shale, argillic breccia, coal,

anthracite, water, dead water; no responses were received from oil shale, ice, hydrogen, brown coal, iron ore, diamonds, salt and potassium-magnesium salt.

Signals from 1, 2, 3, 4, 5 and 6 groups of sedimentary rocks were recorded; there were no responses from igneous rocks.

By fixing the responses from the 2nd group of sedimentary rocks at different depths (5, 50, 150, 250, 450, 550, 470 km), the root of the volcano of sedimentary rocks was determined at a depth of 470 km.

Responses at the frequencies of oil, condensate, gas and amber were recorded on the surfaces of 56(57) km.

Signals from water were received on the surfaces of 56, 60, 68 and 69 km, from dead water - on the surfaces of 56 and 59 km, and there were no responses at 60 km.

The main conclusion is that in volcanoes, filled with dolomites, signals at HC frequencies have never been recorded. When drilling detected by seismic structures within block 48, the probability of obtaining commercial fluid inflows will be very low. In volcanoes, filled with sedimentary rocks of groups 1-6, signals at HC and amber frequencies are almost always recorded.

### Dry well offshore Uruguay

Paper [53] also notes that previously drilled Raya-1 well within Block 14 offshore Uruguay was the deepest one. Commercial inflows of hydrocarbons were not obtained in well.

The position of Block 14 and the empty well Raya-1 is shown in Fig. 22 [23, 55], the satellite image of the block, prepared for processing, is shown in Fig. 23.

During frequency-resonance processing of the image (Fig. 23), no responses from oil, condensate, gas, amber, hydrogen, water, salt were recorded from the surface; signals were received from dead water.

Intense signals were registered only from the 8th group of sedimentary rocks (dolomites), responses from igneous rocks were not registered.

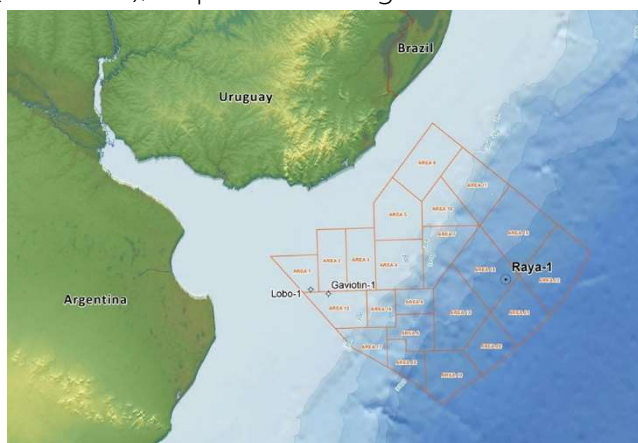


Fig. 22. Map of search Block 14 and Raya-1 drilled well location on Uruguay offshore [23].



Fig. 23. Satellite image of Block 14 and position of Raya-1 well on offshore.

By fixing the responses at different depths (69, 60, 150, 250, 350, 450, 550, 470 km), the root of the channel (volcano), filled with dolomites, was determined at a depth of 470 km. From the upper part of cross-section, responses from dolomites were not received at the surface of 3 km, but were recorded at the surface of 4 km.

*The main conclusion:* in volcanoes, filled with dolomites, signals at HC frequencies were once again not recorded.

### Survey sites in the North Sea

Information about drilled wells in the North Sea (including their coordinates) can be found on Internet sites.

*Local site of the Glengorm well drilling.* An information report on the results of the Glengorm well drilling in the North Sea is available on the website [26]. The depth of the drilled well is 5056 m. The report indicates that a gas and gas condensate collector with a thickness of 37.6 m has been discovered. The coordinates of the well location (57°10.644'N, 001°07.066'E) are borrowed from reports on the sites.

For frequency-resonance processing, an image of a small area of the sea was prepared, in the center of which a drilled well is located. The image processing was carried out in the following sequence.

Using the resonance frequencies of oil and gas condensate samples at the surveyed local area, anomalous responses were obtained at the frequencies of oil, gas condensate (intense signal) and gas (intense signal).

The presence of 1, 2, 3, 4, 5, 6 and 12 groups of sedimentary rocks was established in the surveyed area. Signals (responses) from all groups of igneous rocks were not received.

At the surface (depth) of 250 km, signals of 1, 2, 3, 4 and 5 groups of sedimentary rocks were recorded. This indicates the presence of a vertical channel for the migration of deep fluids and mineral matter in this local area.

Determination of the maximum depth (root) of the channel: group 2, from 0 km, from 1350 m - signal, recorded up to 470 km.

Determining the depth of the sea in the area: water: from 0 m, step 10 cm, water signals were recorded up to 86.0 m.

Determination of condensate depths by scanning: from 86 m, step 1 m, signals in intervals 1) 300-475 m; 2) 2200-2477 m; 3) 3626-3738 m; 4) 4855-5224 m; transition to a step of 10 m, 5) 10000-14400 m (strong); 6) 19880-26900 m; 7) 28.600-56.000 km (refinement 57.0 km).

Refinement of condensate depths (scanning with 10 cm steps): from 300 m, 10 cm step: 435-442 m; from 2200 m - 2284-2342 m; from 3627 m - 3719-3732 m; from 4855 m: 1) 4874-4892 m and 2) 5140-5185 m.

Determination of gas depths by scanning: from 80 m, step 1 m... 1) 286-470 m; 2) 1789-2040 m; 3) 3700-4082 m; 4) 4873-5100 m; 5) 5210-5380 m.

Refinement of gas depths (scanning with 10 cm steps): 10 cm step: from 286 m: 334-342 m; from 1789 m: 1864-1875 m; from 3700 m: 1) 3815-3825 m and 2) 3841-3872 m; m 4873 m: 1) 4930-4947 m; 2) 4968-4995 m; 3) 5074-5126 m; 4) 5235-5293 m.

Determination of oil depths by scanning: oil, step 1 m...1) 5240-5765 m... up to 10 km traced; further from 13000: 13900-14880 m.

Refinement of oil depths (scanning with 10 cm increments): 10 cm increments: 1) 5254-5370 m; 2) 5392-5587 m (strong signal).

The predicted oil reservoirs are located deeper than the bottom of the drilled well.

**Well 6508/1-3.** Information about the results of drilling a dry well 6508/1-3 in the North Sea is given on the website [24]. The well coordinates are 65°58'25.73"N, 08°09'49.06"E. The position of the well on the satellite image is shown in Fig. 24a. A frequency-resonance processing of a small fragment of this image in the area of the marker was carried out.

During processing of the image local fragment, no responses from oil, condensate and gas were recorded. Signals were received from the 8th group of sedimentary rocks (dolomites). The root of a deep channel (volcano), filled with these rocks, was determined at a depth of 194 km (the layer of the plastic state of the rocks).

Note also that responses from water were also recorded at a depth of 69 km; signals from ice on this surface were absent from the upper and lower parts of cross-section.

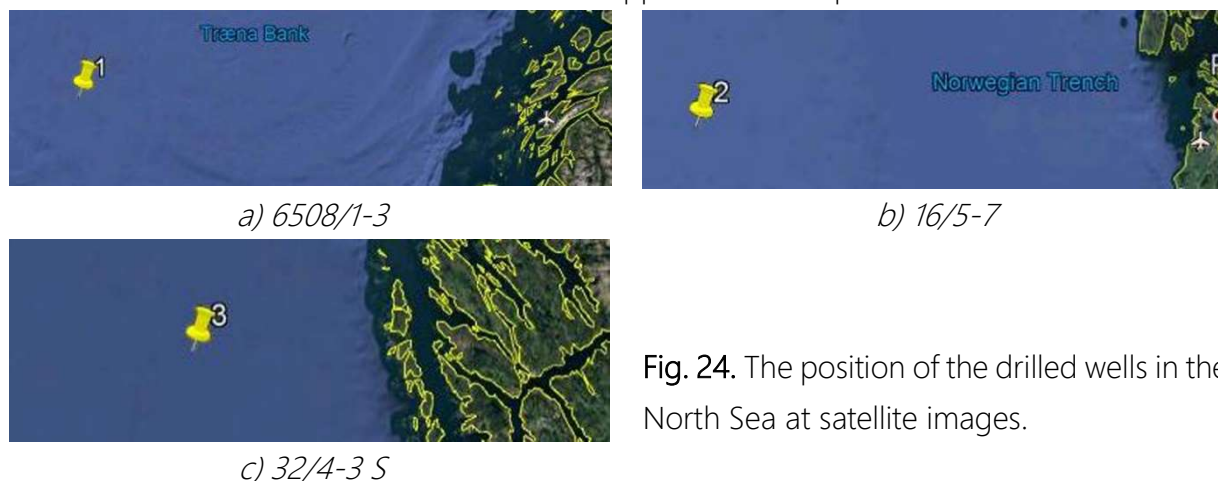


Fig. 24. The position of the drilled wells in the North Sea at satellite images.

**Well 16/5-7.** Information about dry well 16/5-7 in the North Sea was borrowed from the site [30]. The well coordinates are 58°42'12.13"N, 02°31'08.81"E, its position on the image is shown in Fig. 24b.

During frequency-resonance processing of a fragment of this image in the area of the well, no responses from oil, condensate and gas were registered. As in the previous section, the presence of a volcano with a root at 194 km, filled with sedimentary rocks of the 8th group



(dolomites), was established in the area of the well. Here we also received responses from water on the surface of 69 km.

**Well 32/4-3 S.** Information about the project well 32/4-3 S is presented on the website [31], its coordinates are 60°30'37.36"N, 04°09'18.03"E. The position of the well in the North Sea is shown in Fig. 24c. At the time of image fragment processing, the well had not yet been drilled.

During frequency-resonance processing of a fragment of the image in Fig. 24c responses from oil, condensate and gas were not registered. Signals were received from the 9th group of sedimentary rocks (marls). The root of a volcano, filled with these rocks, was recorded at a depth of 194 km. Responses from water on the surface of 69 km were also received in this section.



**Fig. 25.** Satellite image of the site for the re-interpretation of seismic materials on the Denmark offshore in the North Sea.

The results of well 32/4-3 S drilling are given in the information message [29]. As it followed from the results of the frequency-resonance processing of the satellite image of the well location, it turned out to be dry.

**Search block on the Danish shelf.** The report [35] provides information about the project of reinterpretation of 3D seismic data within the search block on the Danish shelf. Using the block layout in the North Sea, a satellite image of this area was prepared (Fig. 25). The processing area is indicated in this image by a rectangular outline.

During frequency-resonance processing of a fragment of the image in Fig. 25 responses of oil, condensate, gas, gas hydrates, and amber are not registered. Signals were received only from the 9th group of sedimentary rocks (marls). By fixing the responses at different depths, the root of the volcano, filled with marls, was determined at a depth of 470 km.

Signals from water within the block were also recorded on the surface of 69 km.

### Production well in Barents Sea

On August 20, 2019, the site [39] published information about the discovery of a light oil field in the Barents Sea by well 7324/6-1 ('Sputnik'). The location of well within block PL 855 is shown in the figure (Fig. 26) in the site document [39]. Borehole coordinates (73°39'07.05"N, 24°58'35.39"E) were borrowed from the site [40]. Using them, a satellite image of the local drilling site (Fig. 27) was prepared for further processing.

During frequency-resonance processing of this image, responses were obtained at the frequencies of oil, condensate, gas (intense), amber, coal and shale gas.

Responses from 1-6 groups of sedimentary rocks were recorded - the presence of a volcano (channel) of these rocks was established.

Responses at the frequencies of oil, condensate, gas and amber were recorded, when scanning the section up to 57 km.

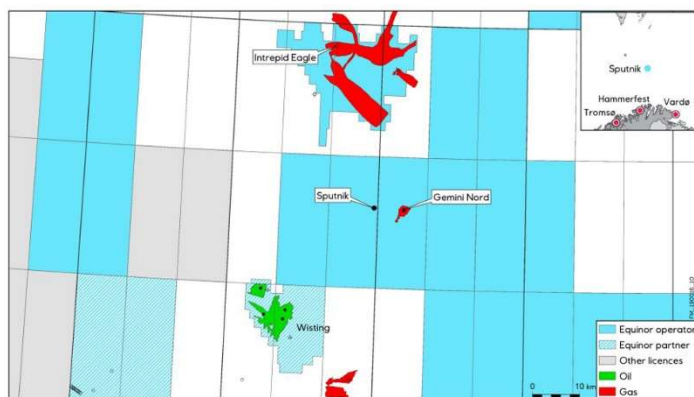


Fig. 26. The position of the well 7324/6-1 "Sputnik" within the block PL 855.



Fig. 27. Satellite image of the Sputnik well site.

### Australian shelf

An Internet paper [47] reports the discovery of "significant" accumulations of gas and condensate in the Browse Basin off the northwest coast of Western Australia. Hydrocarbon deposits were discovered using the exploration well Bratwurst-1, which was successfully drilled in 78 days. The coordinates of the Bratwurst-1 well -  $12^{\circ}52'18.385''\text{S}$ ,  $124^{\circ}24'50.050''\text{E}$  - were found on one of the Internet sites. This made it possible to carry out frequency-resonance processing of a satellite image of a local drilling area in order to additionally test the developed mobile direct-prospecting technology.

A satellite image of a fragment of the Browse Basin off the northwestern coast of Western Australia was prepared using the coordinates of the well (Fig. 28). The position of the well on the image is indicated by a marker, the local section of the frequency-resonance processing is indicated by a rectangular contour.

We also note that in the process of the image preparing, it was decided to additionally conduct an integrated assessment of the oil and gas potential of a larger fragment of the Browse basin (see Fig. 28). At the same time, the problem of detecting and identifying channels (volcanoes) for the migration of chemical elements, mineral matter, and fluids, filled with rocks of various types, was additionally solved.

At the initial stage of the experimental work, the processing of a satellite image of a local fragment of the well drilling site, indicated in Fig. 28 by rectangular outline, was carried. During frequency-resonance processing of the image fragment in the area of the well, signals from condensate (low intensity), gas, water (low intensity), "dead" water (low intensity) were



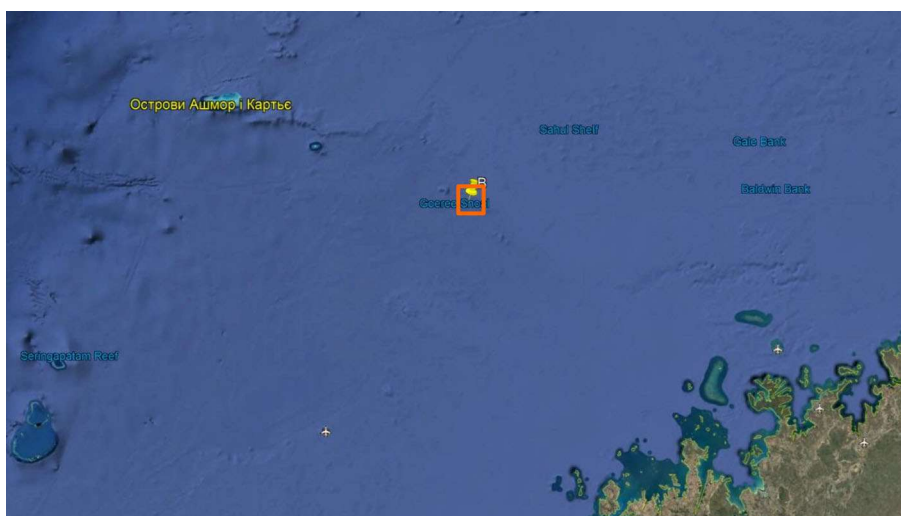
recorded from the surface; responses from oil, amber, oil shale, gas hydrates, hydrogen, coal, anthracite, potassium-magnesium salt and sodium chloride salt are not registered.

Signals from the 7th group of sedimentary rocks (limestones) were recorded; no responses were received from igneous rocks. By fixing the responses at different depths (50, 150, 250, 350, 450, 550, 650, 722, 723), the root of the channel (volcano), filled with carbonate rocks, was established at a depth of 723 km.

At the surface (depth) of 56 km, responses from condensate and gas were obtained from the lower and upper parts of the section; there were no signals from oil. On the surface of 57 km, signals were also received from condensate and gas; no responses were received from water (deep) and "dead" water.

By scanning the section from the surface, step 1 m, gas responses were recorded from the following intervals of the section: 1) 1830-2015 m; 2) 3400-3830 m; 3) 4585-5615 m; 4) 7550 - (stronger) (strong -8450) - 8570 m (up to 10 km traced).

When processing the image of the entire survey block in Fig. 28 signals were received from the surface at the frequencies of oil, condensate, gas, amber, oil shale, argillite breccia, gas hydrate rocks, gas hydrates, ice, coal, anthracite, fresh water, dead water, brown coal, potassium-magnesium salt, traditional salt; responses from hydrogen and iron ore were not received.



**Fig. 28.** Satellite image of a fragment of the Browse basin off the northwest coast of Western Australia. The marker indicates the position of the Bratwurst-1 well, a rectangular outline – the local site of the frequency-resonance processing.

Within the survey area, signals were received from 1, 2, 3, 4, 5, 6 and 7 groups of sedimentary rocks, as well as 1, 2, 4, 7, 8, 9 and 10 groups of igneous rocks.

By fixing the responses at various depths, the presence and roots of the following channels (volcanoes) were established: 1) sedimentary rocks of 1-6 groups – 217 km; 2) sedimentary rocks of the 7th group – 723 km; igneous rocks of the 7th group – 470 km.

Salt signals were obtained on the surface of 20 km only from the upper part of the section. From potassium-magnesium salt, responses were recorded on the surface of 20 km from the upper and lower parts of the section, as well as at depths of 56 and 57 km; there were no signals on the surface of 57.1 km.

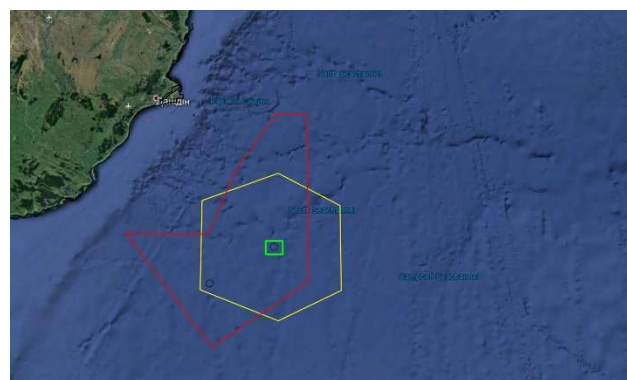
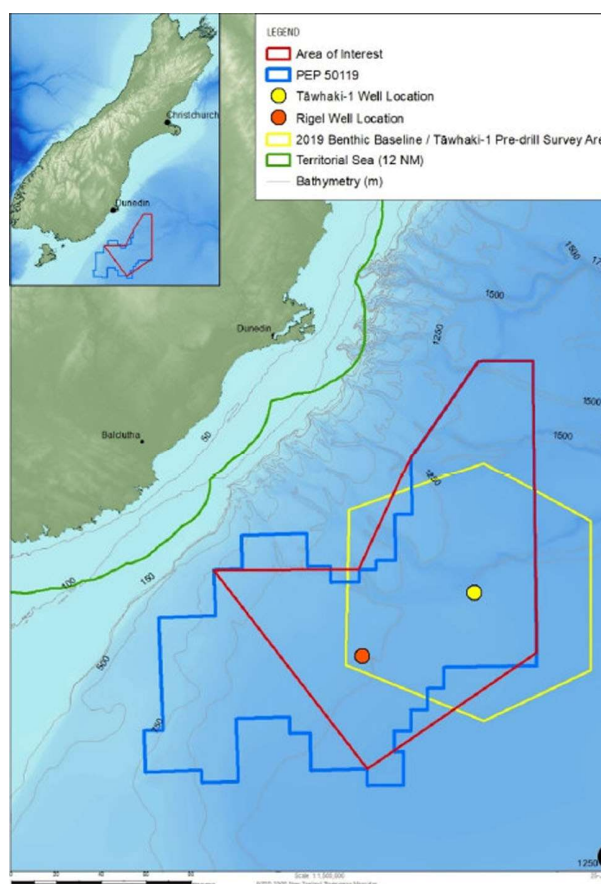
### **Exploratory well drilling site offshore New Zealand**

A white paper [41] provides information about the intention of OMV, Beach Energy and Mitsui to drill an exploration well on the Tawhaki structure, located in the territorial waters of New Zealand (Great South Basin), 146 kilometers from the coast southeast of Balclutha. The position of the planned exploratory well is shown in Fig. 29 [43]. Using this figure, a satellite image of a large fragment in the South Basin was prepared for further research (Fig. 30). Approximate location of the local drilling area is indicated in this image by a rectangular outline.

When processing a satellite image of a local site in the well area (rectangular contour in Fig. 30), signals from oil, gas, “dead” water and potassium-magnesium salt were recorded from the surface. Responses from condensate, amber, oil shale, argillite breccia, gas hydrate rocks, gas hydrates, ice, coal, anthracite, hydrogen, deep water, brown coal, iron ore, diamonds, and sodium chloride salt were not obtained.

Responses were registered only from the 7th group of igneous rocks (ultramafic rocks), signals from sedimentary rocks were not received. By fixing the responses at different depths (50, 150, 250, 350, 450, 470 km), the root of the volcano of ultramafic rocks was determined at a depth of 470 km.

By scanning the section from 1500 m, step 1 m, responses at oil frequencies were obtained from the following intervals of the section: 1) 1945-2415 m; 2) 3250-4040 m; 3) 4410-4970 m; transition to a step of 5 m, 4) 6860-7940 m; 5) 10190-12640 m; 6) 14500-16970 m (not followed further).



**Fig. 30.** Satellite image of the Tawhaki-1 exploratory well in the Great South Basin. The approximate position of the well is indicated by a rectangular contour.

**Fig. 29.** Map of the location of licensed areas and the Tawhaki-1 exploratory well [43].

Responses from “dead” water were received at the surfaces of 48 and 57 km; no signals were received from deep water at a depth of 57 km.

Signals from oil and gas were also received on the surface of 57 km; at a depth of 57.1 km, there were no responses.

During processing the entire image in Fig. 30, signals from oil, condensate, potassium-magnesium salt and dead water were received from the surface.

Responses from 9-10 groups of sedimentary rocks and the 7th group of igneous rocks were also registered. The root of the channel (volcano) of the 10th group of sedimentary rocks was determined at the surface of 470 km, and the root of the 7th group of igneous rocks - at a depth of 723 km.

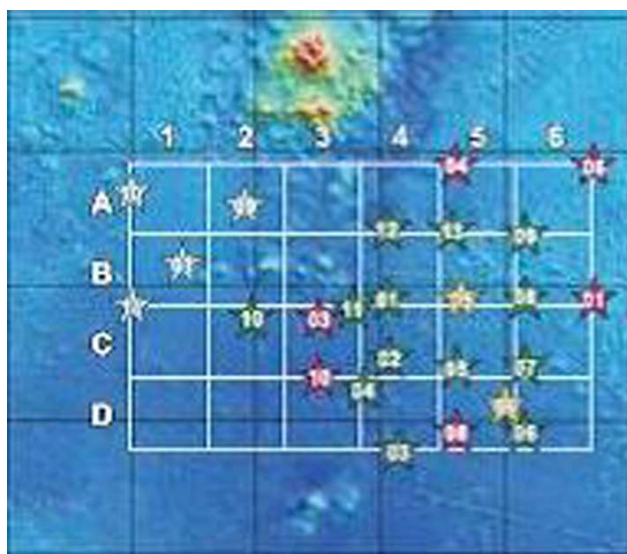
### Approbation of the technique in deep-water area in Pacific Ocean

The report [10] provides information on the discovery by Japanese specialists of large accumulations of rare earth elements and yttrium in deep-water mule deposits at the bottom of the Pacific Ocean in international waters, as well as in the economic zone of Japan. The same

information is available on various Internet sites. The article [46] focuses on the importance of these findings.

In a more detailed form, research materials in international waters are presented in the report [57]. A map-scheme of the location of the research site from this report is presented in Fig. 31.

In order to study the possibility of using the methods of satellite images and photographs frequency-resonance processing for searching and localizing sites of accumulation of ore minerals and chemical elements on the area in the Pacific Ocean, experimental studies of a demonstration nature were carried out.



**Fig. 31.** The map of the location of the site of detection by Japanese experts of large concentrations of rare earth elements at the bottom of the Pacific Ocean in international waters. The white rectangle indicates the site of the survey, where the calculation of REE resources was performed. The site coordinates are given in [57].

At the initial stage of research, when processing the image, responses (signals) were found at resonance frequencies of 1, 2, 3, 4, 5, 6, 7, 9, 10, 11 and 12 groups of sedimentary rocks, as well as 6 (gabbro and basalts) and 7 (ultramafic) groups of igneous rocks. Signals were also registered at the frequencies of oil (intense), condensate, gas, amber (intense), oxygen, hydrogen, carbon, fresh water, gold (layer), diamonds (layer). However, the processing of the satellite image in order to determine the depths of occurrence in the section of the discovered rocks and minerals was not carried out.

Mule deposits, in which rare earth elements (REE) and yttrium are found, occur in this area at a depth of 6000 m and deeper. In this regard, the surface (depth) of 6500 m was taken for reference. At this depth, responses were recorded at the resonant frequencies of chemical elements present in the cross-section above 6500 m. The Pacific Ocean contains hydrogen, deuterium, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon, silicon, phosphorus, sulfur, chlorine, argon, potassium, calcium, **scandium**, titanium, vanadium, chromium, cobalt, nickel, copper, zinc, gallium, germanium, arsenic, selenium, bromine, krypton, rubidium, strontium, **yttrium**, zirconium, niobium, technetium, ruthenium, palladium, silver, cadmium, indium, tin, antimony, tellurium, iodine, xenon, cesium, barium, **lanthanum**,

cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, hafnium, tantalum, tungsten, rhenium, iridium, platinum, gold, mercury, thallium, lead, bismuth, polonium, astatine, radon, francium, radium, actinium, thorium.

The results of the experimental studies, carried out in the studied area in the Pacific Ocean, allow us to conclude that it is possible to use frequency-resonance technology of satellite images and photographs processing for the rapid detection of the localization of areas of accumulation of minerals and chemical elements (including rare earths) in various regions of the World Ocean. The chemical elements, included in the group of rare earths, are indicated above in bold.

### Findings and conclusion

The studies carried out at the sites of drilling exploratory wells for oil and gas onshore and offshore in various regions of the world confirmed the feasibility of additional work conducting with direct-prospecting methods using, when choosing sites for their laying.

In the exploration process for oil and gas, the bulk of the resources are spent on drilling wells. Unfortunately, the success rate of drilling exploratory wells is not high. According to [3, p. 3] "the success of prospecting and exploration in the world is kept at an average level of 30%". It can be assumed that an increase in the success rate of drilling at least twice will contribute to a significant increase in the efficiency of the exploration process.

Other researchers are currently paying attention to the expediency of direct-prospecting technologies using. Thus, the authors of the article [6, p. 36] state: "The efficiency of prospecting for oil and gas on land in Ukraine is approximately 30%, and on the Black Sea shelf it is even lower. If the problem of reservoirs in carbonate and terrigenous complexes is sometimes solved by geophysical forecasting of decompressed zones in the section, then there are no reliable traditional methods for sorting these objects into oil and gas saturated and "empty" (water-bearing) ones. Therefore, the efficiency of prospecting for oil and gas is rather low.

Because of this, the latest unconventional methods for predicting hydrocarbon accumulations in various types of traps deserve to be introduced, including the method of electrophysical forecasting of oil and gas content, remote sensing methods and other modern geophysical technologies, the effectiveness of which has been confirmed by further exploratory drilling."

In the article [4, p. 193] devoted to the problems of "synclinal" oil, Karpov V.A. notes: "It should be recognized that the success achieved over many years of geological exploration on hydrocarbons can no longer be increased by improving the methodology, introducing various innovations, if you continue to drill out positive structures, if you do not proceed to mapping hydrocarbon accumulations directly, regardless of the structural characteristics, to using various

technologies of "direct" methods". In another article [5, p. 141] he states: "It seems that the "synclinal" direction will have a similar fate: sooner or later all companies will be engaged in it. And this will happen when they (companies) move from searching for structures to searching for oil, to a direct search for oil."

According to the materials of Rystad Energy [34, 38], over the past three years, 95 "impact" (especially important) wells have been drilled in the world, and 40 of them have led to the discovery of hydrocarbon accumulations. Drilling success rate according to Rystad Energy is 42%. In 2019, the success rate based on the results of drilling 35 "impact" wells was 31%! In addition to the above, Rystad Energy classifies wells as "impact" by evaluating a number of key factors, including the size of the prospect, whether they can discover new hydrocarbons in border or new basins, and their value to the operator.

Figure 32 shows a schematic map of the location of 30 "impact" wells [38], which will be drilled in 2020. Reconnaissance studies have already been carried out at the locations of some of them (the Mediterranean Sea, the New Zealand shelf). It also seems expedient to conduct reconnaissance studies at the drilling sites of all wells in Fig. 32 in order to establish the main criteria for the success of drilling.

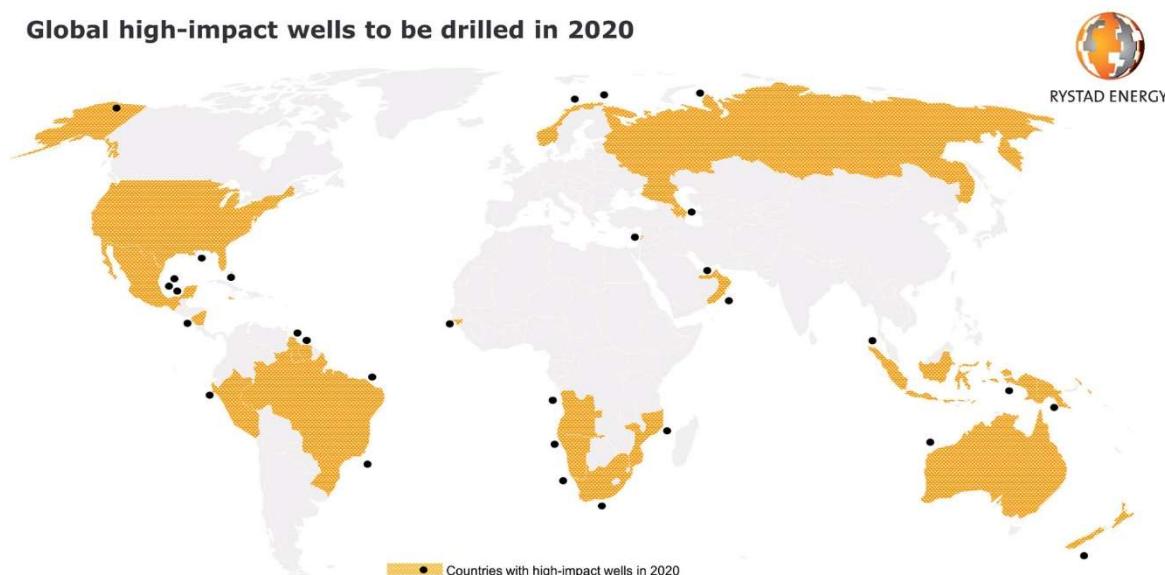
Article [56] provides the coordinates of 40 wells drilled in the Turkish exclusive economic zone in the Black Sea, 26 wells drilled onshore in this region, and 17 wells that are proposed to be drilled. It is also advisable to process satellite images of local drilling sites for these wells in order to establish the features of the geological structure of their location areas.

The results of the experimental studies, performed in various regions, allow us to state the following with sufficient justification.

1. Within deep channels (volcanoes), filled with sedimentary rocks of 1-6 groups, signals (responses) are almost always recorded at resonant frequencies of hydrocarbons. In very many cases, responses at the resonant frequencies of amber are also recorded in the circuits of such channels.



### Global high-impact wells to be drilled in 2020



Source: RystadEnergy ECube, research and analysis

Fig. 32. A map showing the location of 30 impact wells to be drilled in 2020 [38].

2. In volcanoes, filled with the 7th group of sedimentary rocks (carbonates, limestones), signals at the frequencies of oil, condensate and gas are also almost always recorded. However, responses from amber are not recorded in these volcanoes.

3. In volcanic complexes, filled with sedimentary rocks of the 8th group (dolomites), 9th group (marls) and 10th group (siliceous rocks), responses at the frequencies of oil, condensate and gas have never been registered!

4. In the surveyed areas, within which signals from hydrocarbons were recorded, the existence of a boundary at 57 km was confirmed, in the area of which oil, condensate, gas and amber are synthesized from hydrogen and carbon migrating from below.

5. Additional materials have been obtained, indicating the synthesis of water at a depth of 69 km in volcanic complexes of a certain type.

6. To detect local areas of possible accumulation of hydrocarbons within large blocks, it is necessary to carry out detailed area surveys.

Within the areas and blocks, promising for the discovery of hydrocarbons, identified at the stage of an integral assessment of their oil and gas potential, detailed studies can be carried out using frequency-resonance methods of satellite images processing. Detailed studies allow [20]:

a) detect and localize within blocks and sections local anomalous zones of fixing responses (signals) at resonant frequencies of oil, condensate, gas;

b) within the limits of the mapped anomalous zones, using the technique of vertical scanning of the section, determine (and refine using a finer scanning step) the depths of the response intervals at the resonant frequencies of oil, gas and condensate;



c) in the intervals of responses at the frequencies of hydrocarbons, determine the types of reservoir rocks;

d) establish what types of rocks are seals for the detected intervals of responses at the resonant frequencies of oil, condensate and gas;

e) determine the types of oil and condensate from which signals (responses) are recorded in the intervals of the section (in frequency-resonance methods 117 oil samples and 15 gas condensate samples are traditionally used).

To date, the results of numerous experimental studies presented above, as well as in articles and reports [14–21], can be summarized as follows.

1. The conducted experimental reconnaissance studies provided additional evidence in favor of the deep (endogenous) origin of oil, condensate, gas and amber in the process of hydrogen degassing of the Earth. In survey areas, where responses from hydrocarbons are recorded, within (in the central parts, most likely) channels (volcanoes) of deep migration of fluids, mineral matter, and chemical elements, a boundary of 57 km is almost always fixed. Below this boundary, responses are recorded at the frequencies of hydrogen and carbon, above - oil, condensate, gas and amber (only in channels of a certain type) [14-21]. Additional information on the problem of mineral synthesis of hydrocarbons is also presented in the abstracts of the VII-th Kudryavtsev Readings (7KCH) at <http://conference.deepoil.ru/index.php/materials>.

2. The results of studies in various regions of the world allow us to conclude that the areas of extraction and finds of amber should be considered promising for the hydrocarbons searching [14, 20].

3. A survey of the areas, where salt deposits are located, showed that signals at the frequencies of hydrocarbons are also recorded within them [20].

4. In the process of direct-prospecting methods approbation, responses from hydrocarbons were also repeatedly recorded in coal basins from the horizons of the section, lying below coal-bearing seams (including at fairly large depths) [20].

5. Practically in all surveyed areas of visible hydrogen degassing, responses from basalts were recorded. In the discovered basalt channels with roots at different depths, signals at hydrogen frequencies are recorded everywhere (almost in the entire interval of basalt registration) [17, 19].

6. Signals from sedimentary and metamorphic rocks, as well as oil, condensate, gas, and amber are recorded from the interval between the upper and lower granite layers in certain areas of the Ukrainian Shield (USh) [16, 18]. When conducting soundings along the profile in the northern part of USh, an area similar in structure to a fragment of the area within the White Tiger deposit on the shelf of Vietnam was found [16]. Signals from HC within this area were recorded up to 57 km. We also note that the presence of two intervals of granites was also established by scanning the section in a separate area of the Voronezh crystalline massif and within the Romashkino oil deposit in Tatarstan.

7. Recently, in some areas, responses from hydrocarbons have been recorded from the intervals of ultramafic rocks finding.

8. Numerous areas (sites) of the location of deep channels, filled with sedimentary and igneous rocks of various types, the areas have been found on land and in marine areas, within which water is forming at the boundary of approximately 69 km!

9. The results of the conducted studies can be considered as such that they testify in favor of the concept of a growing (expanding) Earth.

In their publications, the authors have already noted the "cautious" attitude of practitioners and researchers to the developed direct-prospecting methods (based on the processing and interpretation of Earth remote sensing data, in the first place). There is reason to note with satisfaction that experimental work on the problem of creating mobile and low-cost direct-prospecting methods and technologies is also being carried out in other regions. The expediency of conducting research in this direction is convincingly emphasized in a short fragment from the report of N.M. Andreev at 7KCH [1]:

"According to the author, the dispute about the origin of hydrocarbons no longer makes any sense today. The results of studies by the biogeophysical method (BGF) of dozens of hydrocarbon deposits, and hundreds of them using the recently developed spin-holographic technology for remote sounding of space images (SHT RZ) do not leave a single chance for an organic hypothesis. At least when it comes to the scale of deposits. These studies clearly and unambiguously indicate the deep nature of the hydrocarbon's formation. Therefore, this issue will not even be discussed here. There is also no point in wasting time on proving the reality of the BGF method, and now in the SGT DZ version, with its truly fantastic capabilities and efficiency. In his reports at the first three Kudryavtsev Readings, the author unsuccessfully tried to draw the attention of specialists to the amazing results of applying the BGF method. But realizing that at the current level of public consciousness it is useless to expect him to understand this topic (according to one geologist, colleagues will not understand it for another 50 years), he simply began to use these technologies in solving his various production problems.

And in his free time, study the opportunities that have opened up, form new search approaches and create his own, now huge, database of deposits of various minerals on all continents. In the course of various studies, it became obvious that hydrocarbon and ore deposits are closely interconnected, and these technologies no less effectively allow us to search for ore deposits as well."

In conclusion, we note once again that the results of frequency-resonance processing of satellite images of local areas for drilling exploration wells on the shelf and onshore in various regions of the world quite convincingly indicate the feasibility of the developed methods (in combination with traditionally used ones) using to select the optimal locations for prospecting and exploration wells. The super-operational method for the integral assessment of the prospects for oil and gas potential and ore content provides an opportunity to significantly

speed up and optimize the exploration process for combustible and ore minerals. The proven mobile technology of satellite images and photographs frequency-resonance processing is recommended for use on the territory of Ukraine (as well as in other regions of the world) in order to preliminary assess the prospects for oil and gas potential and ore content of poorly explored and unexplored prospecting blocks and local areas.

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# ТАБИҒИ ТАУ ЖЫНЫСТАРЫНЫҢ ФИЗИКА-МЕХАНИКАЛЫҚ КӨРСЕТКІШТЕРІНІҢ МАҢЫЗДЫЛЫҒЫ

Сүйеуова Набат Базархановна

магистр, аға оқытушы, Yessenov University, Казахстан

**Аннотация:** Тау-кен өндірісінде машиналар мен жабдықтарды пайдалану кезіндегі маңызды факторлардың бірі - тау-кен жыныстарының қасиеттері. Тау жыныстарының физика - механикалық сипаттамалары және оларды анықтау әдістері талданып, тау-кен машиналарының жұмыс атқарушы органдарын есептеу үшін қажетті тау жыныстарының негізгі көрсеткіштері сипатталған.

**Түйін сөздер:** қирауға қарсыласу, сызықтық сығылу – созылу, беріктік шектері, статикалық шыңдалу кедергісі, морт-пластикалық қасиеттерінің критерийлері, қирау тұтқырлығы.

Табиғи тау жыныстарының физика - механикалық қасиеттері тау - кен өндіру машиналарының құрылымдық ерекшеліктерін, олардың өнімділігін, пайдалы қазбаларды игеру жүйесінің параметрлерін, пайдалы қазбаларды өндіру және оларды өңдеу кезінде, сондай-ақ әртүрлі мақсаттағы тау-кен қазбаларымен өндірістік процестердің сипатын анықтайтын басты факторлардың бірі болып табылады. Эксперимент нәтижесінде жыныстардың беріктік және пластикалық сипаттамалары үлгілердің өлшемдері мен пішініне, жүктеу шарттарына, қоршаған орта температурасына, ылғалдылығына және т.с.с. факторларға байланысты өзгеріп отырады [1].

Тау жыныстарының қирауға қарсыласуын бағалау үшін инвариантты корреляциялық қатынастар қағидасына сәйкес интегралды көрсеткіштерді қолданған ыңғайлы [2]. Бұл көрсеткіштер әртүрлі элементар кернеу тудыратын қандай да бір процесте жыныстардың қиратушы әсерлерге қарсыласуын сипаттайды. Тау-кен ісінде жыныстардың қарсыласуының интегралдық сипаттамалары **беріктік көрсеткіштері** деп аталады. Олар қарапайым деформациялардың жекелеген түрлеріне қарсыласуын сипаттайды және оны интегралдық емес, жеке сипаттамалар болып табылатын жыныстардың беріктік көрсеткіштерімен шатастырмау керек.

Алайда, әр түрлі пішін мен өлшемді үлгілерде анықталған сызықтық сығылу мен созылуда уақытша қарсыласу шектері  $\sigma_{сж}$ ,  $\sigma_p$  сияқты беріктік сипаттамалары жыныстың қирауға қарсыласуының интегралдық сипаттамасы ретінде қарастырылады.

Тау жыныстарын қарсыласуға сынаудың кез келген әдісіне мынадай талаптар қойылады:

- 1) сыналатын бір объект үшін тәжірибе қайталанған кезде нәтижелер неғұрлым ұқсас болуы тиіс;
- 2) сыналатын әр түрлі тау жыныстары үшін алынған мәліметтер шамасы бойынша айтарлықтай ерекшеленуі тиіс.

Бірінші талап бойынша сынақ әдісінің дәлдігі, ал екіншісі бойынша - оның сезімталдық дәрежесі сипатталады.

Инженерлік есептеу әдістерін әзірлеу үшін қажетті бізді қызықтырған интегралдық сипаттамаларды ескере отырып, бұл талаптарды тағы бір рет толықтыру қажет, бұл жағдайда аса маңызды емес: алынатын нәтижелер қираудың тиісті нақты процесінің көрсеткіштерімен тұрақты корреляциялануы тиіс.

Қарапайым жағдайда соңғы талапты қанағаттандыратын сынақ технологиялық сынама бола алады. Көптеген зерттеулерде технологиялық сынаманы пайдалануда, мысалы, көмірді кесу бойынша есептеу әдістерін алынған қасиеттері забойдағы сығылу әсерінің салдарынан алынған үлгілердің қасиеттерінен айтарлықтай ерекшеленуі мүмкін.

Алайда, аталған талаптарды орындау үшін өндірістік процесті имитациялау міндетті емес - көрсеткіштер арасындағы тұрақты корреляциялық байланыс қажет. Қазіргі кезде игеру тереңдіктерінде жыныстар үшін басым көпшілік жағдайларда үлгілерде зертханалық сынаулар рұқсат етілген. Мұндай сынақтар өте қарапайым және маңызды емес, кен орнын игеру басталғанға дейін жүргізілуі мүмкін.

Зертханалық сынақтардың қолайлылығы маңызды үлгілерді алудың техникалық мүмкіндіктеріне негізделеді. Қажетті шарттар мынадай екі себептен жиі бұзылады:

- егер жыныстың қасиеттері үлгіні алу кезінде айтарлықтай өзгерсе;
- егер массивтің бұзылуы үлкен масштабта болса және жарықтары бар (олардың арасындағы қашықтық үлгінің мөлшеріне жақын немесе одан жоғары) массив пайда болса.

Көрсетілген себептердің біріншісінде жыныстар үшін маңызды шарттары елеусіз болады: массивте әсер ететін гравитациялық жүктемелер көп жағдайда қиратушы күштен едәуір аз (көмір үшін олар қиратушыға жақын). Шынында, бұл зерттеменің тереңдігі салыстырмалы аз жағдайға ғана қатысты. Көмір үшін ғана емес, жыныстар үшін де айтарлықтай терең горизонттарға көшумен қирауға қарсыласуды анықтаудың забойлық әдістерін қолдану қажет болуы әбден мүмкін.

Көрсетілген себептердің екіншісін ірі (камералық немесе ұңғымалық) зарядпен жарылу кезінде ескермеуге болмайды; тек салыстырмалы түрде шағын аймақ шегінде ғана әрбір бұзу жеке актісі үшін құралдың локализацияланған әрекетімен ерекшеленетін бұзылудың механикалық тәсілдері кезінде бұл себеп, әдетте, елеулі мәнге ие болмайды.

Тау-кен технологиялық қасиеттерін анықтау үшін жыныстарды сынау әдістері және қажетті сынақ аппаратурасы қарапайым және қолжетімді болуы тиіс. Күрделі емес аспаптардың салыстырмалы төмен дәлдігі бірлі-жарым анықтаулар санының ұлғаюымен өтеледі.

Өндірістік қазу комбайндарының жұмыс атқарушы органдарын есептеу үшін негізгі тау-кен **технологиялық көрсеткіштер** ретінде ұтымды пайдалану қажет:

- сызықтық сығылу - созылу кезіндегі беріктік шектері -  $\sigma_{сж}$ ,  $\sigma_p$ ;
- жанасу беріктігінің көрсеткіші –  $P_k$  ;
- абразивтілік көрсеткіші -  $\alpha$ ;

Тау жыныстары қасиеттерінің аталған негізгі көрсеткіштерінен басқа жаңа **физика-механикалық сипаттамаларды** да есепке алған жөн: тау жыныстарының  $P_{сжк}$  - статикалық шыңдалу кедергісі және  $t_{гц}$  - морт-пластикалық қасиеттерінің критерийлері, сондай-ақ  $K_{1с}$  - қирау тұтқырлығы.

Бұл көрсеткіштер мынадай жағдайлар бойынша қабылданды:

Көрсеткіш  $P_{сжк}$  - индентор жаншылған кезде сыну шұңқыры пайда болатын жыныстар үшін, яғни негізінен морт сынатын жыныстар үшін ғана анықталуы мүмкін. Тау жыныстарының беріктік қасиеттерінің жалпылама көрсеткіші кесу кезінде қирау сипаттамасымен коррелирлейтін  $P_{сжк}$  - статикалық шыңдалу кедергісі болып табылады және әртүрлі морт-пластикалық қасиеттері бар тау жыныстары үшін эксперименталды анықталуы мүмкін. Тау-кен жыныстарының морт-пластикалық қасиеттері және механикалық тәсілдермен бұзылған орта ретінде олардың сандық бағасы жеткіліксіз зерттелген және одан да аз сенімді жанама анықтама беріледі. Тау-кен-технологиялық инженерлік есептеулер үшін сипаттамаларға қойылатын талаптарға жауап беретін  $P_{сжк}$  шамасын, сондай-ақ  $t_{гц}$  - морт-пластикалық қасиеттерінің критерийлерін,  $P_k$  - жанасу беріктігін анықтау кезіндегі жасалатын сынақ қондырғысында бағалауға болады [3].

Жер қыртысындағы тау жыныстары әртүрлі генезисі, жасы, морфологиясы, өлшемі, ені және т.с.с. сипатталған жарықшақтардың қалың торымен бөлінген. Тау жыныстарын сынау, қирату жөніндегі мамандарды механикалық тәсілдермен жыныстардың жарықшақтануы, оның жарықшақты орталарды бұзудың оңтайлы құралдарын таңдау кезінде есепке алуға жататын әлсірететін фактор ретіндегі рөлі тұрғысынан қызықтырады. Жарықтың тұрақты өсуінен орнықтылыққа өту сәтіне сәйкес келетін жүктеменің ең үлкен мәні қызығушылық тудырады. Бұл кезде материалдың беріктік сипаттамасы болып табылатын және  $H/мм^{3/2}$  өлшенетін  $K_{1с}$  - қирау тұтқырлығы мәніне қол жеткізумен сипатталады. Бұл көрсеткіш әлі де аз зерттелген, оны қосымша сипаттама ретінде пайдалану үшін перспективалы деп санауға негіз бар, кейбір жағдайларда түрлі жыныстардың қасиеттерін механикалық тәсілдермен бұзу объектілері ретінде бағалауды нақтылауға мүмкіндік береді.

Осындай тау жыныстарының физика-механикалық қасиеттерін есепке алу тау-кен өндіру машиналарының қызметі үшін маңызды факторларының бірі болып табылады. Сондықтан тау жыныстарының қасиеттерін зерттеу нәтижелері және оларды анықтап, талдау шартты түрде жасалуы қажет. Тау-кен өндіру өнеркәсібінің дамуы тау жыныстарының қасиеттері мен жағдайы туралы терең білімді талап етеді.

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# REGIONAL FEATURE OF LEOSS-LIKE SUBSIDENCE CLAYEY SOILS COMMON IN MONGOLIA

**S.Nyamdorj**

Institute of Civil Engineering Mongolian National Technical University, Ulaanbaatar

**D.Dashjamts**

Construction and Architectural Institute Mongolian State University of Science and Technology, Ulaanbaatar

**Kh.Bayanmunkh**

Institute of Civil Engineering Mongolian National Technical University, Ulaanbaatar

## ABSTRACT

In connection with the regional climatic and geographical features of Mongolia, loose soil deposits of the Quaternary period of the Cenozoic era are common at the depth of the foundations of buildings and below, such as loess-like subsidence and swelling clay soils, permafrost soils, heaving soils during seasonal freezing, eluvial, etc. From this, the innovative application of optimal experimental and theoretical solutions for foundations and the preparation of artificial foundations, taking into account regional characteristics, is an important scientific and national economic task.

**KEYWORD:** initial settling pressure, initial settling moisture, soaking, relative settling, pile foundations, artificial foundations.

## I. INTRODUCTION

The regularity of the process of changing the stress-strain state of loess-like subsiding soils due to technogenic soaking is subject to the general theory of soil mechanics, but each region of the world has its own distinctive feature in terms of soil conditions. Proceeding from this, the modern experimental and theoretical study of the mechanics of subsiding soils and geotechnical science, aimed at developing optimal experimental and theoretical solutions for foundations and the preparation of artificial foundations, taking into account regional features, is an important scientific and national economic problem.

In accordance with the administrative division, 5 aimak centers and more than 100 somon centers and settlements were built on loess-like soils in Mongolia, including the city of Darkhan built in the 1960s, in the 1970s, Erdenet, in the 1980s, other new cities, such as the city of Khutul and many other settlements, and infrastructural engineering structures were erected. According to the experience of construction and operation of buildings and structures built on loess-like subsiding soils in Mongolia and other countries of the world, cracks and damage are formed in many buildings due to subsidence deformation. Buildings with cracks and damage,

even after repair and reinforcement work, do not fully restore their original state, their seismic resistance decreases by 1-2 points, the likelihood of risk increases, and financial resources are spent inefficiently.

To study these problems, V.A. Obruchev [1], J.G.Anderssen [2], R.Ch.Andrews [3], Yu.V. Syrokomy [4], Yu.A. Bagdasarov [5], T.G. Ryashchenko [6], A. Anand [7], D. Dashjamts [8], N. Batsukh [9], S. Nyamdorj [10] and other researchers devoted their experimental and theoretical work to identify the regional features of loess-like subsidence soils in the territory of Mongolia and development of optimal solutions for bases and foundations.

## II. RESEARCH METHODS

In the 1900s, D. Dashzhamts [11] studied the origin, distribution, and physical and mechanical characteristics of subsiding loess-like soil, common in Mongolia, and compared it with similar parameters of subsiding soils, common in the Eurasian regions, the Transcaucasus, the countries of Central Asia and Siberia.

S. Nyamdorj [12] developed this study and determined the regional features of loess-like subsidence clayey soils in Mongolia by comparing the indicators (Table 1) of similar soils common in Southwestern Siberia, including the regions of Novosibirsk, Barnaul, Irkutsk, Transbaikal Territory, Ulan-Ude, Western and Central Mongolia, Nort-heat China (Ryashenko T.G., Akulova V.V. [13]).

**Table 1.** Table for comparing the physical and mechanical properties of loess soils common in the territory of the Euro-Asian region

|  | Characteristics, region  | $n, \%$   | $\gamma_s, \text{кН/м}^3$ | $\gamma, \text{кН/м}^3$ | $W, \%$   | $W_L, \%$ | $W_p, \%$ | $I_p, \%$ | $\varepsilon_{sl}, \%$ |
|--|--------------------------|-----------|---------------------------|-------------------------|-----------|-----------|-----------|-----------|------------------------|
|  | Uzbekistan               | 37-59     | 26.8-28.0                 | 12.1-18.3               | 0.08-0.12 | 25-30     | 17-20     | 5-100     | 3-15                   |
|  | Georgian                 | 39-55     | 26.7-27.4                 | 15.8-19.2               | 0.13-0.17 | 28-44     | 14-26     | 14-18     | 1.0-15.3               |
|  | Don in Rostov            | 38-56     | 26.7-27.2                 | 14.0-19.3               | 0.12-0.15 | 24-40     | 12-24     | 2-30      | 1.6-13.0               |
|  | Eastern Siberia (Russia) | 41-58     | 26.3-27.6                 | 12.5-18.2               | 0.08-0.12 | 21-34     | 12-20     | 9-14      | 1.0-5.0                |
|  | Azerbaijan               | 42-57     | 26.7-27.7                 | 13.5-18.8               | 0.12-0.17 | 23-42     | 15-28     | 8-14      | 2.2-14.8               |
|  | Mongolia                 | 33-41.5   | 26.9-28.1                 | 12.0-21.3               | 0.05-0.08 | 17-30     | 15.5-18   | 13-21     | 1.5-16                 |
|  | Novosibirsk, Barnaul     | 37.5-41.3 | 25.9-28.6                 | 13.2-16.7               | 0.08-0.11 | 21-34     | 14.2-23.2 | 11-18     | 0.9-7.6                |
|  | Irkutsk                  | 40.9-51.5 | 24.2-31.1                 | 15.9-18.3               | 0.11-0.14 | 24-33     | 13.2-21.7 | 8-14      | 1.3-13.1               |

|                            |               |               |               |               |               |               |          |              |
|----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|----------|--------------|
| For the Baikal<br>Ulaan-Ud | 46.3-<br>53.2 | 26,2-<br>28,7 | 14.8-<br>17.5 | 0.10-<br>0.12 | 2-34          | 14.2-<br>22.6 | 9-17     | 2.1-<br>14.8 |
| Northeast<br>China         | 45.7-<br>52.4 | 27,5-<br>28,2 | 15.2-<br>16.3 | 0.06-<br>0.11 | 20-32         | 14.1-<br>20.9 | 6-9.7    | 2.4-<br>11.5 |
| Western<br>Mongolia        | 42.5-<br>49.8 | 25,6-<br>27,5 | 14.4-<br>15.2 | 0.07-<br>0.09 | 21-34         | 15.3-<br>21.7 | 8.5-13.5 | 3.1-<br>12.4 |
| Southern<br>Mongolia       | 46.5-<br>51.3 | 24,2-<br>28,3 | 15.1-<br>17.2 | 0.05-<br>0.08 | 23.1-<br>27.2 | 14.8-<br>20.3 | 6.2-10.1 | 3.4-<br>11.3 |
| Darkhan-<br>Selenge        | 49.2-<br>58.3 | 23,1-<br>25,7 | 14.1-<br>15.8 | 0.05-<br>0.06 | 21-33         | 15.3-<br>21.2 | 7.4-11.4 | 2.4-<br>12.6 |
| Erdenet-<br>Orkhon         | 46.2-<br>53.1 | 22,9-<br>24,8 | 13.8-<br>14.9 | 0.06-<br>0.07 | 23-35         | 14.3-<br>20.8 | 8.3-12.7 | 3.0-<br>14.1 |

Initial drawdown pressure.

On fig. Figure 1 shows the dependence curve of the initial subsidence pressure ( $P_{sl}$ ) of the loess-like soil in the territory of the city of Darkhan. According to the analysis of the dependence curve of the relative subsidence value on the initial subsidence pressure  $\varepsilon_{sl}=f(P_{sl})$  of loess-like silty sandy loamy soil fluctuates within  $P_{sl} = 0.25 \div 1.50 \text{ kg/cm}^2$ .

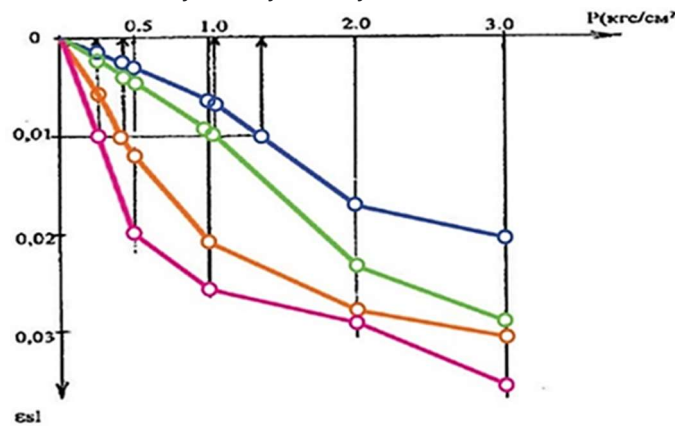


Figure 2.1. Curves of dependence of the relative subsidence of loess-like subsidence soil on the initial subsidence pressure  $\varepsilon_{sl} = f(P_{sl})$ .

- Darkhansky Metallurgical Plant, sandy loam.,  $P_{sl} = 0.4 \text{ kg/cm}^2$  (D.Dashjamts [128])
- City of Darkhan. Site for full-scale testing of piles, sandy loam.  $P_{sl} = 1.08 \text{ kg/cm}^2$  (S.Nyamdorj, A.Anand [136])
- City of Darkhan. Site for testing compaction with a heavy rammer. Sandy loam.  $P_{sl} = 0.35 \text{ kg/cm}^2$  (S.Nyamdorj, A.Anand [137])
- City of Darkhan. Site of full-scale testing of FVK. Sandy loam.  $P_{sl} = 1.35 \text{ kg/cm}^2$  (Yu.A.Bagdasarov, S.Nyamdorj [140])

#### B. Initial subsidence moisture.

On fig. 2.2÷2.4 shows the dependence curves of relative subsidence on humidity and pressure  $\varepsilon_{sl} = f(W_i, P_i)$  of the site for field testing of driven piles in Darkhan (Fig. 2.2).

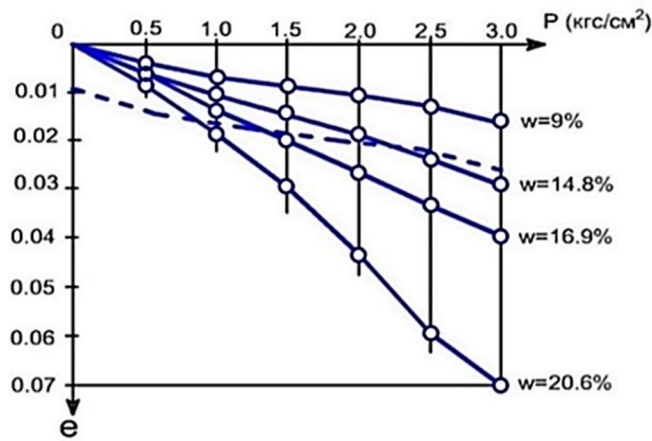


Figure 2. Dependence curves  $\varepsilon_{sl} = f(W_i, P_i)$ . (S.Nyamdorj. 2003)

According to the analysis of the dependence curve  $\varepsilon_{sl} = f(W_i, P_i)$  with subsiding soil moisture up to  $W=9.0\%$  or depending on the moisture level ( $S_r \leq 0.5$ ) and at pressure  $P_i \leq 3, 0$  kg/cm<sup>2</sup> no subsidence detected. At pressure  $P=1.5$  kg/cm<sup>2</sup> and humidity  $W=20.8\%$  or  $W_{sat}$ , subsidence ( $\varepsilon_{sl} \geq 0.01$ ) starts. At pressure  $P=2.0$  kg/cm<sup>2</sup> and moisture content  $W=14.0\%$ , and at pressure  $P=2.5$  kg/cm<sup>2</sup> and moisture content  $W=11.2\%$ , subsidence starts accordingly (Fig. 3).

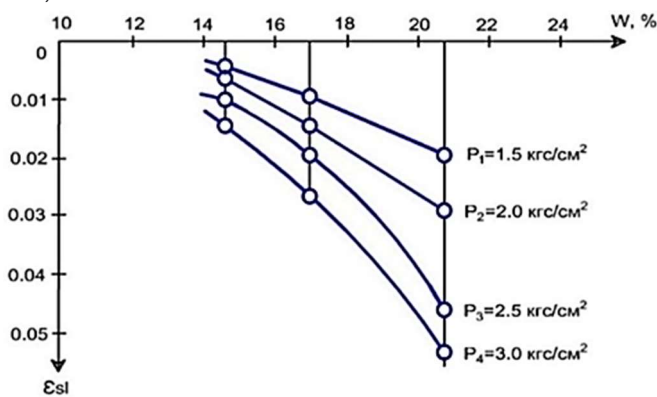


Figure 3. Comparison of the dependence curves  $\varepsilon_{sl} = f(P_1, P_2, P_3, P_4)$  at constant humidity (S.Nyamdorj. 2003)

According to the analysis of dependence curves  $\varepsilon_{sl} = f(P_i)$  with natural soil moisture  $W=\text{const}$  and pressure  $P_1=1.5$  kg/cm<sup>2</sup>, no subsidence was detected if pressure  $P_2=2.0$  kg/cm<sup>2</sup>,  $P_3=2.5$  kg/cm<sup>2</sup> and  $P_4=3.0$  kg/cm<sup>2</sup>, relative subsidence index is within  $\varepsilon_{sl}=0.021 \div 0.54$ . For example: at a pressure of  $P_4=3.0$  kg/cm<sup>2</sup>, the value  $\varepsilon_{sl}=0.54$ , which calls for when the soil moisture level changes from a wet to a water-saturated state, there is a possibility of uneven subsidence of the base, significantly exceeding the allowable value (Fig. 4).

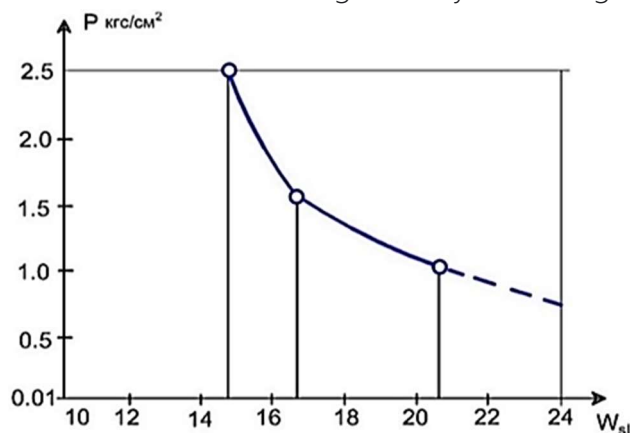


Figure 4. Dependence curve  $W_{sl} = f(P_i)$  for subsiding sandy loamy soil of Darkhan (S.Nyamdorj. 2003)



According to the analysis of the dependence curves of the initial subsidence moisture and pressure  $W_{sl} = f(P_i)$ , the following was established: at pressure  $P_1 = 1.0 \text{ kg/cm}^2$ , soil moisture  $W \geq 20.8\%$  or when water is saturated, soil subsidence is not formed. And at pressure  $P_2 = 1.5 \text{ kg/cm}^2$  initial subsidence moisture  $W_{sl} = 16.3\%$ ; at pressure  $P_3 = 2.0 \text{ kg/cm}^2$  initial subsidence moisture  $W_{sl} = 15.5\%$ ; at pressure  $P_4 = 2.5 \text{ kg/cm}^2$ , the initial subsidence moisture  $W_{sl} = 14.7\%$ , the latter show that loess-like subsidence soils common in the territory of Mongolia do not subside at pressure from their own soil and water saturation, and at additional pressures from  $1.5\text{--}2.5 \text{ kg/cm}^2$  and moisture content of  $16.3\text{--}14.7\%$  begin to show subsidence.

### III. RESULTS AND DISCUSSION

Based on these provisions, based on the results of the above-mentioned theoretical and experimental studies, construction experience and lessons learned on the causes of subsidence and deformation of buildings built on subsidence soils, the main solutions that meet the regional characteristics of Mongolia are:

1. Due to the fact that the territory of Mongolia is located at the height of the Central Asian Plateau, the thickness of the vegetation layer and snow cover in winter is relatively small, the average annual temperature of the territory is about  $0^\circ\text{C}$ , and the average number of days with a negative temperature is about 200. According to the BNbD norm (SNiP) "Climatology of the Territory of Mongolia" the depth of seasonal soil freezing is  $3.5\div 5.0 \text{ m}$ , in rare cases permafrost is found under it.

2. As a result of the sublimation process of permafrost (the last Altai-Tunguska ice age, which covered most of the Euro-Asian region 15-18 thousand years ago) of seasonal deep frozen soils, occurring for many years in deep frozen subsiding soils, the structure is decompressed, as a result of the latter, porosity  $n = (50\div 65)\%$ , porosity coefficient  $e = (0.70\div 0.84)$ , density of dry soil  $\rho_d = (1.35\div 1.60) \text{ t/m}^3$  or undercompacted, moisture content of sandy loam  $W = (0.04\div 0.06)$  and loam  $W = (0.05\div 0.08)$ , as a result repeated freezing and thawing occurs cracking and grinding of the solid part of the soil, based on this, the content of dusty parts is  $50\text{--}60\%$ .

3. Settling clayey soils of Mongolia in natural conditions have a relatively high content of water-soluble and slightly soluble carbonate and other salt compounds and, due to their cemented and crystallized structural bonds, have relatively high mechanical properties, but mechanical properties due to the weakening of structural bonds during soaking are sharply reduced to the value  $c = 7.0\div 10.2 \text{ kPa}$ ,  $\varphi = 16 \div 20^\circ$ ,  $E = 3.5\div 4.5 \text{ MPa}$  and subsidence begins depending on the type of soil at pressure  $P = 1.5 \text{ kg/cm}^2$  and  $W = (6.7 \div 8.6)\%$  or  $W_{sat}$  while the relative subsidence index is  $\varepsilon_{sl} > 0.01$ . At pressure  $P = 2.0 \text{ kg/cm}^2$  and  $W = (6.1\div 7.6)\%$ , subsidence begins, and at pressure  $P = 2.5 \text{ kg/cm}^2$  and  $W = (5.2\div 6.9)\%$  the slump begins. These moisture values are calculated respectively at given pressures as the initial subsidence moisture  $W_{sl}$ .

4. Loess-like clayey soils, common in some regions of Mongolia, do not belong to the category of subsiding soils according to the soil classification standards of other countries,

including Russia, but at different pressures and increasing humidity, a solid subsidence is observed, so there is a need for classification by indirect signs.

#### **Optimal foundations and artificial bases.**

Taking into account the established regional features, a theoretical and methodological justification for the innovative use of scientific methods has been developed, taking into account the soaking of the subsidence base of buildings. The issues of construction and operation of buildings, structures built on loess-like subsidence deposits and in areas with high seismic activity (7, 8 and 9 points) of Mongolia are poorly studied from a scientific point of view (S. Nyamdorj [14]). On the basis of the studies carried out, rational types of foundations and artificial foundations of building structures were established, taking into account the regional features of the territory of Mongolia:

From the types of foundation:

- driven and bored pile foundations;

Of the types of artificially improved bases:

- foundations in tamped pits;
- compaction of subsidence soil with a heavy rammer;
- soil foundation pads with geosynthetic reinforcement;
- grouting and silicification to increase the density of the base of new and exploited

deformed buildings, including historical buildings and structures.

An obligatory requirement for the application of these solutions is the optimal development of complex and partial structural measures to increase the compliance of structures, drainage and water protection measures, depending on the regional and territorial features of a given site in order to reduce sensitivity to uneven settlement and increase the operational suitability of buildings and structures.

#### **IV. CONCLUSION**

Taking into account the established regional features, a theoretical and methodological justification for the innovative use of scientific methods, such as a pile foundation, a foundation in a rammed pit, and artificial improvement of the subsiding soil of the base, including compaction with a heavy rammer, a soil cushion with geosynthetic reinforcement, and chemical fixation by cementation methods, has been developed and silicification, taking into account the soaking of the subsidence base of buildings and structures.

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## Medical Sciences

### Способы борьбы с профессиональным выгоранием медицинских работников

Боданова Сымбаттым Қайратқызы

Врач общей практики, Городская поликлиника №4 город Кызылорда, Казахстан

Медицина - это целенаправленное воздействие на сохранение жизнедеятельности человечества. В современном обществе, где научный прогресс приобрел чрезвычайное развитие, общество потеряло гораздо больше, чем получило. Существенное облегчение жизни человека заставило его несколько деградировать в плане выработки иммунитета и его относительной устойчивости. Ограничивая себя в физических нагрузках, человечество стало значительно слабее, по сравнению с прошлым поколением. Тысячу лет назад, человечество страдало от страшных инфекционных заболеваний только потому, что медицина была недостаточно развита и сами люди не имели представление об элементарных методах предотвращения болезни. Здоровье - это универсальная ценность человека, столь же важна, как счастье и благополучие. Здоровье имеет особое значение в жизни каждого человека, это ключевой аспект национальной безопасности, оно определяет возможности достижения индивидуального и общественного благосостояния и благополучия, перспективы устойчивого развития. В современных условиях значение здоровья существенно переосмысливается с учетом понимания его как неотъемлемого права человека, с точки зрения существующих угроз и вызовов, растущих требований к качеству здоровья, технологических и финансовых возможностей его обеспечения. Здоровье людей является приоритетом любой страны. Каждая страна стремится к построению лучшей и наиболее справедливой системы здравоохранения, которая позволяет максимально охватить население доступными медицинскими услугами высокого качества. Каждое общество стремится законодательно на уровне государства определить важность здоровья нации. В нашей стране это закреплено на уровне Конституции. Соответственно и профессия медицинского работника в современных условиях приобретает особенное значение. Медицинские кадры сейчас рассматриваются как стратегический капитал, и 70% всех капиталовложений в отрасль здравоохранения в мире направлены именно на кадровое обеспечение. Предъявляются высокие внутренние требования к представителям медицины (личностные и профессиональные качества, высокий уровень образования, его разносторонность, непрерывность и т.д.). Многие медицинские работники (как представители помогающих профессий) подвержены

высокому риску эмоционального выгорания, в зарубежной литературе обозначаемым термином «burnout», что переводится как «сгорание», «выгорание».

Под профессиональным выгоранием понимается процесс развития хронического профессионального стресса умеренной интенсивности, вызывающий негативные изменения личности профессионала. Проявления профессионального выгорания (истощения) у специалистов социальных, или «субъект – субъектных» отношений (врачей, медицинских сестер, учителей, воспитателей, работников социальных служб, судей, адвокатов, продавцов и др.) известны давно. Не случайно девизом врачей средневековья было выражение «Сгорая сам – свечу другим».

Имеется ряд психологических факторов, влияющих на здоровье медицинских работников:

- Ответственность за жизнь и здоровье пациентов;
- Длительное нахождение в «поле» отрицательных эмоций, которые по механизму «эмоционального заражения» (эмпатии) передаются на медицинского работника;
- Неравномерный режим работы с ночными и суточными дежурствами;
- Трудности сочетать работу и личную жизнь, что вызывает чувство неудовлетворенности и хронический фрустрационный дистресс.

Причины эмоционального выгорания можно разделить на две группы:

- Объективные причины, связанные с особенностями выполняемой деятельности (например, распорядком дня, объемами работы, количеством выходных дней).
- Субъективные причины, связанные с отношением работника к собственной деятельности (например, отношения врача и его пациента, отношение к неудачам, взаимоотношения с коллегами).

В целом можно выделить следующие причины профессионального выгорания медицинских работников:

- Психологическая неготовность к оказанию экстренной помощи.
- Огромная физическая и психологическая нагрузка.
- Неизлечимые болезни и смерть пациентов.
- Давление пациентов и их родственников.
- Отсутствие необходимых знаний.
- Личное отношение к смерти.
- Невысокая заработная плата.
- Неудовлетворительные условия труда.
- Неоднозначные требования к работе.
- Риск выговоров и штрафов.
- Отсутствие отпуска и полноценных выходных.
- Физические перегрузки.
- Социальная незащищенность.

Существует трехкомпонентная модель синдрома эмоционального выгорания:

1. Истощенность: изнурение, недостаток сил, подавленность, астения и усталость.
2. Цинизм (деперсонализация): негативное или ненадлежащее отношения к пациентам, раздражительность, утрата перфекционизма и «замыкание в себе». В качестве неадаптивных копингов привлекались употребление ПАВ.
3. Неэффективность (редукция профессиональных достижений): снижение продуктивности или компетентности, низкий моральный дух и неспособность совладать с ситуацией.

Выгорание не является одномоментно возникающим процессом, оно развивается постепенно, динамично. Психологи Фроуденбергер и Ноуф разделили процесс выгорания на 12 этапов, и каждый из них показывает детали процесса выгорания, причем эти этапы не обязательно следуют друг за другом по порядку. Определенные этапы могут пропускаться, и в то же время жертва выгорания может одновременно находиться на нескольких этапах цикла. Продолжительность каждого этапа варьирует индивидуально у разных пациентов.

Данная модель начинает развиваться с появлением нереальных ожиданий, а затем описывает динамику процесса формирования выгорания.

#### 1. Навязчивое желание проявить себя

Этот этап часто начинается с чрезмерного стремления достичь успехов на работе в соответствии с собственными целями признания, стать лидером, сделать карьеру, получить власть, знания. Данный сотрудник стремится показать прежде всего себе и своим коллегам, что он отлично, идеально выполняет свою работу во всех отношениях, чтобы коллеги признали это.

#### 2. Работать все интенсивнее

Цель этого этапа – удовлетворить свои высокие личные ожидания и доказать свою незаменимость. Для реализации этой цели сотрудник берет на себя все больше и больше работы, однако процесс ее выполнения сопровождается принуждением себя.

#### 3. Пренебрежение своими потребностями

В распорядке дня почти все время отводится работе, а сон, еда и другие предметы первой необходимости рассматриваются как несущественные и часто отвергаются. Сотрудники говорят себе: для того чтобы достичь высоких целей, требуется чем-то жертвовать. Они преданы работе часто в ущерб семье и друзьям, становятся трудоголиками.

#### 4. Вытеснение внутренних конфликтов

Сотрудники осознают, что жизнь идет неправильно, но они не могут распознать истоки возникшей проблемы, в которой видят угрозу. На этом этапе возникают первые физические симптомы: нарушение сна, потеря аппетита, головные боли, тошнота, боли в пояснице, сексуальные проблемы.

#### 5. Ревизия собственных ценностей

Избегание конфликта, возникающая изоляция и отрицание собственных базовых потребностей изменяют восприятие человека, вставшего на путь выгорания. Такой человек старается пересмотреть свои базовые ценности, продолжает упорно трудиться и обнаруживает, что из его жизни исчезли важные ранее ценности, касающиеся семьи, друзей, любимого дела. Успехи на работе становятся единственным стандартом для оценки себя. Эмоциональное притупление развивается все сильнее.

#### 6. Отрицание возникающих проблем

Возникающие проблемы начинают отрицаться, социальные контакты с другими людьми становятся непереносимыми. Цинизм, агрессивность нарастают, пропадает сопереживание, усиливаются черствость, обвинение, порицание других. Причины нарастающих проблем видятся в нехватке времени, в возрастающем объеме работы. Выгорающие сотрудники не видят путей выхода из возникшей ситуации, чтобы изменить ее.

#### 7. Избегание, прекращение участия

Социальные контакты ограничиваются до минимума, возникает отгороженность и замкнутость. Профессиональные обязанности выполняются формально, по инструкции, теряется надежда, направленность действий. Возникает тенденция снимать эмоциональное напряжение употреблением алкоголя или наркотиков.

#### 8. Очевидные изменения поведения

Человек не способен увидеть произошедшие изменения в своем поведении. Коллегам заметно, что в результате переутомления из энергичного сотрудника он превращается в стеснительного, апатичного, боязливого, никчемного, внутренне все более ощущающего свою бесполезность.

#### 9. Обезличивание, деперсонализация

Сотрудник теряет контакт с самим собой, не видит ценности в себе и коллегах, ощущает себя машиной. Собственные потребности все менее и менее востребованы, жизнь становится механистичной.

#### 10. Внутренняя пустота

Ощущение внутренней пустоты нарастает. Эту проблему человек пытается решить путем импульсивной активности, гиперсексуальности, переедания, употребления алкоголя и наркотиков. Свободное время не используется.

#### 11. Депрессия

Возникают депрессивное настроение, равнодушие, ощущение безнадежности, истощение, жизнь теряет смысл, пропадает забота о будущем.

#### 12. Синдром выгорания



Возникает сильное желание выйти из возникшей ситуации, что может приводить к мыслям о суициде. Могут наступить физический коллапс, деморализация и потребоваться неотложная медицинская помощь.

Для того, чтобы улучшить самочувствие медицинских работников и уменьшить риск выгорания легче предотвратить профессиональное выгорание, нежели бороться с уже появившейся проблемой. Профилактику профессионального выгорания стоит начинать в момент обучения в медицинском вузе. Студентов нужно подготовить к специфике их будущей работы. Они должны быть осведомлены обо всех возможных рисках. Заканчивая учебное заведение, работник должен знать о методах профилактики профессионального выгорания. С новыми работниками необходимо проводить профилактическую беседу, где стоит описать возможные трудности, с которыми они могут столкнуться, и способы их преодоления. Важно обучить персонал правилам общения с пациентами, правильным действиям в критической ситуации, методикам, направленным на борьбу с профессиональным стрессом. Можно создать группы взаимопомощи, где медицинские работники смогут общаться и делиться своим опытом преодоления синдрома профессионального выгорания. В случае возникновения эмоционального выгорания и депрессии любой работник должен получать квалифицированную помощь психолога. Не стоит забывать о материальной стороне жизни. От того, сколько получают врачи, напрямую зависит их эмоциональное состояние. Оплата труда должна соответствовать сложности выполняемой работы. Профилактика эмоционального выгорания заключается в следующем: правильное питание и здоровый образ жизни; наличие иных интересов, которые далеки от профессиональной деятельности; наличие рядом близких людей, с которыми вы находитесь в хороших отношениях; способность к адекватной оценке собственной работы, отсутствие зависимости от чужого мнения; разработка новых подходов и методик, творческий подход к работе; адекватное принятие неудач; осознание, что врач – нужная профессия; стремление к достижению целей; принятие нового опыта, способность учиться на ошибках; отсутствие заикливания только на вещах, связанных с профессией; повышение собственной квалификации, общение с другими специалистами, посещение семинаров; наличие хобби; совместная работа с коллегами.

Можно выделить следующие способы борьбы с профессиональным выгоранием медицинских работников со стороны администрации:

Повышение заработной платы сотрудникам.

Пересмотр оптимальной нагрузки.

Предоставление отпусков и выходных.

Подбор компетентного и понимающего руководства.

Помощь молодым сотрудникам в адаптации к особенностям профессии.

Проведение профессиональных тренингов и семинаров.

Профессиональное мотивирование работников.

Меры предотвращения профессионального выгорания медработников:

Первая - обязательное обеспечение базовых потребностей медицинских работников: обеспечение СИЗами, своевременным питанием, транспортом; забота о детях.

Вторая - обеспечение комплексной психологической поддержки сотрудников: взаимная поддержка коллег, постоянная «горячая линия» с психологами, наличие плана действия руководства при смерти сотрудника или его родственника, а также четких инструкций по диагностике и действиям в случае крайней степени «выгорания».

Третья - меры по активной, постоянной и позитивной коммуникации руководства с работниками: постоянные встречи руководства с сотрудниками и обратная связь с ними, создание благоприятной психологической обстановки в коллективе.

Таким образом, профессиональное и эмоциональное выгорание – это проблема, с которой сталкиваются практически все медицинские работники. Постоянные стрессы, неизлечимые болезни и смерть пациентов, высокая рабочая нагрузка запускают защитные механизмы в организме, под воздействием которых человек становится равнодушным и безынициативным. Постепенно происходит профессиональная деформация, при которой меняется характер и повадки человека в повседневной жизни. Мы перечислили способы профилактики профессионального выгорания медицинских работников, которые направлены на помощь в борьбе с рабочими стрессами и трудностями.

# Оценка психологического состояния взрослого населения, проживающего в нефтегазовых регионах

**Ахметова Улдай Жаксыбаевна**

магистр медицинских наук, кафедра патологической физиологии, НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова», Актобе, Казахстан

**Жексенова Ажар Николаевна**

кандидат медицинских наук, кафедра патологической физиологии, НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова», Актобе, Казахстан

**Нурсейтова Тотыгуль Хайроллакызы**

магистр медицинских наук, кафедра патологической физиологии, НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова», Актобе, Казахстан

## **Актуальность:**

Изучая проблемы загрязненности экологически неблагоприятных регионов, обычно исследуется соматическое здоровье населения. Но в последнее время актуально акцентировать внимание и на психологическое состояние населения, проживающего в этих регионах.

Согласно научных исследований российских ученых (Ларионов М.В., Любимов В.Б., Т.А.Перевозчикова 2013г. и Н.М. Сараева 2015г.) у населения, проживающего в нефтегазовых регионах, могут развиваться заболевания периферической нервной системы, органов дыхания, желудочно-кишечного тракта, артериальной гипертензии и психические расстройства.

По данным ВОЗ, в настоящее время более чем у 300млн. человек в мире – 3-6% популяции – выявлены те или иные клинические значимые проявления таких расстройств. Так, в 2015 году в своем мета-анализе ученый США Е. Atlantis сделал заключение, что клинически выраженная депрессия и тревожность на 43% увеличивают риск развития хронической обструктивной болезни легких, на 60% увеличивает шанс развития сахарного диабета (СД) 2-го типа, повышает риск развития ишемической болезни сердца (ИБС) и артериальной гипертензии (АГ). В среднем в мире в 2000 г. каждый 10-й страдал депрессией в той или иной форме. По прогнозам Всемирной организации здравоохранения к 2020 г. распространённость депрессивных расстройств увеличится в 3 раза и выйдет на первое место в мире среди всех заболеваний, обогнав ишемическую

болезнь сердца. То есть страдать депрессией будет каждый 3-й. Многие исследователи полагают, что реальная цифра распространенности депрессий еще выше. Так, согласно результатам проведенного в США исследования лиц, находящихся в лечебных учреждениях с различными соматическими (телесными) заболеваниями, у 72% из них были выявлены признаки невыраженной депрессии.

По официальной статистике женщины страдают депрессией в 2 раза чаще, чем мужчины. Но здесь дело, скорее всего, в нежелании мужчин, в среде которых жалобы на психическое нездоровье — табу, обращаться за врачебной помощью. Они традиционно (но безуспешно) пытаются снять депрессивные проявления алкоголизацией, трудового голодом, компьютерными играми, экстремальными видами деятельности.

Что касается возрастных показателей, то по официальной статистике в большей степени депрессии подвержены лица среднего возраста. Но эти цифры могут быть связаны с максимальной социальной активностью этой возрастной группы, и, как следствие — с максимальной обращаемостью за медицинской помощью. В сравнении, например, с более старшей возрастной группой, не привыкшей обращаться за помощью к психиатрам или психотерапевтам и традиционно игнорирующей проблемы своего психического состояния. Или в сравнении с детско-подростковой группой, на депрессивные проявления которой зачастую не обращают внимание ни педиатры, ни родители, ни сами дети или подростки (в силу их ментальной или эмоциональной незрелости и, как следствие, неумения распознавать и дифференцировать свое эмоциональное состояние).

#### **Цель исследования:**

Оценить психологическое состояние взрослого населения, проживающего в нефтегазовом регионе.

#### **Задачи исследования:**

1. Изучить распространенность депрессии среди населения, проживающего вблизи и на удалении от нефтегазового месторождения Актюбинской области.
2. Изучить распространенность генерализованного тревожного расстройства (ГТР) среди населения, проживающего вблизи и на удалении от нефтегазового месторождения Актюбинской области.
3. Изучить состав загрязняющих веществ атмосферного воздуха регионов, находящихся на разном удалении от нефтегазового месторождения Актюбинской области.

#### **Материалы и методы исследования:**

Исследование проводилось в двух регионах Актюбинской области: исследуемый регион — населенные пункты, расположенные вблизи нефтегазового месторождения Жанажол (Шенгельшы, Сага, Кеңқияқ) и контрольный регион — п.Хобда. В результате

анкетирования нами были охвачены лица от 18-50 лет согласно выборке: Месторождение «Жаназол» Шенгельши - 26 человек; Сага - 35 человек; Кенкияк – 169 человек; всего – 230 человек и Хобда контрольная группа - 230 человек. Всего – 460 человек.

Психологическое состояние населения изучалось с помощью опросников PHQ-9 и GAD-7 для оценки психологического состояния.

Скрининг на наличие симптомов депрессии проводился с помощью опросника здоровья пациента (PHQ-9), разработанного для диагностики депрессии в первичной медицинской сети. Опросник был разработан Spitzer, Kroenke и Williams в 1999г.

Для диагностики генерализованного тревожного расстройства была использована анкета GAD-7. Анкета была разработана Spitzer в 2006 году.

Анкеты были переведены на казахский язык Семейским государственным медицинским университетом и были утверждены на заседании ВНК НТП 03.04.2017года, протокол№1.

**Дизайн исследования:** Одномоментное поперечное.

**Научная новизна:**

Впервые было изучено психологическое состояние взрослого населения (распространенность депрессии и ГТР) Актюбинской области в зависимости от региона проживания, на различном удалении от нефтегазового месторождения.

**Практическая значимость:**

Полученные результаты использованы в разработке методических рекомендаций «Методологическая оценка психологического профиля населения нефтегазоносного региона» по проведению оценки психологического состояния в рамках фрагмента «Оценка психологического состояния населения, проживающего на экологически неблагоприятных территориях, и системы медико-психологической защиты от неадекватной информации о влиянии радиационных и нерадиационных факторов рисков на состояние здоровья» Республиканской НТП «Разработка научно-методологических основ минимизации экологической нагрузки, медицинского обеспечения, социальной защиты и оздоровления населения экологически неблагоприятных территорий Республики Казахстан», номер государственной регистрации № 0117PK00026.

**Результаты исследования:**

*Распространённость уровня депрессии изучалась среди взрослого населения, проживающего вблизи и на удалении от нефтегазового месторождения в Актюбинской области.*

При рассмотрении распространения каждого уровня в зависимости от места проживания можно отметить следующее: I уровень тревожности (0-4 балла) выявлены у 100 % (230 из 230) жителей контрольной группы (далее КГ), тогда как у жителей, проживающих вблизи нефтегазового месторождения (далее НГ) отмечается у 86% (198 из 230). Данный показатель характеризует отсутствие депрессии (Таблица №1).

Таблица №1

| Группа              | Абс.количество, распространенность(%) |                      |
|---------------------|---------------------------------------|----------------------|
| Нефтегазовый регион | 198 человек (86%)<br>из них:          | Сага: 27 (13,6%)     |
|                     |                                       | Шенгелши: 21 (10,6%) |
|                     |                                       | Кенкияк: 150 (75%)   |
| Контрольный регион  | 230 человек (100%)                    |                      |

Признаки легкой депрессии определяются при II уровне тревожности. Данный показатель отсутствует у КГ, в то время как у населения НГ регионов он равен 86% (28 из 230). При депрессии легкой степени основные проявления слабо выражены. В клинической картине могут проявляться лишь отдельные черты (моносимптомы) – утомляемость, нежелание что-либо делать, нарушение сна, ухудшение аппетита (Таблица №2).

Таблица №2

| Группа              | Абс.количество, распространенность(%) |                     |
|---------------------|---------------------------------------|---------------------|
| Нефтегазовый регион | 28 человек (86%)<br>из них:           | Сага: 8 (28,5%)     |
|                     |                                       | Шенгелши: 5 (18%)   |
|                     |                                       | Кенкияк: 15 (53,5%) |
| Контрольный регион  | Не выявлено                           |                     |

Депрессия средней степени отражается при III уровне, в КГ отмечается полное отсутствие этого уровня, а у жителей НГ районов III уровень составляет 0,9 % (2 из 230). При этой степени депрессии основные проявления депрессии выражены умеренно;

также отмечается снижение социального и профессионального функционирования (Таблица №3).

Таблица №3

| Группа              | Абс.количество, распространенность(%) |                       |
|---------------------|---------------------------------------|-----------------------|
| Нефтегазовый регион | 2 человек (0,9%)<br>из них:           | Сага: не выявлено     |
|                     |                                       | Шенгелши: не выявлено |
|                     |                                       | Кенкияк: 2 (100%)     |
| Контрольный регион  | Не выявлено                           |                       |

Тяжелая депрессия соответствует IV степени тревожности, у КГ отсутствует, тогда как у жителей НГ районов отмечается у 0,9 % (Таблица №4).

Таблица №4

| Группа              | Абс.количество, распространенность(%) |                       |
|---------------------|---------------------------------------|-----------------------|
| Нефтегазовый регион | 2 человек (0,9%)<br>из них:           | Сага: не выявлено     |
|                     |                                       | Шенгелши: не выявлено |
|                     |                                       | Кенкияк: 2 (100%)     |
| Контрольный регион  | Не выявлено                           |                       |

*Распространенность ГТР взрослого населения, проживающих вблизи и в удаленном регионе от нефтегазового месторождения в Актюбинской области.* Результаты нашего исследования по распространенности ГТР, дали нам следующие показатели: I уровень тревожности, которая означает легкую тревогу по ГТР у жителей НГ регионов составляет 83%, тогда как у жителей КГ она составляет 77.4 % (Таблица №5).

Таблица №5

| Группа              | Абс.количество, распространенность(%) |                      |
|---------------------|---------------------------------------|----------------------|
| Нефтегазовый регион | 191 человек (83%)<br>из них:          | Сага: 23 (12%)       |
|                     |                                       | Шенгелши: 22 (11,5%) |
|                     |                                       | Кенкияк: 146 (76%)   |
| Контрольный регион  | 178 человек (77,4 %)                  |                      |



II уровень тревожности обозначает умеренную тревогу по ГТР встречается у 13 % жителей НГ регионов, так же эта уровень тревожности встречается и у жителей КГ и составляет 22,6 % (Таблица №6).

Таблица №6

| Группа              | Абс.количество, распространенность(%) |                   |
|---------------------|---------------------------------------|-------------------|
| Нефтегазовый регион | 30 человек (13%)<br>из них:           | Сага: 9 (30%)     |
|                     |                                       | Шенгелши: 4 (13%) |
|                     |                                       | Кенкияк: 17 (57%) |
| Контрольный регион  | 52 человек (22,6%)                    |                   |

III уровень тревожности ГТР обозначает присутствие тревоги средней степени, у жителей НГ районов этот показатель составляет 0,9% и отсутствует у жителей КГ (Таблица №7).

Таблица №7

| Группа              | Абс.количество, распространенность(%) |                       |
|---------------------|---------------------------------------|-----------------------|
| Нефтегазовый регион | 2 человек (0,9%)<br>из них:           | Сага: 1 (50%)         |
|                     |                                       | Шенгелши: не выявлено |
|                     |                                       | Кенкияк: 1 (50%)      |
| Контрольный регион  | Не выявлено                           |                       |

IV уровень тревожности по ГТР выражает тяжелую тревогу, и она составляет 3% у жителей НГ регионов, и также отсутствует у жителей КГ (Таблица №8).

Таблица №8

| Группа              | Абс.количество, распространенность(%) |                       |
|---------------------|---------------------------------------|-----------------------|
| Нефтегазовый регион | 7 человек (3%)<br>из них:             | Сага: 2 (29%)         |
|                     |                                       | Шенгелши: не выявлено |
|                     |                                       | Кенкияк: 5 (71%)      |
| Контрольный регион  | Не выявлено                           |                       |

*Состояние атмосферного воздуха населенных пунктов, расположенных вблизи и на удалении от нефтегазового месторождения в Актюбинской области изучалось по уровню содержания в воздухе следующих загрязняющих веществ: диоксид азота, сернистый ангидрид (диоксид серы), фенол, оксид углерода, углеводороды, взвешенные вещества (пыль).*

По результатам исследования можно отметить, что в отобранных пробах атмосферного воздуха в п.Кенкияк выявлено присутствие диоксида азота в концентрации 0,25 ПДК и присутствие углеводорода (по Гексану) 35мг/м<sup>3</sup> при ПДК 60 мг/м<sup>3</sup>, т.е. 0,6 ПДК, что показывает составляет большей половине допустимого уровня. Остальные вредные вещества не выявлены.

В атмосферном воздухе с.Сага отмечалось присутствие диоксида азота в концентрации 0,5 ПДК, оксид углерода в концентрации 0,06 ПДК, углеводорода (по Гексану) 40мг/м<sup>3</sup>, что составляет 0,7 ПДК, что также показывает большую половину допустимого уровня и взвешенных веществ т.е. пыли в концентрации 0,03 ПДК. Все показания не превышают ПДК.

В атмосферном воздухе с.Шенгельши выявлено присутствие диоксида азота в концентрации 0,25 ПДК, оксид углерода в концентрации 0,06 ПДК, углеводород (по Гексану) – 42мг/м<sup>3</sup>, что также составляет большую половину допустимого т.е. 0,7 ПДК, и взвешенных веществ в концентрации 0,03 ПДК.

Из отобранных вредных веществ в атмосферном воздухе п.Хобда определялось незначительное присутствие диоксида азота в концентрации 0,25 ПДК. Остальные вредные вещества не выявлены.

#### **Выводы:**

1. Признаки депрессии в регионе, расположенном вблизи от нефтегазового месторождения Жанажол встречаются в 14% случаев, тогда как в Кобдинском районе (контрольный регион) признаков депрессии не отмечалось.
2. Распространённость тревоги средней тяжести и тяжелой тревоги ГТР (уровень преддепрессии) отсутствуют в контрольном регионе и составляют в нефтегазовом регионе 3,9%.
3. В связи с тем, что в атмосферном воздухе контрольного региона загрязняющие вещества не выявлены, а в населенных пунктах, расположенных в нефтегазовом регионе загрязняющие вещества, такие как диоксид азота, оксид углерода, углеводород (по Гексану) присутствуют в атмосферном воздухе в количествах, не превышающих предельно-допустимых концентраций, можно предположить, что на психологическое состояние населения оказывает влияние не проживание вблизи нефтегазовых месторождений, а другие факторы, нуждающиеся в изучении.

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# ОСНОВНЫЕ ДЕЗИНФЕКЦИОННЫЕ МЕРОПРИЯТИЯ ДЛЯ ОБЕСПЕЧЕНИЯ БИОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ В РЕСПУБЛИКЕ КАЗАХСТАН

**Круглова Оксана Викторовна**

Врач-эпидемиолог ГКП на ПХВ «Областная многопрофильная больница» УЗ акимата Западно-Казахстанской области

**Шагалбаев Булатбек Кендебаевич**

Заместитель руководителя ГУ «Департамент Комитета санитарно-эпидемиологического контроля Актюбинской области КСЭК МЗ РК»

**Молдаязова Ляззат Тыныштыковна**

Доцент кафедры «Общая гигиена» НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова»

**Артыкбаева Айслу Изгликовна**

Руководитель ЧМУ «Здоровое поколение»

## Аннотация

В статье акцентируется важность дезинфекционных мероприятий в системе биологической безопасности государства, актуальность которых возросла в условиях пандемии коронавирусной инфекции. Описываются основные разделы работы по проведению предрегистрационных испытаний дезинфицирующих средств, количество которых существенно увеличилось.

**Ключевые слова:** биологическая безопасность, дезинфекция, антисептики, дезинсекция.

**Введение.** С 1973 по 1999 год впервые выявленные патогенные микроорганизмы и инфекционные заболевания насчитывают 36 наименований, из которых 20 патогенов относятся к вирусам [1, 2]. К особо опасным инфекциям вирусной этиологии относятся лихорадки Эбола и Зика. Основным симптомом, характерным для коронавирусной инфекции, считался ринит, при этом возбудитель коронавирусного ринита не относился к высокопатогенным микробам. В ноябре 2002 года в Китае в провинции Гуандун были зарегистрированы первые случаи заболевания коронавирусной этиологии, получившее название «атипичная пневмония» или «тяжелый острый респираторный синдром» — ТОРС (или SARS), возбудитель которого был обозначен как SARS-CoV-1. В те годы (2002–2003 гг.) эпидемия распространилась на 32 страны разных континентов – Азии, Америки,

Австралии, Европы, Африки, но основное количество заболевших зарегистрировано в Китае, Сингапуре, Канаде. Затем, во второй половине 2012 г., вначале в Саудовской Аравии, а позднее во многих других странах распространилась еще одна коронавирусная инфекция — ближневосточный респираторный синдром (MERS-CoV). Единичные случаи заболевания Ближневосточным респираторным синдромом (БВРС – CoV) регистрируются до последнего времени [3]. У всех пациентов прослеживается связь с Ближним Востоком. Начало заболевания COVID-19 зарегистрировано 01.12.19 г. в г. Ухань КНР [4]. Всемирная организация здравоохранения 12 марта 2020 г. объявила о начале пандемии COVID-19 [5]. Таким образом, за последние 20 лет коронавирусы стали возбудителями 3-ех новых опасных инфекций. За анализируемый период COVID-19 распространился в 189 странах мира, из доступных источников известно о 80765784 случаях [6]. В Казахстане зарегистрировано 152 460 случаев COVID-19 с положительной ПЦР и 45 442 случая пневмонии с признаками коронавирусной инфекции, но отрицательной ПЦР [7].

В начале развития новых коронавирусных инфекций в связи с отсутствием сведений об источниках инфекций, путях и факторах их передачи медицинские работники не располагали информацией о средствах и методах защиты от возбудителей этих болезней и нередко становились первыми людьми, заразившимися от больных пациентов [8]. Не зная характеристик и свойств вирусов, трудно было решить вопрос о выборе эффективных дезинфицирующих средств (ДС). Во всех случаях в числе первых мер профилактики и борьбы с этими заболеваниями было применение ДС — кожных антисептиков, средств обеззараживания поверхностей, различных изделий, оборудования, воздуха и т.д. При этом на первых этапах проведения профилактических мероприятий использовали ДС, обладающие выраженным вирулицидным эффектом в отношении наиболее устойчивых вирусов, включая хлор-, кислород-, альдегидсодержащие средства, кожные антисептики на основе спиртов. Учитывая неизбежное появление новых инфекций, в том числе вирусной этиологии, ДС были и остаются препаратами «первого эшелона», обеспечивающими немедленную и эффективную противоэпидемическую защиту населения. При этом целесообразно использовать ранее изученные средства на основе известных действующих веществ в эффективных режимах применения.

Специалисты Всемирной организации здравоохранения (ВОЗ) сообщают: в передаче вируса, как в медицинских учреждениях, так и в других условиях, могут быть задействованы загрязненные поверхности мебели, столов, стульев, стен, выключателей света, компьютеров, электронного оборудования, раковин, туалетов, лестничных перил, полов, а также поверхности медицинского оборудования, к примеру, манжет для измерения кровяного давления, стетоскопов, инвалидных колясок, инкубаторов. И с большей вероятностью они будут загрязнены вирусом в медицинских учреждениях, где ухаживают за пациентами с COVID-19, поэтому должны быть хорошо очищены и

продезинфицированы, чтобы предотвратить дальнейшую передачу инфекции. То же касается и альтернативных учреждений для изоляции лиц с не осложненной и легкой формой COVID-19, включая домохозяйства и перепрофилированные учреждения. На объектах, где невозможна регулярная очистка и дезинфекция, основными методами профилактики должны быть частое мытье рук и избегание прикосновения к лицу.

Одно из исследований на способность к выживанию SARS-CoV-2 на разных поверхностях обнаружило, что вирус остается жизнеспособным до 1 дня на ткани и дереве, до 2 дней – на стекле, 4 дня – на нержавеющей стали и пластике и до 7 дней – на внешнем слое медицинской маски. Другое исследование показало, что вирус выживал в течение 4 часов на меди, 24 часа – на картоне и до 72 часов – на пластике и нержавеющей стали. Вообще, SARS-CoV-2 выживает в широком диапазоне температур окружающей среды и значений pH (мера кислотности водных растворов), но является довольно восприимчивым к нагреванию и стандартным методам дезинфекции [9].

**Материалы и методы.** Для проведения дезинфекции применяются средства, зарегистрированные и разрешенные в установленном порядке к применению на территории Республики Казахстан и Евразийского экономического союза, в соответствии с инструкцией по применению дезинфицирующих средств. К настоящему времени дезинфекционные мероприятия в Казахстане осуществляются согласно Приказу Министра Здравоохранения Республики Казахстан от 28 августа 2018 года №ҚР ДСМ-8 «Санитарно-эпидемиологические требования к организации и проведению дезинфекции, дезинсекции и дератизации» [10]. Все зарегистрированные и разрешенные к применению дезинфекционные средства внесены в Единый реестр свидетельств о государственной регистрации стран Евразийского экономического союза и должны иметь «Свидетельство о государственной регистрации»; «Методические указания или инструкции по применению дезинфицирующих средств, утвержденные производителями.

**Результаты и обсуждение.** В системе обеспечения биологической безопасности в условиях пандемии коронавирусной инфекции дезинфекционные мероприятия приобрели особую актуальность. Потребовалось увеличение арсенала ДС, оперативная экспертиза большого количества препаратов на пригодность к борьбе с новым вирусом. SARS-CoV-2 является вирусом с хрупкой липидной оболочкой, восприимчив к средствам обеззараживания, и поэтому в борьбе с этим высокопатогенным возбудителем дезинфекция эффективна и является важной составной частью противоэпидемических мероприятий.

Дезинфицирующие средства подразделяются на несколько групп: перекисные соединения, соединения, содержащие хлор, бромистые и йодистые соединения, спирты, альдегиды, кислоты и их соли, ПАВ (поверхностно-активные вещества), крезолы, фенолы.

Дезинфицирующие растворы могут иметь вид концентратов, готовых растворов, аэрозолей, дезинфицирующих салфеток.



К персональным средствам защиты относятся антисептик для рук – это специальное средство, обладающее противомикробным и противовирусным действием, посредством которого можно в любой момент очистить кожу, тем самым предотвратив заражение различными заболеваниями. Как правило, качественный бытовой антисептик позволяет защитить человека от патогенных микроорганизмов на 5-6 часов после обработки рук. Современные производители средств личной гигиены разработали широкий спектр продуктов, которые имеют свою особенность и специфику применения. Например, для лиц, которые постоянно сталкиваются со счетом денег, есть особые антисептические препараты, которые направлены на уничтожение бактерий, наиболее часто присутствующих на купюрах. Антисептические средства давно нашли себе применение в медицине, но для бытового использования препараты стали выпускаться совершенно недавно. С момента массового распространения антисептиков среди населения, значительно сократились случаи острых инфекционных заболеваний. Это подтверждает высокую актуальность препаратов данной группы и необходимость применения их в бытовых целях. В условиях пандемии COVID-19 кожные антисептики, в соответствии с документом Всемирной организации здравоохранения «Обновленная стратегия борьбы с COVID-19», отнесены к эффективной мере подавления передачи вируса среди населения.

Состав антисептических средств для рук определяется их типом. При этом продукты одного типа могут включать в себя несколько активных компонентов, повышающих эффективность препарата для повседневного применения среди населения.

Ряд компонентов определяют тип и назначение того или иного антисептического препарата [11]: на основе спиртов; на основе органических кислот; с поверхностно активными компонентами; гуанидины; биспиридины; кислородонасыщенные; галоиды и пр.

В документах Всемирной организации здравоохранения говорится, что распыление дезинфицирующих средств в окружающее пространство в связи с эпидемией COVID-19 может привести к риску повреждения глаз, раздражению дыхательных путей или кожи и связанным с этим последствиям для здоровья. Корреспондент газеты Караван Нэля Садыкова попросила объяснить [12]: Отчего травятся люди? Из СМИ мы знаем о случаях отравлений и даже гибели людей вследствие применения некими специализированными организациями каких-то химикатов, которыми обеззараживали жилье, например, от насекомых-вредителей. Если выше мы говорили о дезинфекции (уничтожении в окружающей среде или удалении из нее возбудителей инфекционных болезней), то эти случаи относятся к двум другим видам обработки: дезинсекции (уничтожение насекомых) и дератизации (истребление грызунов – мышей, крыс и др.).

Так, к примеру, в Мангистауской области был случай отравления сразу семерых человек, где представители некоего ТОО при помощи ядохимиката ( "Квикфос" ) занимались уничтожением клопов в многоквартирном доме. Но этот препарат вовсе не предназначен для использования в жилых помещениях, а направлен на уничтожение вредителей в зернохранилищах! И после такой дезинсекции там скончались ребенок и молодая женщина. Удивительно, но работодатель присылал инструкции по использованию столь сильного яда начинающему дезинфектору без опыта работы прямо на телефон. И обработку эта организация проводила даже не инсектицидами, а пестицидами, применяющимися в сельском хозяйстве.

К сожалению, в настоящее время на территории Республики Казахстан в торговой сети, в том числе на рынках городов и населенных пунктов, в реализации без ограничения находятся средства дератизации и дезинсекции (инсектициды, акарициды, инсектоакарициды). Эта неконтролируемая доступность средств дезинсекции и дератизации и привела к летальным случаям от токсического отравления после проведения самостоятельной обработки жилых помещений от бытовых насекомых в городах: Актау – 3 случая (из них 2 – в 2018-м и 1 – в 2019 г.) и Алматы – 2 случая в 2019 г. В феврале 2020 года было зарегистрировано 11 случаев отравления токсическим веществом, в том числе 1 случай с летальным исходом в той же Мангистауской области (8 случаев, произошедших в Актау) и 3 случая, в том числе 1 – летальный, в Шымкенте при использовании дезинсекционных средств. Это свидетельствует о том, что к дезинсекции и дератизации привлекались необученные, неподготовленные специалисты, которые не знали, вещества какого класса опасности применяются в жилых помещениях и какие методы нужно использовать. Усугубляет положение отсутствие у населения специальных навыков надлежащего применения средств дезинфекции, дезинсекции и дератизации: не выдерживаются концентрация, экспозиция, не используются средства защиты, не учитываются побочные эффекты и меры по предупреждению отравления. Коронавирусная болезнь, вызванная вирусом SARS-CoV-2, – респираторная (дыхательная) инфекция. Она передается через мельчайшие капельки слюны и тесный физический контакт между людьми в закрытых условиях, таких, как домашние хозяйства, медицинские учреждения, дома престарелых, интернаты, общедоступные здания, религиозные и общественные центры, рынки, транспорт, бизнес-учреждения, другие общественные объекты. В целях предупреждения распространения COVID-19 для дезинфекции применяются средства, обладающие противовирусной эффективностью. Они различаются по своим физико-химическим свойствам, биологической (антимикробной) активности, токсичности и по сфере применения. При выборе дезинфицирующих препаратов следует обращать внимание на их безопасность для персонала, на спектр антимикробного действия, удобство способов и режимов применения, экономичность. К примеру, гипохлориты быстро инактивируются в

присутствии органических веществ, поэтому важно сначала тщательно очистить поверхности водой с мылом или моющим средством. И помнить, что высокие концентрации хлора при несоблюдении мер предосторожности могут привести либо к коррозии металла, либо к раздражениям кожи и слизистых оболочек человека, а также к побочным эффектам, связанным с запахом хлора для уязвимых лиц, таких, как пациенты, страдающие астмой. Если речь идет об антисептических средствах, которые применяются исключительно для наружной обработки рук и поверхностей, то запрещено обрабатывать веществом слизистые оболочки тела и раны. При их использовании следует избегать контакта с открытым пламенем и они не подлежат использованию после окончания срока годности. При использовании ДС следует знать правила оказания первой доврачебной помощи при отравлениях. Если антисептик попал на слизистую глаз, то их следует промыть чистой водой и закапать 1-2 капли 30 % раствора сульфацила натрия. Если ребенку или взрослому средство случайно попало внутрь, то необходимо принять адсорбенты: активированный уголь (10-12 измельченных таблеток) или жженую магнезию (1-2 ст. л. на 1 стакан воды). Рвоту вызывать не нужно, при ухудшении самочувствия следует обратиться к врачу. Согласно "Санитарно-эпидемиологическим требованиям к организации и проведению дезинфекции, дезинсекции и дератизации" , утвержденным приказом министра здравоохранения Республики Казахстан от 28 августа 2018 года № ҚР ДСМ-8, к работе с дезинфицирующими средствами допускаются совершеннолетние лица, не имеющие противопоказаний по состоянию здоровья. Специалисты, привлекаемые к работе с дезинфицирующими средствами (дезинструктор, дезинфектор), должны пройти профессиональную подготовку и инструктаж по вопросам безопасного осуществления работ, оказания первой доврачебной помощи при отравлении дезинфицирующими средствами. Такая подготовка осуществляется в филиале «Научно–практический центр санитарно-эпидемиологической экспертизы и мониторинга» РГП на ПХВ «НЦОЗ» в г. Алматы, в областных филиалах Национального центра экспертизы. В средствах массовой информации необходимо предупреждать население о существующем риске в случае приобретения на рынках сомнительных дезинфекционных средства без документов, подтверждающих их безопасность. С начала 2020 г. в НПЦСЭМ прошли предрегистрационные испытания более 150 средств дезинфекции. Исследования были проведены в связи с предстоящей государственной регистрацией средства на территории Таможенного союза. При экспертизе ДС определялась дезинфицирующая активность средств в стандартных испытаниях на бактерицидное, фунгицидное, туберкулоцидное, вирулицидное действие для оценки его соответствия заявленным свойствам. Наряду с этим были получены экспериментальные данные о токсичности и безопасности, проводились химико-аналитические исследования для подтверждения соответствия ДС требуемым физико-химическим показателям («Единые санитарноэпидемиологические и гигиенические требования к товарам, подлежащим

санитарноэпидемиологическому надзору (контролю)» Глава II. Раздел 20. Требования к дезинфицирующим средствам утвержденных Решением КТС от 28.05.10г. №299) [13].

На экспертизу представлялись следующие документы:

1. Методические указания или инструкции по применению.
2. Документы в соответствии с которыми изготавливается продукция рецептура, стандарт организации (или международный стандарт), технологическая инструкция.
3. Письменное уведомление изготовителя (производителя) о том, что изготовленная им продукция отвечает требованиям документов, в соответствии с которыми она изготавливается (письмо уведомление или паспорт безопасности).
4. Этикетки и их макеты.
5. Акт отбора образцов.
6. Образцы средства.
7. Протоколы проведенных лабораторных испытаний. В процессе экспертизы проводится определение внешнего вида и запаха. Внешний вид определяется визуально.

Для этого в пробирку из бесцветного стекла с внутренним диаметром 30-32 мм наливают средство до половины и для определения внешнего вида просматривают в проходящем или отраженном свете. Запах определяют органолептическим методом. Испытуемое средство проверяется на бактерицидную активность в отношении грамположительных и грамотрицательных микроорганизмов: *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans*. Характеристика токсичности включает в себя определение средней смертельной дозы (LD50).

В программе токсикологических исследований предусмотрены:

1. Определение класса опасности средства по ГОСТ 12.1.007-76 при внутрижелудочном введении.
2. Определение токсичности средства в насыщающих концентрациях.
3. Определение кожно-раздражающего действия на кожу.
4. Определение раздражающего действия на слизистые оболочки глаз.
5. Изучение кожно-резорбтивного действия.
6. Изучение сенсibiliзирующего действия.

Вирулицидная активность определяется суспензионным методом. В качестве тествируса используется полиовирус 1 типа. В качестве нейтрализатора используется инактивированная сыворотка крупного рогатого скота. Суспензионный тест проводят в вариантах: с белковой нагрузкой и без нее. Определение туберкулоцидной эффективности в количественном суспензионном методе ведется с использованием бактерий.

#### **Выводы:**

Унификация методов исследований и критериев оценки эффективности дезинфекционных средств необходима для обеспечения единства требований и

сравнимости результатов испытаний дезинфекционных средств различного состава при проведении дезинфектологической экспертизы с целью государственной регистрации на территории Таможенного союза, проводимой в разных странах Таможенного союза, а также обеспечения стандартизации условий применения эквивалентных дезинфекционных средств (аналогичного состава).

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# АКТУАЛЬНЫЕ ПРОБЛЕМЫ ВНЕДРЕНИЯ ДОКАЗАТЕЛЬНОЙ МЕДИЦИНЫ И ИХ УРОВЕНЬ ПРИМЕНЕНИЯ

**Садыкова Гульнар Макатовна**

кандидат медицинских наук, руководитель кафедры доказательной медицины и научного менеджмента НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова»

**Молдаязова Ляззат Тыныштыковна**

кандидат медицинских наук, доцент кафедры общей гигиены НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова»

**Ракишева Венера Арыстангалиевна**

преподаватель кафедры общей гигиены НАО «Западно-Казахстанский медицинский университет имени Марата Оспанова»

## Аннотация

Одним из методов внедрения доказательной медицины в практическое здравоохранение является создание клинического протокола диагностики и лечения (далее – КП) основанные на клинических руководствах (**Clinical practice guidelines**). *Клинические руководства* (далее – КР) – это практические **рекомендации основанные на доказательной медицине**, где каждая рекомендация детально, точно и недвусмысленно прослеживает связь между научными данными, научными фактами первенствующие над мнением экспертов. Разработкой и распространением и в том числе внедрением КР занимаются крупные профессиональные организации по разным отраслям клинической практики. Они должны включать также преодоление барьеров использования достоверных научных данных клинических исследований в реальной деятельности. Прежде чем внедрять доказательность как основу принятия решений в Республике Казахстан, необходимо обратить внимание на причины, сдерживающие её распространение в мире на различных уровнях.

В этой связи целью данной работы является выявление уровней использования принципов и инструментов доказательной медицины в клинической практике в мире, а также определение основных барьеров внедрения доказательной медицины в практическую деятельность.

**Ключевые слова:** доказательная медицина, клинические рекомендации, принципы доказательности.

## Материалы и методы исследования

Для исследования были использованы базы данных Web of Science, Scopus и индексируемых публикации научного цитирования, библиотека PubMed. В качестве маркеров поиска были использованы такие ключевые слова, как «attitude toward evidence-based medicine», «clinical guideline use», «evidence-based medicine prevalence», «evidence-based medicine among physicians», включены публикации с 2006 г. (последние 15 лет измерений) по настоящее время (2021 г.). Всего было проанализировано 163 публикаций.

## Результаты и обсуждения

Повышение качества медицинской помощи является одной из приоритетных направлений реформирования системы здравоохранения большинства стран мира.

Самым эффективным инструментом признано широкое применение в клинической практике принципов доказательной медицины (Evidence-Based Medicine – медицина, основанная на доказательствах).

Доказательная медицина (далее ДМ) – это поиск, критическая оценка, сравнение, анализ и распространение наилучших доказательств из систематических исследований в медицинскую практику для использования в интересах конкретного пациента.

Оценка распространенности использования доказательной медицины в отечественных и зарубежных исследованиях изучается при помощи специально составленных опросников. Данные, получаемые в этих исследованиях, позволяют с высокой степенью достоверности судить об отношении врачей к доказательной медицине и частоте применения ее принципов в реальной клинической практике. Так, например, в исследовании, проведенном Baig M. (2016) в Саудовской Аравии при участии 117 врачей только 23,9% респондентов использовали ДМ в практике, несмотря на то, что отношение врачей к заложенным в ней принципам было позитивным [1].

В более крупном исследовании Butzlaff M. (2006) с участием 511 врачей общей практики в Германии использовался опросник из 21 вопроса (с применением шкалы Ликерта), целью которого была оценка использования ДМ в ежедневной практике, установление наиболее часто используемых источников для получения достоверной информации, а также уровня знаний о ДМ и принятия ее принципов. Из всей исследуемой популяции 55,3% врачей сообщили об использовании клинических рекомендаций в практике, при этом 33,1% участников опроса продемонстрировали решительный отказ от их применения. Кроме того, в исследовании показано, что среди врачей общей практики в Германии принятие клинических рекомендаций, утвержденных на государственном уровне, значительно ниже, чем предлагаемых медицинскими профессиональными сообществами (36,2% против 53,4% против 62,0%), при этом 73,8% врачей интерпретируют ДМ как совокупность научных исследований и индивидуальных



медицинских знаний, а 80% считают ДМ лучшей основой выбора тактики ведения пациентов [2].

Позднее подобное исследование, в рамках которого также использовался онлайн-опросник из 21 вопроса, было проведено в Германии Kalies H. (2017) и включало уже 1031 респондента, из которых почти две трети были врачами и одна треть – медсестрами. Опрос показал высокий уровень скептицизма относительно качества существующих клинических руководств (12,8-73,2%), а также сомнения в отношении практических аспектов рекомендаций (21,8-57,6%). При этом около одной трети (5,4-31,4%) считают, что рекомендации ограничивают варианты лечения [3].

Большинство (91,2%) участников другого опроса (n=386), проведенного Al Omari M. et al. в Иордании (2009), согласились с тем, что результаты исследований полезны при ежедневном лечении пациентов. Около трети респондентов (32,7%) считают, что наиболее подходящим способом перехода к ДМ является использование результатов, описанных в обзорах литературы, однако при этом около половины участников (47,9%) не знали о Кокрановской библиотеке, и только 5% использовали ее при принятии клинических решений [4].

В Канаде коллективом ученых под руководством Graham I. D. (2000) спланирован и проведен опрос, в котором более 80% респондентов (n=584) согласились с тем, что клинические руководства и рекомендации являются хорошими инструментами для обучения, удобными источниками информации, направленными на улучшение качества медицинской помощи. Более 40% утвердительно ответили на вопрос, являются ли они объективным синтезом экспертного мнения, однако 42% также считали, что они предназначены для сокращения расходов, 26% говорили, что клинические руководства – «поваренная книга по медицине», 20% считали их слишком жесткими, чтобы применять их к отдельным пациентам. Использование принципов ДМ в клинической практике отметил 41% респондентов [5].

Этой же группой ученых проведен срез с использованием аналогичного опросника в 2006 году. Результаты охарактеризовали позитивную тенденцию в отношении к ДМ (n=520): уже 85% врачей считали клинические руководства хорошим источником информации, а две трети согласились что ДМ – синтез экспертного мнения. Более половины респондентов сообщили, что за последние 5 лет их взгляд на клинические руководства, основанные на принципах ДМ, стал более положительным (для 6,3% намного более положительным (n = 32), для 47,5% более положительным (n = 242), 42,2% отметили отсутствие изменений во взглядах (n = 215), для 3,7% взгляд изменился в отрицательную сторону (n = 19) и для одного врача более отрицательную) [6].

Таким образом, в целом практикующие врачи поддерживают внедрение принципов доказательности в рутинную клиническую практику, считают клинические руководства хорошим источником информации. Тем не менее, по данным некоторых

исследований не все медицинские работники считают возможным опираться на ДМ в своей практике, в том числе из-за того, что рекомендации ограничивают возможности при назначении лечения, или вследствие трудностей при экстраполяции на отдельных пациентов. Эти результаты соответствуют выводам систематического обзора 2018 года, проведенного Barzkar F. et al. Данная группа исследователей продемонстрировала, что на фоне положительного отношения к ДМ врачи не обладают достаточными знаниями и умениями для применения принципов доказательности на практике [7].

Значительное количество исследований в области применения ДМ посвящено не только оценке частоты использования, но и выявлению барьеров, определяющих низкую приверженность врачей принципам ДМ. Результаты этих исследований обобщены в нескольких крупных систематических обзорах. Так, например, Sadeghi-Bazargani H. et al. (2014) на основании систематического обзора 106 публикаций, посвященных данной тематике, выявили 1140 различных барьеров, которые авторы объединили в 18 категорий. Самой значимой оказалась группа «исследовательских» барьеров: противоречивые результаты исследований, лежащих в основе ДМ, методологические проблемы, недостаточная обобщаемость данных, понимание или непонимание статистики, а также отсутствие привязки теории к практике [8]. На втором месте оказалась группа барьеров «изменений»: сложность трансформации привычных рабочих процедур, отсутствие мотивации к изменениям, недостаточная автономность врачей, недостаточные ресурсы для изменений [9]. Кроме того, авторы выделили пять главных барьеров для разных уровней и видов медицинской помощи: результаты продемонстрированы в табл.1 [10].

Таблица 1

Пять наиболее распространенных барьеров на разных уровнях и при разных видах медицинской помощи (Sadeghi-Bazargani H. et al., 2014)

| № | Первичная медико-санитарная помощь | Стационарная помощь         | Реабилитация                | Медицинская организация     | Организация здравоохранения |
|---|------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1 | Недостаток ресурсов                | Недостаток времени          | «Исследовательские» барьеры | «Исследовательские» барьеры |                             |
| 2 | Недостаток компетенций             | «Исследовательские» барьеры | Недостаток ресурсов         | Недостаток времени          | Недостаток времени          |
| 3 | Недостаток подготовки              | Недостаток ресурсов         | Недостаток времени          | Недостаток знаний           | «Исследовательские» барьеры |
| 4 | Недостаток времени                 | Недостаток компетенций      | Недостаточный доступ к ДМ   | Недостаток подготовки       | -                           |
| 5 | Нет приоритета ДМ                  | Отсутствие коммуникации     | Недостаток подготовки       | Нет поддержки               | -                           |

Специфические барьеры, которые препятствуют внедрению ДМ в практику врачей-ординаторов еще на этапе обучения, были выявлены в литературном обзоре Van Dijk N. et al. (2010) [11]. Такими барьерами являются: неодобрение со стороны основного персонала медицинской организации при использовании ДМ, отсутствие заинтересованности кураторов, низкий уровень мотивации к внедрению ДМ, а также языковые барьеры [12-14].

Говоря об изучении личного отношения субъектов в рамках какого-либо вопроса особо актуальным является проведение качественных исследований, которые позволяют более детально оценить мнение респондента. Одно из таких исследований проведено Alexander P.E. et al. в Канаде (2016) с участием 10 врачей [15]. Основной целью данной работы было определение возможности внедрения в реальную врачебную практику системы GRADE (Grading of Recommendations Assessment, Development and Evaluation – система классификации и оценки качества рекомендаций), позволяющей проводить оценку достоверности и качества клинических рекомендаций. В целом врачи признали необходимость и преимуществ использования метода GRADE в процессе разработки

клинических рекомендаций [16]. Они также отметили несколько барьеров на пути к соблюдению рекомендаций: отсутствие возможности для медицинских работников вносить вклад в разработку клинических рекомендаций, невозможность интерпретации слабых или условных рекомендаций по GRADE, а также недостоверность калькуляторов риска, являющихся основной для принятия некоторых клинических решений [17].

Одно из последних качественных исследований, проведенных [Minozzi S.](#) et al. в Италии в 2018 году, также было направлено на изучение отношения врачей к методу GRADE. В ходе интервьюирования респонденты показали положительное отношение к ДМ и клиническим руководствам на фоне непонимания методологии их разработки, а также принципов и инструментов критической оценки научной литературы. При этом никто из респондентов (n=10) не знал о подходе GRADE. Наиболее значимыми барьерами, о которых говорили участники исследования, стали: нехватка времени, плохое знание английского языка и статистических методов, неприменимость международных рекомендаций в местных условиях и к реальным пациентам [18].

В систематическом обзоре 2012 года, проведенном Zwolsman S. et al. и включавшем 22 публикации, основной упор был сделан на поиск барьеров использования ДМ врачами общей практики [25]. На основании полученных данных авторами сделаны выводы о том, что врачи считают необходимым наличие стимулов для использования принципов ДМ в своей работе, поскольку инфраструктура, необходимая для внедрения ДМ, требует финансовых затрат, а для практического использования ДМ требуется время, которое не возмещается [19-21].

Недавнее исследование (2018 г.) влияния различных факторов на успешность внедрения ДМ в Китае с участием 357 врачей ВИЧ-клиник продемонстрировало отрицательное влияние профессионального стресса на этот процесс, показав важность создания позитивного рабочего контекста и снижения стресса, связанного с работой в медицинских организациях [22].

Таким образом, обобщенные результаты исследований по выявлению барьеров использования ДМ врачами различных специальностей демонстрируют их разнообразие и переменную степень выраженности в разных странах.

Преодоление барьеров: как внедрить ДМ?

В кохрановском обзоре 2016 года, посвященном инструментам содействия внедрению руководств включено описание четырех работ разных научных коллективов [23]. Так, в рандомизированном исследовании Bekkering G.E. (2005) оценивалась эффективность проведения двух (2,5-часовых) образовательных тренингов о соблюдении клинических руководств. По результатам исследования в группе вмешательства по сравнению с группой контроля врачи чаще правильно оценивали необходимое количество процедур для пациентов (ОШ = 2,39; 95%ДИ 1,12-5,12), чаще правильно определяли цели лечения (ОШ = 1,99, 95%ДИ 1.06-3.72), использовали активные

вмешательства (ОШ = 2,79, 95%ДИ 1,19-6,55) и обеспечивали адекватное обучение пациентов (ОШ=3,59, 95%ДИ 1,35-9,55) [24].

В другом исследовании, которое также было включено в упомянутый обзор, оценивалась эффективность двух инструментов внедрения клинических руководств по диагностике патологий щитовидной железы во Франции. Один из этих инструментов представлял собой специально разработанную карточку-памятку с описанием критериев назначения определенных анализов, а другой – тест-алгоритм назначения диагностических процедур, в котором при ответе на определенные вопросы оценивалась необходимость назначения. Общая приверженность клиническим руководствам составила 78% в обеих группах воздействия, при этом в группе тест-алгоритма – 83%, в группе карточек-памяток – 73%, а в группе контроля 62%, при сравнении групп только использование тест-алгоритмов статистически увеличивало приверженность клиническим руководствам (ОШ=2,65, 95%ДИ 1,52-4,62) [25].

Остальные исследования, упомянутые в обзоре, использовали многогранные стратегии, которые позволили достичь значительно лучшей приверженности принципам ДМ у врачей [26,27].

Существует мнение о том, что во многом успешность внедрения новых подходов зависит от используемой образовательной модели. Научная группа из Нидерландов под руководством Zwolsman S. в 2011 провела исследование с целью выявления наиболее адекватного образовательного подхода для внедрения ДМ. Согласно полученным ими данным, нет никакой статистически значимой разницы между знаниями и навыками в области ДМ и методом преподавания ( $p=0,21$ ;  $p=0,19$ ) [28]. Подобные исследования подводят к вопросам необходимости более детального понимания механизмов внедрения ДМ, которые, по-видимому не являются напрямую результатами простого обучения врачей и приобретения ими знания о ДМ, а представляют собой комплексную компетенцию врача в данной области.

Компетентностный подход в объяснении механизмов использования ДМ в практике был использован в работе Galbraith K. et al. (2017). Указанная группа исследователей провела большую работу по созданию определения компетенции использования ДМ в практике врача. По итогам она состояла из двух компонентов: внимательность при использовании доказательств и критическая оценка ДМ и осознанность их влияния на принятие решений, а также использование знаний пациента, как наиболее полезного ресурса в применении ДМ [29]. Наличие структурированной компетенции — это важный шаг на пути внедрения ДМ, поскольку оно позволяет прорабатывать образовательные программы и применять новые образовательные технологии в данной области.

Одной из таких технологий является смешанное обучение (blended learning course), попытка доказать эффективность которого сделана в исследовании te Pas E (2015). В

общей сложности 129 врачей-преподавателей общей практики приняли участие в смешанном учебном курсе по ДМ, состоящем из четырех трехчасовых личных встреч и интенсивного подготовительного электронного курса перед каждым собранием в течение 12-месячного периода. По результатам обучения 16,7% участников полностью изменили свое отношение и поведение в рамках ДМ, 47,6% изменили отношение, а 35,7% заявили об отсутствии изменений [30].

В ряде стран были инициированы другие образовательные проекты по ДМ с последующей оценкой их эффективности. Так, например, в педиатрическом отделении в общей учебной больнице в Зволле (Нидерланды) в 2018 г. все сотрудники отделения преднамеренно были обучены принципам ДМ, а также было осуществлено структурное внедрение мероприятий по ДМ в недельный график работы отделения и разработка местных рекомендаций [31]. Подобная практика позволила изменить способ лечения педиатрических больных, уменьшить неоправданные вариации практики и ненужной диагностики. Основными выявленными барьерами оказались нехватка времени и нежелание изменять процедуры и привычки.

Одним из способов повышения эффективности использования клинических рекомендаций и принципов доказательности в реальной клинической практике и, следовательно, преодоления барьеров, выявленных в упомянутых ранее исследованиях, является вовлечение пациентов в процесс создания данных руководств [33]. В 2017 году группой исследователей из США была разработана модель создания руководств с участием пациентов, включающая десять шагов [32]:

Шаг 1 – помощь пациентов в определении темы руководства; шаг 2 – определении приоритета темы; шаг 3 – помощь в формировании команды по разработке; шаг 4 – мнение пациентов при постановке вопросов; шаг 5 – создание аналитической основы и плана исследований; шаг 6 – участие пациентов в проведении систематического обзора и формировании заключения; шаг 7 – участие пациентов в разработке рекомендаций; шаг 8 – участие пациентов в распространении и реализации рекомендаций; шаг 9 – участие пациентов в определении необходимости обновления рекомендаций; шаг 10 – оценка подхода разработчиков к взаимодействию с пациентами.

В исследовании Armstrong M.J. et al. (2018) в рамках разработки руководства по использованию амилоидной позитронно-эмиссионной томографии в диагностике деменции были сформированы две работающие параллельно группы, в одной из которых присутствовали пациенты. Группа с пациентами работала по указанной выше модели. По результатам работы, данная группа продемонстрировала более удобные и практичные клинические рекомендации со слов практикующих врачей (оценка производилась путем интервьюирования) [33].

Немаловажным фактором успешности внедрения принципов ДМ является модернизация образования в медицинских университетах. Так, в Университете

Фармацевтических наук Осаки в Японии при реализации курса по принципам доказательности с 2016 года внедрена технология смешанного обучения (flipped teaching), в рамках которой преподаватель предоставляет материал для самостоятельного изучения дома, а на очном занятии проходит практическое его закрепление. Такая модель образования достоверно позволила повысить приверженность выпускников принципам ДМ [30].

Проведенный обзор показал, что в среднем большинство практикующих врачей поддерживают внедрение принципов доказательной медицины в клиническую практику, считая клинические рекомендации и руководства хорошим источником информации. Тем не менее существуют сторонники иной точки зрения, которые не считают возможным опираться на ДМ в своей практике, в том числе из-за того, что рекомендации ограничивают возможности при назначении лечения, или вследствие трудностей при экстраполяции на отдельных пациентов.

Эти результаты соответствуют выводам систематического обзора 2018 года, проведенного Barzkar F. et al. Данная группа исследователей продемонстрировала, что на фоне положительного отношения к ДМ врачи не обладают достаточными знаниями и умениями для применения принципов доказательности на практике [7].

Результаты исследований по выявлению барьеров использования ДМ врачами различных специальностей демонстрируют их разнообразие и вариабельную степень выраженности в разных странах, однако при этом есть некоторые общие тенденции. Так, например, важным барьером в большинстве исследований оказался низкий уровень владения иностранными языками, понимания статистической информации, а также сложность в оценке качества клинических рекомендаций и руководств.

Пути преодоления барьеров, представленные в данном обзоре, также представляются неоднородными: это могут быть образовательные тренинги, создание специальных инструментов (например, карточек-памяток), разработка структурированной компетенции по владению ДМ, использование технологий смешанного обучения, разработка локальных рекомендаций, вовлечение пациентов, а также в целом модернизация образования в медицинских университетах. Важно отметить, что каждый из инструментов, представленных в исследованиях, был направлен на наиболее актуальный для исследуемой группы барьер, и поэтому ни один из них не может считаться универсальным для содействия внедрению принципов доказательной медицины.

Задачей данных организаций является изучение всей доступной литературы по определенному вопросу, ее критическая оценка с применением соответствующих современных принципов и формулирование четких рекомендаций с возможностью применения их на практике, а также удобство в использовании.



Таким образом КП является одним из инструментов внедрения клинических руководств в практическое здравоохранение.

При составлении КП выбор диагностических исследований и лекарственного препарата при лечении основывается на принципах доказательной медицины, полученных в результате большого количества клинических исследований. КП необходим для обеспечения преемственности и взаимосвязи в оказании медицинской помощи в различных медицинских организациях, выбора оптимальных методов профилактики, диагностики, лечения и реабилитации для конкретной нозологии, для защиты прав пациента и врача при разрешении спорных и конфликтных вопросов.

Применение доказанных рекомендаций практическими врачами нашей страны позволит приблизить медицинскую практику к международным стандартам оказания медицинской помощи, сделать наше здравоохранение более качественным, эффективным и рентабельным, значительно снизит риск осложнений и летальных исходов, уменьшит частоту применения неэффективных методик лечения и профилактики, малоинформативных методов диагностики, небезопасных лекарственных средств и хирургических вмешательств.

**Выводы:** Несмотря на положительное отношение врачей к доказательной медицине (до 91,2%), использование ее принципов в клинической практике остается низким во всем мире (до 55,3%).

Зарубежные исследования демонстрируют, что большинство практикующих врачей обладает недостаточными навыками для использования доказательной медицины в реальной клинической практике.

Барьеры внедрения доказательной медицине весьма разнообразны и имеют вариабельную степень выраженности в разных странах.

Наиболее распространенными барьерами являются: низкий уровень владения иностранными языками, отсутствие знаний в области биостатистики статистической информации, а также сложность в оценке качества клинических рекомендаций и руководств.

В настоящее время существует множество путей преодоления этих барьеров, успешность которых зависит от детального понимания локальных проблем.

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## Psychological Sciences

# КОМПЕТЕНЦИИ ПЕДАГОГА-ПСИХОЛОГА ПРИ ПРОВЕДЕНИИ ТРЕНИНГА

**Колюх Ольга Анатольевна**

Кандидат психологических наук, доцент высшей школы педагогики, директор центра практической психологии, НАО «Павлодарский педагогический университет»

**Колесниченко Юлия Николаевна**

Магистрант образовательной программы «Педагогика и психология» высшей школы педагогики, НАО «Павлодарский педагогический университет»

В своей практической деятельности педагогу-психологу приходится регулярно сталкиваться с необходимостью применять компетенции и квалификационные навыки, образующие вместе компетентность. По мнению психолога-эксперта в групповых методах тренинга И.В. Вачкова, для достижения основных целей в практической психологии по отношению к клиенту можно выделить четыре способа – метаметода: информирование, консультирование, интервенция и тренинг.

Поскольку с помощью тренинга возможно обучить учащегося самостоятельному решению проблем, следовательно, для эффективного проведения тренинга, педагог-психолог должен обладать соответствующими компетенциями, например компетентностью решения проблем [1].

С гуманистической точки зрения в практической психологии развивающий и оздоравливающий эффект на учащихся оказывает атмосфера эмпатии, искренности, самораскрытия и особых теплых взаимоотношений между педагогом-психологом и учеником. Невозможно насильно привести к счастью, невозможно осуществлять личностное развитие извне по отношению к личности. Следовательно, педагог-психолог должен обладать такими личностными характеристиками, которые позволили бы ему заботиться о создании максимально благоприятных условий для развития самосознания, осуществления личностных изменений.

Вачков В.И. в исследовании профессионально важных личностных черт для педагогов-психологов, выделил следующие качества, необходимые для психологической практики:

- концентрация на помощи ученику, способность и желание ему помочь;
- открытость к взглядам и суждениям отличным от собственных, терпимость и толерантность;

- способность к эмпатии, к созданию атмосферы эмоционального комфорта;
- аутентичность поведения, то есть демонстрацию подлинных эмоций и переживаний для учеников;
- вера в способность к изменению и развитию ученика, энтузиазм и оптимизм;
- высокий уровень саморегуляции, терпимость к неопределённости и фрустрации, уравновешенность;
- адекватная самооценка, позитивное самоотношение, уверенность в себе, осознание собственных конфликтных областей, мотивов, потребностей;
- интуиция, богатое воображение;
- высокий уровень интеллекта [2].

Очень часто, наравне с классификацией восьми видов интеллекта по Говарду Гарднеру, выделяют девятый вид интеллекта – эмоциональный. Эмоциональный интеллект (Emotional Quotient или Emotional Intelligence) определяет способность распознавать свои и чужие эмоции, намерения, мотивацию, желания и использовать эту способность для управления своим эмоциональным состоянием и выстраивания эффективного взаимодействия с другими людьми. В течение профессиональной деятельности педагогу-психологу приходится преодолевать стрессовые состояния, фрустрацию и депрессию. Уровень эмоционального интеллекта влияет на способность к рациональному мышлению и противодействию негативным эмоциональным влияниям. Во многих психологических курсах присутствуют программы по развитию эмоционального интеллекта [3].

Перечисленные личные качества влияют на достижение профессиональной компетентности, поскольку являются её составляющей. Следующим компонентом компетентности являются компетенции. Под компетенциями понимают умения, навыки, личностные характеристики и модели поведения, используемые для достижения желаемых результатов. С их помощью составляют модели компетенций работника, а сами они состоят из поведенческих индикаторов, определяющих каким образом, компетенция будет достигнута.

Попыток создать единую модель компетенций психолога в сфере образования было немного. Одна из успешных попыток свершилась в 2016 году, когда Международная ассоциация прикладной психологии (IAAP) и Международный союз психологических наук (IUPsyS) (2016) определили и объявили набор компетенций для практикующих психологов в сфере образования, одновременно преследуя несколько целей. В частности, они стремились создать обобщенный профессиональный образ, достичь признания международной системы эквивалентности в системах профессионального обучения (т. е. посредством программной аккредитации и профессиональной аттестации) и регулирования профессиональных компетенций и поведенческих характеристик.



Достижение международного соглашения по ключевым компетенциям в области психологии могло бы укрепить профессию педагога-психолога и облегчить глобальное понимание и дорожную карту для коммуникации, оценки и сравнительного анализа в профессии. Список IAAP представляет собой первую попытку охватить основные знания и навыки, необходимые практикующим психологам в сфере образования.

В таблице 1 представлены компетенции, определенные Международной ассоциацией прикладной психологии (IAAP) и Международным союзом психологических наук (IUPsyS).

Таблица 1 – Международный набор компетенций для практикующих психологов в сфере образования.

| Компетенции               | Психологические знания и навыки, лежащие в основе компетенций | Профессионально-поведенческие компетенции                       | Компетенции профессиональной деятельности                       |
|---------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Составляющие (индикаторы) | Обладает необходимыми знаниями                                | Практикует этичность                                            | Практикует этичность                                            |
|                           |                                                               | Демонстрирует профессионализм                                   | Демонстрирует профессионализм                                   |
|                           |                                                               | Деловое отношение к подопечным и окружающим                     | Деловое отношение к подопечным и окружающим                     |
|                           | Обладает необходимыми навыками                                | Поступает как практик, опираясь только на подтверждённые данные | Поступает как практик, опираясь только на подтверждённые данные |
|                           |                                                               | Опирается на опыт проведённой работы                            |                                                                 |

На образ компетентности педагога-психолога также оказал влияние Болонский процесс. В методических указаниях по проектированию модульных образовательных программ в Республике Казахстан, рекомендуется ориентироваться на дублинские дескрипторы при составлении компетенций и результатов обучения.

Таким образом, в Республике Казахстан в каждой модульной образовательной программе квалификационная характеристика выпускника определяется картой (профилем) компетенций, которая подразделяется на группы: универсальные (общекультурные/базовые), общепрофессиональные и профессиональные (специальные) компетенции, а также результаты обучения. Результаты обучения отражают степень усвоения компетенций [4].

К примеру, в образовательной программе «6В01110 Педагогика и психология» НАО «Павлодарский педагогический университет», целью подготовки является высококвалифицированный педагог-психолог, обладающий высокой социальной и гражданской ответственностью, способный осуществлять профессиональную деятельность [5].

В соответствии с этим были составлены результаты обучения:

- РО1 - Демонстрирует понимание социально-политических ситуаций в стране и мире;
- РО2 - Знает этапы проведения научного психолого-педагогического и стандартного исследования в разных областях психологии и педагогики;
- РО3 - Умеет собирать, анализировать фактический материал, обрабатывать эмпирический материал, описывать и представлять результаты исследования;
- РО4 - Владеет категориальным аппаратом возрастной и педагогической психологии, с учетом возрастных особенностей, аналитическим подходом к концепциям учебной деятельности и воспитания;
- РО5 - Применяет базовые процедуры психолого – педагогического анализа проблем человека, социализации индивида, профессиональной и образовательной деятельности, функционированию людей с ограниченными возможностями, в том числе и при различных заболеваниях;
- РО6 - Осуществляет самопознание и саморазвитие на основе рефлексии поведения и деятельности в решении психолого-педагогических задач;
- РО7 - Способен выявлять специфику психического функционирования человека с учетом особенностей возрастных этапов, кризисов развития и факторов риска, его принадлежности к гендерной, этнической, профессиональной и другим социальным группам;
- РО8 - Способен к коммуникации в устной и письменной формах для решения задач межличностного и межкультурного взаимодействия.

В компетентностном развитии педагога-психолога особенно уделяется внимание саморазвитию (РО6). Практическая деятельность педагога-психолога подразумевает не только применение личных черт и компетенций, но и постоянное самосовершенствование посредством рефлексии и супервизии.

Под рефлексией в психологии понимается способность человека к осмыслению своих собственных действий и их законов, деятельность самопознания, раскрывающая внутреннее строение и специфику духовного мира человека. Рефлексия возникает там, где человек в своей деятельности попадает в затруднительную ситуацию и для нахождения выхода из нее ему надо выйти из своей прежней позиции деятеля и перейти на новую позицию. Для развития в профессиональной деятельности, педагогу-психологу приходится сталкиваться с ситуациями, когда необходимо поменять подход к решению

проблемы ученика или применить новый метод работы с ним. Применение рефлексии в такой ситуации увеличит шанс на успешную работу с учеником, что положительно скажется на формировании профессионально-поведенческой компетенции – на опыте проведённой работы.

Именно благодаря рефлексии в профессиональной деятельности сохраняется целостность, достигается возможность внесения в ее содержание необходимых коррективов. Иными словами, профессиональная деятельность педагога-психолога и его личность переходят на качественно новый уровень именно за счет функционирования механизмов рефлексивной саморегуляции, поскольку в их составе всегда находится субъект деятельности, рефлексирующий себя в ней [6].

Существует свойство личности, предопределяющее способность человека к эффективной рефлексии – локус контроля факторов. Для людей с внешним локусом контроля свойственно приписывать свои результаты деятельности к внешним факторам. Для них существует определение экстернальный тип – человек, имеющий низкий уровень субъективного контроля.

Люди с внутренним локусом контроля принимают ответственность за все свои успехи и неудачи. Их определяют как интернальный тип – человек, имеющий высокий уровень субъективного контроля. Такое свойство личности позволяет адекватно оценивать свои возможности, осознавать влияние собственного выбора и поведения на результаты во всех аспектах жизни. Принятие ответственности за свои действия помогает эффективнее справляться с изменениями, что важно для рефлексии [7].

Будет неправильным действием заключить, что рефлексия — это внутренний процесс одного человека. Рефлексия также может происходить между двумя или несколькими людьми объединённых общей целью. Наглядным примером для совместной рефлексии является механизм профессиональной поддержки, а также повышения квалификации педагога-психолога — супервизия.

Механизм супервизии представляет собой процесс консультирования опытным педагогом-психологом менее опытного педагога-психолога в ходе его работы с учащимися, что позволяет супервизируемому педагогу-психологу осознать и проанализировать свои профессиональные действия и своё профессиональное поведение. Этот процесс демонстрирует рефлексия как результат отражения одним человеком внутреннего мира другого человека, то есть осознание супервизируемым того, как он воспринимается опытным наставником в профессиональном плане [8].

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## Social Sciences

### The Emergence of Gender Studies in Azerbaijan

Adigezalova Svetlana

PhD, docent, Cathedra of Philosophy and Social Science, Azerbaijan State Pedagogical University, Baku

<https://orcid.org/0000-0002-7573-6878>

Since the 1990s in Azerbaijan, as well as in many other post-Soviet republics, there has been a real boom of gender research and study of women's problems, prepared by the efforts of international organizations, first of all, the UN, which allocated significant financial and technical resources for these purposes. In a short period of time, numerous nongovernmental organizations and few research centers were established, dealing with practical and theoretical problems of gender and women's status. Today, when, for various reasons, there is a certain decline in interest in this field of research, it is possible to summarize some results of the development of gender studies in Azerbaijan.

The widespread practice of demographic representation of this or that country in those years was supplemented by gender characteristics designed to reflect the social roles and place of women and men in various spheres of society. The long period of hegemony of the world patriarchal culture, which gave rise to a masculine type of society, began to be overcome by international structures through the adoption of a number of documents aimed at improving the legal, social, economic and political status of women in the world. Without assessing whether these trends were indeed in line with a gender approach, we should note that for the countries of the South Caucasus, addressing the numerous problems of women that had developed over the years of independence was not only justified, but also helped to mirror the problems of the male population of these countries. During the Soviet era, the South Caucasus was a region of patriarchal attitudes toward women, who were traditionally viewed as the keeper of the home and the mother, busy with family and child-rearing. The situation changed dramatically in the post-Soviet era, when the traditional way of life was destroyed.

The numerous conflicts that arose everywhere, the sharp deterioration of the economic situation, the growing unemployment rate and the consequent outflow of the male population from the region in search of work have led to large-scale demographic changes. This led to the rapid emergence of women into the social arena of society, where they began to take on the previously traditionally male roles in the economy and production. Women formed an absolute majority in health care and education, and their share in previously strictly "male" spheres of employment increased significantly. Even according to the official statistics of that time, the

share of the region's female population was significantly higher than that of the male population. And if we take into account the data of independent experts, according to which out of 15 million population - 5 million (predominantly men) left the region in search of work, then we can safely state that the South Caucasus was increasingly acquiring a female face.

At the same time, the weight of traditional inheritance still hindered women's opportunities to occupy a place in the political sphere commensurate with their social significance. Power, authority structures, and decision-making spheres were still solely the domain of men, who were in the absolute majority in the executive, legislative and judicial branches at all levels, in local government, and in the leadership of party and community organizations. Paradoxically, women, who constituted the majority of voters, traditionally voted for men, giving them, as in the family, the reins of power (1). The patriarchal face of power in the republics of the South Caucasus manifested its negative traits most negatively in the sphere of interethnic relations, which resulted in a number of conflicts of varying degrees of confrontation. Subsequently, these conflicts were frozen but not resolved, the military phase was replaced by an unstable truce, during which the authorities of the opposing sides never found a way to a lasting and just peace. This was not least because the patriarchal authorities professed a culture of war as a philosophy of inter-ethnic relations. In order to stop the destructive processes, it was necessary to involve women more actively into the social sphere and politics, who by nature are inherently peace culture, opposing the culture of war. Experts believed, and the situation is unlikely to change, that in politics, in the power structures of the state there should be no less than 15-30% of women, otherwise statehood is carried out according to male standards, often reduced to confrontation, nationalism, and wars.

Azerbaijan is a country of complex, contradictory historical development, imprinted in the culture of the people by the influence of many world and regional religions, which formed a special atmosphere of tolerance and sensitivity to foreign religion and culture. With the establishment throughout Azerbaijan of Islam, this sensitivity continued, and the norms and prohibitions against women were milder than in other Muslim countries. Russian influence and the rapid development of industry, which accelerated urbanization processes, increased public tolerance and liberalism, including on the issue of women's education and civil rights, something in which Azerbaijani educators were particularly successful.

The gender culture of post-Soviet Azerbaijan was the result of a complex interweaving of different kinds of historical events, which developed a number of stable stereotypes, which find their indirect refraction in the spiritual, social, political and economic life of society. The reconstruction of gender codes of culture is an important and completely undeveloped topic of domestic research. Azerbaijan has always been a region of interaction between different cultures and religions. Even before the dominance of Zoroastrianism, polytheistic beliefs with strong matriarchal motifs were widespread in the region, which gave way to patriarchal hegemony and the transition from polytheism to monotheism. Zoroastrianism, Christianity, and

Islam successively became the state religion. Islam, in spite of historical collisions and persecutions in the USSR, continued to be the fundamental basis of Azerbaijani culture and the psychology of the people. Islam, being a total and holistic doctrine, a doctrine that seeks to cover all spheres of practical life of its followers with its norms, for the first time introduced law-making principles, regulating the status, rights and behavior of women. The attitude of Islam toward women is the most complex part of Muslim doctrine, which over a long historical period has absorbed many ethnic views and values of different peoples, as a result of which the early Islamic views have undergone significant changes under the influence of time and place of its spread.

The Azerbaijani Enlightenment (second half of the 19th century) was the first in the East to raise the issue of women's status. The problem of women's rights and freedoms emerged and began to be developed in all aspects in the context of this trend, which had a well-known impact on neighboring Muslim countries. Moreover, this problem was interpreted as one of the central problems of socio-cultural development, the growth of self-consciousness and the beginning of consolidation of the Azerbaijani people. The founding fathers of education M. F. Akhundov (2) and G. Zardabi (3) and their later followers constantly returned to this topic, permanently increasing its social significance. For example, at the beginning of the last century, G. Minasazov stated: "The main reason for this is the fact that, as long as the Muslim woman is a slave, as long as the word "arwad" (woman) is the most insulting word among Muslims, as long as our mothers and wives remain in the atmosphere of darkness, hopeless ignorance and mental squalor - all our loud phrases that Muslims join the universal culture, that they are supporters of progress, civilization and all its attributes, like freedom of personality, speech, convictions, etc. n., All these phrases will reek of insincerity and crude bluster" (4).

It is important to note that at the end of the 19th and beginning of the 20th centuries in Azerbaijan the demographic ratio of the population was in favor of men, which increased the social value of women. Thus, according to the statistics, at the beginning of the 20th century in Russia there were 103 women for 100 men, and in Azerbaijan - 87. At the beginning of 1901 the population of Azerbaijan was 54% men and only 46% women. This situation was still observed in 1926, when men outnumbered women by 112,000 (5). It is possible that for this reason polygamy, which is widespread among Muslims, was rarely practiced in Azerbaijan.

The Enlightenment everywhere saw in education a panacea, and therefore in Azerbaijan the modernist programs to change the status of women were written in the framework of the creation of women's education. In 1901 the first Russian-Tatar (Muslim) school for girls was opened. In 1905 a famous patron of art and oil-industry Z.Tagiyev organized a school for Muslim girls and his wife S.Tagiyev created a Committee of Muslim women that was engaged in charity among women in the city of Ganja since 1906. In 1911 H. Alibekova started to publish the first women's magazine "Ishig" ("Light"). Journal "Molla Nasreddin" (1906-1931) many times raised women problem in its pages. In a word, by the moment of the establishment of short



independent existence of the Transcaucasian republics Azerbaijan had passed a way that allowed the Parliament of the first independent Azerbaijan Democratic Republic (1918-1920) to discuss the proposal on the equality of rights of women and men already at one of its first sessions. The planned elections to the Constituent Assembly of the ADR were preceded by legislative acts stipulating full equality of rights of men and women, including the right of women to vote and to stand for election to the supreme legislative body of the country (Azerbaijan was a parliamentary republic then). The Soviet occupation frustrated these plans, but set in motion an ultra-radical for a Muslim country modernization program of "liberation of the women of the East".

The dynamics of the women's movement of the early Soviet period are very impressive and characterized by an artificially inflated and exported pathos of life renewal. The women's movement in Azerbaijan was supposed to become a model for all the countries of the East, most of which were Muslim. And, indeed, at first it was a very powerful incentive and role model: women shed their veils, they were actively involved in public life, their voting rights were not challenged by anyone, on the contrary, the Soviet authorities took special care and consideration in the field of women's politics (6). On the one hand, women immediately became "equal" in rights with men; on the other hand, this process was inspired by the authorities, and women were deprived of the important experience of achieving their rights in direct social struggle, as it was in the West.

From February 8 to 11, 1921 the first congress of non-party women of Azerbaijan took place in Baku; 815 of 1188 delegates represented Baku, 373 - uyezds. The congress adopted the Appeal "To all women of the East" (7, 8), the rhetorical character of which was aggravated by the total illiteracy of the contingent to which it was appealed. At the same time, one cannot deny the "liberal" atmosphere created by the Bolsheviks for the Muslim republics, which contrasted sharply with the situation in other republics before 1929.

The mass involvement of women in public life and labor activities began. In 1929, only 3,000 women were employed in manufacturing, but in 1933 there were 15,000, and in agriculture 37% of workers were women (9). The Soviet regime's favorable attitude towards women and Muslims had a similar motive, similar to its attitude towards young people: all the oppressed and deprived and hence the less conscious strata of the population were attracted to the revolution, on the one hand, as its fighting and destructive forces, and on the other, as models, serving as attractive showcase for the outside world. Naturally, as soon as these strata fulfilled the tasks set by the party, repression or prohibition began to haunt them themselves. Numerous women's clubs and organizations that emerged after the revolution were closed by the will of the authorities in the 1930s (closed in stages in 1930-33). The gap between the first and the second women's congress was 36 years. The second congress took place only in 1957 (March 28-29), 482 of the 745 delegates were party members. The agenda spoke for itself:

"discussion of the role of women in implementing the decisions of the 20th Congress of the CPSU" (10, 11).

The 3rd Congress of Women was held on October 20-22, 1967; 85% of its 506 participants were the Communist Party members, 9 were the members of the USSR Supreme Soviet, 57 of the Soviet of the Azerbaijani SSR, 178 represented the local councils, 141 were party workers, Komsomol members, or trade union representatives for 102 women workers. The agenda reflected the epoch: "The Great October and the Azerbaijani woman" (the 50th anniversary of the formation of the USSR).

On September 14-15, 1998, the first "independent" congress of Azerbaijani women took place. The 2,138 women delegates elected to the congress held their meeting in the best traditions of the Soviet past. The second congress, held in September 2003, was not much different.

As in the rest of the world, women's activity in Azerbaijan peaked during World War II, when 78% of the workers in agriculture and 60% in urban areas were women (12). During the same years, women were demographically equal, and then significantly outnumbered the male population of the republic (1939 - 1562.6 women, 1642.6 men; 1959 - 1941.1 women, 1756.6 men).

Strengthening the social role of women was encouraged by a special quota system, responsible for a certain percentage of women in power structures, which lasted until the time of perestroika in the USSR. For example, in the Supreme Soviet of the Azerbaijan SSR in 1985, out of 450 deputies, 179 were women - 39% (in the USSR - 32.8%, in the republics - 50.3%). Out of 179 women deputies, 85.4% (men - only 25.4%) were collective farmers and workers.

During perestroika, the number of women in elected bodies sharply decreased, but the number of women's organizations increased. After the abolition of the election quota, the percentage of women deputies in the USSR fell from 50% to 27%. In the Azerbaijan Supreme Soviet of 1991 there were 17 women deputies out of 349. - 4,8%. Milli Mejlis (Parliament) of 1992 - out of 50 deputies - 3 - 6% were women. In 1995 parliament there were 15 (12%) women deputies against 109 (88%) men; in 2000 parliament there were 13 (11%) women deputies against 111 (11%) men. - 13 (11%), 111 - (89%). The situation in the executive branch is roughly similar. In Azerbaijan only 2 out of 77 heads of executive power were women - 2.6%. However, as a rule women were chosen for the post of deputy head for humanitarian or social issues. In the composition of Azerbaijani parties at that time half of them were women, but only one third of them were in the leadership and only one party was headed by a woman. At the same time, there were about 50 women's organizations in Azerbaijan, three of which had more than 2,000 members.

In 2002, there were 1,039 to 1,121 women per 1,000 men age 25 and 1,060 to 1,213 between the ages of 40 and 60. Women, made up 45% of the labor force, but 1.5% were represented in management. 60-70% of the unemployed were women. By branches it looked

as follows: public health and education - 65 % (the sphere of education most fully reflected a situation of gender asymmetry in the republic: if in 1980 women - teachers made up 54,4 %, in 1994 already - 65 %), science - 43 %. Ministers - 9%, ambassadors - 11%, judges - 18%, lawyers - 21%, in police - 2%, 55% of refugees and displaced persons - women. The share of participation in the state economy (1990: w. - 41.8%, m. - 58.2%; 1997: w. -46.9%, m. - 53.1%) reflected a steady downward trend in the number of men and an increase in the number of women in it. At the same time, the public sector itself nearly halved in seven years, while the private sector more than doubled.

Privatization, which began very late in Azerbaijan, had a "male face. The participants of privatization were 90% men, and only 7% of women were managers of small enterprises that had passed through the registration process. According to the results of the survey of that time, 86% of women did not want to set up a personal business.

Patriarchal consciousness in the post-Soviet period faced a period of initial capitalist relations. Democracy and the market were being established amidst chaos and legal chaos, exacerbated by ethnic conflict. Dynamic, assertive, forceful, brutal methods of struggle for the assertion of their place in life collided with outwardly liberal and democratic rhetoric, generating paradoxes of consciousness and mental confusion. The state, parties, and women's organizations were not concerned with women's issues, but with individual women organized into interest groups. As in the West, the women's movement in the South Caucasus began by blindly copying patriarchal values and "adjusting" women's norms of behavior to male models. The studies of the time reflect this bias in favor of women's (power) rather than gender issues. Society witnessed the formation of new women's "ghettos" that were closed to the public.

Most women's organizations, organized on the basis of personal acquaintance, loyalty or community affiliation, were close to the government or the opposition, and as such pursued "their party line," receiving money and technical assistance from foreign foundations, which in turn favored state structures or the opposition.

After the Beijing Conference (13), international organizations strengthened their demands on states to increase the role of women in society. In Azerbaijan, the State Committee for Women's Affairs was created, and the authorities clearly intended to rely on women in the near future, and therefore personally formed their structures. The evidence of it is the decree "About the measures on strengthening of the role of Azerbaijani woman" (14.1.1998), prescribing the whole set of measures, the decree of the president "About increase of the role of woman in the society" (2001) which supposed to enter again the system of "women's quotas". A stratification began to be observed: on the one hand, public organizations acting as mouthpieces, expressing the ideology of the ruling party, on the other hand, NGOs, causing the authorities concern with their unsanctioned initiative.

It would be a mistake to think that the authorities and the opposition could "forget" about the old Bolshevik principle of involving women in the movement, just as in those days

when they were advancing toward their cherished goal. It was then, on the road to independence and power, that the foundations and "philosophy" of the women's movement were laid. In those days, one could observe large groups of women at various points in the city aggressively picketing state and party organizations, demanding the resignation of their leaders. Later, there was a shift from words to deeds - women simply threw unwanted people out of offices.

The old, almost fabulous, and therefore ostentatious attitude of the Azerbaijani to the Azerbaijani woman began to disappear. The newspapers printed with enviable consistency numerous skirmishes between famous people of the opposite sex and political orientation.

But the kind of woman who existed in Soviet times was no longer present in the new Azerbaijan. One could argue that feminism ever existed in Azerbaijan, and can we call the short Soviet period in which the authorities flirted with women as such? But we could safely say that at that time an aggressive seeker of her rights, like her sisters in Western countries, the feminists and suffragettes, entered the political and economic scene of Azerbaijani life and, at first, hating male chauvinism, blindly copied the behavior of the representative of the patriarchy. It seems that the Azerbaijani woman had tried on the "men's suit" and was not going to leave it for a long time. Another thing is who and how subtly manipulated such a fascination for women. The question of the time - how long it could last - has its answer today: before the gender and women's issue goes out of fashion due to the sharp decline in funding from international organizations.

There is a perception that the growth of women's NGOs is a result of the displacement of women from decision-making. While acknowledging this view, it should be noted that without the financial support of Western funds, such growth is unlikely to be possible at all. Fortunately, the wave of NGO growth in the post-Soviet space coincided with the peak of the West's fascination with gender issues and the special attitude of international organizations to the position of women in the world. But it is also true that women's tolerance and intuition have always been vital to a world of politics in the grip of patriarchal power standards.

Another version was also discussed: there was a demographic catastrophe in all three republics of the South Caucasus, in which the male population decreased significantly: the first Soviet emigration, wars, high male mortality, and large-scale departure abroad to earn money. The gender situation in the region was highly destabilized, and women willy-nilly began to play social roles that were not their own, quickly filling the niches that had formed. The observed female aggressiveness led, as a rule, to the victory of the interests of those who were far from the plans of the "triumph" of gender symmetry.

Economic and social difficulties led to an even greater orientation of society in Azerbaijan toward the institution of the family and its values; moreover, just as in Soviet times, the family became the last bastion that Azerbaijanis were ready to defend by all possible means.

Instead of the structures and cells of civil society in Azerbaijan, the family was still the first and last structure of consolidation on the basis of, it turns out, patriarchal values.

Meanwhile, the processes taking place in the republic were first of all directed against these most intrinsic values of the society. The male half of society observed, quite painfully, how women were gradually becoming the main breadwinner and subsistence earner. The "chiseling woman" exploring abroad, a previously taboo topic of discussion, suddenly broke through the pages of the press, shocking the morals of society, as did an even more painful and shocking topic, the "corrupt woman".

Although many have no interest in women and continue to reinforce patriarchal views of their role in society, pushing women out of politics and economics, the unfolding of the third millennium (in both politics and economics) will increasingly demand the attraction of "feminine qualities. At the same time, the need for "masculine qualities" will diminish. The agrarian and industrial eras, which mobilized male physical strength, are coming to an end, and the "female age" of information technology, which requires intuition, attentiveness, and thoroughness in work, is beginning. The need for "masculine" and "feminine" qualities remains, their balance is changing.

These changes in the world, unfortunately, persistently do not want to notice. The decline of interest in gender issues, therefore, has its own political and social reasons.

The demographic situation is not only about reproduction with rigidly fixed roles for men and women in procreation. On the contrary, it is to a large extent a process of redistribution of the roles of women and men (in crisis and stable situations) in the economy, politics, culture, in the broad sense of the word, in the social sphere of society. All these processes in Azerbaijan (as well as in other post-Soviet republics) are stimulated by political processes that have led to the transformation of the structure of society and its system. It should be specifically emphasized that unlike stable Western countries, the gender situation in Azerbaijan is complicated by the radical transformation of society. A woman does not simply enter and replace a man in society; she takes over his gender role, which is just as dangerous. A woman: mother and father in one person, a teacher, teacher, educator - this is a threat of feminization of the younger generation and, consequently, of society. Therefore adequate measures must be taken. These measures should become a subject of public discussion and a factor in the adoption of government programs aimed at overcoming the current situation. Along with an increase in the number of women in decision-making, there should be an increase in the number of men in areas of professional activity in which there is a clear gender imbalance.

To summarize, it can be noted that the first stage of gender studies and women's studies in Azerbaijan, which was completed, was generally of an educational nature, aimed at introducing the basic principles of gender equality to society. At the same time, for obvious reasons, there was a clear bias towards paying more attention to the problems of women than men. This situation is not unique; it occurred in Western countries, which were the first to explore

these issues. It was among Western feminists that a gradual transition began, first to a gender approach, and then to the study of men's problems, in order to find out the necessary measures for the establishment of true equality of the sexes (14). It seems that Azerbaijan will have to go the same way.

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# Physical and Mathematical Sciences

## STUDY OF SCATTERING RELATIVISTIC ELECTRONS IN ATOMS

Mirabutalibov Mirteimour Mirkazim

prof., Sc.D., Azerbaijan State University Oil and Industry University

Aliyeva Mina Beyler

dos., PhD. Azerbaijan State University Oil and Industry University

**Abstract:** Differential section of elastic scattering of electrons, obtained in the distorted-wave approximation, is calculated on the basis of the proposed mathematical method. The charge density distribution in the atom is chosen as a function calculated in the Dirac-Hartree-Fock-Slater approximation, which is superposition of the spherically symmetric Yukawa potential. Screening function in atoms were studied In, Ga, Se and Yb atoms when the energies of electrons falling 80eV and calculated the radii of these atoms.

### Introduction

One of the conclusions of interest made with studies of the properties of atoms scattering of electrons, is the angular position laws of differential cross sections, which are considered one of the fundamental properties of scattering in the broad field of energy [1].

As is known, the provisions of the diffraction minima allow you to determine the size of the target (atom). But the depth of these minima depends mainly on the front falling electronic waves.

Conducted numerous theoretical analysis of differential cross sections obtained from the experiment on scattering of electrons on nuclei and atoms [2] have shown that the distortion in the fronts of waves falling and leaving particles in the target box, fills diffraction minima and moves them to the left side that leads to better agreement with experiment theories.

### The Proposed Theory

To explore the properties of scattering atoms, electrons [3] in an analytical form of expression for the differential cross section of elastic and inelastic scattering of relativistic electrons in atoms. As shown in this work, the wave function of the electron re-scattered obtained from the solution of the Dirac equation. One of the important properties of this function is that distortion is counted as in phase and amplitude of falling and going of waves. In addition, these members a distorting function are function of the screening function of electric charge in an atom.

Differential cross-section electrons scattering is determined by the standard way [4]:

$$\frac{d\sigma_{if}}{d\Omega} = \frac{E_i E_f}{(2\pi)^2} \cdot \frac{k_f}{k_i} \cdot \frac{1}{2} \cdot \frac{1}{2J_i + 1} \sum_{\sigma_i \sigma_f} \sum_{M_i M_f} \left| T_{if} \right|^2 \quad (1)$$

The matrix element of the transition from initial state ( $i$ ) Atom in the final ( $f$ ) in the high-energy approximation is presented as

$$T_{if} = \langle J_f M_f | \int d\mathbf{r} \Psi_f^{(-)+}(\mathbf{r}) V(\mathbf{r}) \Psi_i^{(+)}(\mathbf{r}) | J_i M_i \rangle \quad (2)$$

The potential energy of Coulomb interaction scattering electrons with target Atom represent both

$$V(\mathbf{r}) = -Ze^2 \int \frac{\rho(\mathbf{x}) d\mathbf{x}}{|\mathbf{r} - \mathbf{x}|} . \quad (3)$$

For the matrix element of the process we get

$$T_{if} = -4\pi Ze^2 \langle J_f M_f | \int d\mathbf{x} \frac{g(\mathbf{x})}{q_{\text{eff}}^2(\mathbf{x})} \exp \{i[\mathbf{q}\mathbf{x} + \phi(\mathbf{x})]\} \rho(\mathbf{x}) | J_i M_i \rangle . \quad (4)$$

Here

$$q_{\text{eff}}(\mathbf{x}) = \mathbf{q} + \nabla \Phi(\mathbf{x}) , \quad (5)$$

- effective impulse of transfer of incident electrons to the target atom.

In order to study the elastic scattering of electrons on atoms, express differential cross section through the form factor atom

$$\frac{d\sigma}{d\Omega} = \left( \frac{d\sigma}{d\Omega} \right)_0 |F(q)|^2 \quad (6)$$

Where is

$$\left( \frac{d\sigma}{d\Omega} \right)_0 = \left( \frac{2Ze^2 k}{q^2} \right)^2 \cos^2 \theta/2 \quad (7)$$

- electron scattering cross section at the point atom. Form-factor atom when it takes the form

$$F(\mathbf{q}) = q^2 \int \frac{g(\mathbf{x}) d\mathbf{x}}{q_{\text{eff}}^2(\mathbf{x})} e^{i[\mathbf{q}\mathbf{x} + \phi(\mathbf{x})]} \rho_e(x) Y^*(\hat{x}) d\mathbf{x} \quad (8)$$

In here,  $|\mathbf{q}| = |\mathbf{k}_i - \mathbf{k}_f| = 2k \sin \theta/2$  is the momentum transfer falling electrons atom target. This assumes that  $|\mathbf{k}_i| = |\mathbf{k}_f| = k$ .

When calculating the three-dimensional integral (8), applying mathematical method proposed in [5], express of atom form-factor resulting in distorted-wave approximation, via plane wave form-factor -  $F_{\Pi}(q)$ :

$$F(q) = 2\pi i(qR) \sum_{n=0}^2 [Re\beta_n F_{\Pi}^{(n)}(q) + Im\beta_n F_{\Pi}^{(n)}(q)] \quad (9)$$

Here  $F_{\Pi}^{(n)}(q) = \frac{\partial^n F_{\Pi}(q)}{\partial q^n}$ , a flat wave form factor:

$$F_{\Pi}(q) = R \sum_{\varepsilon=\pm 1} \varepsilon \int_0^{\infty} e^{iqx\varepsilon} \rho_{\varepsilon}(x) x dx \quad (10)$$

To calculate the  $F_{\Pi}(q)$ , it is necessary to select function charge density distribution in atom. Using electrostatic potential property of an individual atom, computed in the approximation of Dirac-Hartree-Fock-Slater, a superposition of spherical symmetric Yukawa potential, screening function in an atom we choose as follows [6].

$$\rho(x) = \frac{1}{4\pi} \sum_{\mu=1}^3 A_{\mu} \alpha_{\mu}^2 \frac{e^{-\alpha_{\mu}x}}{x} . \quad (11)$$

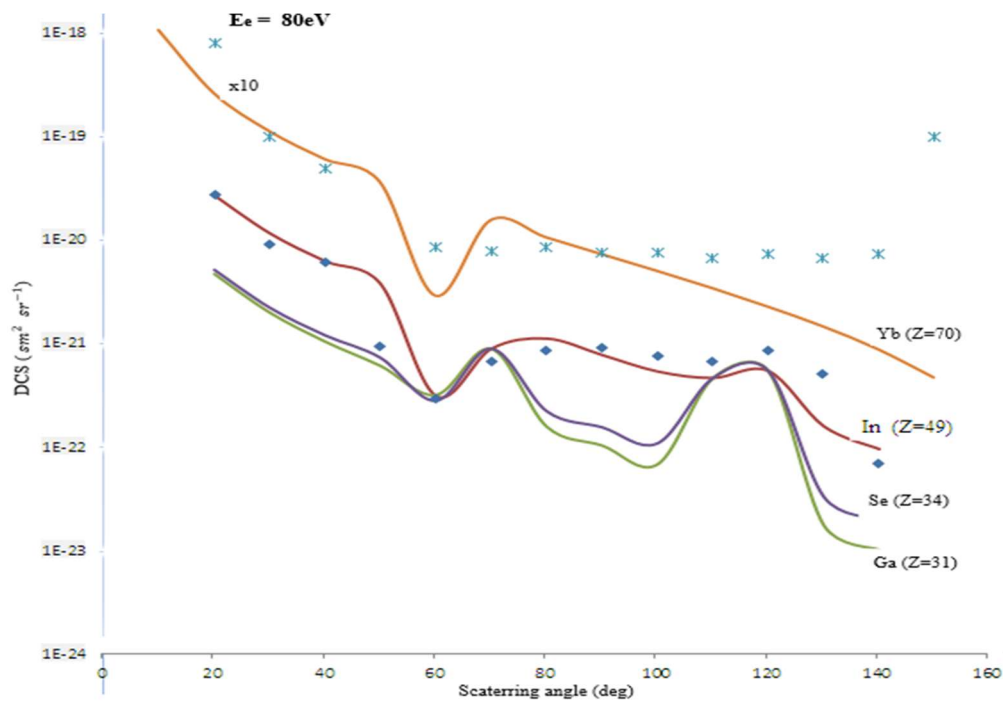


Fig.1. The cross sections (DCS) for the elastic scattering of electrons on In, Ga, Se, Yb atoms at  $E_e = 80 \text{ eV}$ .

The solid line is the results of theoretical calculations, the points are the experimental data [7,8].

Here, the parameters  $A_{\mu}$  and  $\alpha_{\mu}$  are determined by the analytical procedure of fitting to the potential values found by the Dirac-Hartree-Fock-Slater self-consistent field method.

After taking into account this expression in (10), the form factor takes the following form:

$$F_{\Pi}(q) = \frac{2i}{4\pi} \sum_{\mu=1}^3 \frac{A_{\mu} \alpha_{\mu}^2}{q^2 + \alpha_{\mu}^2} \{ qR - [qR \cos(qR) + (\alpha_{\mu}R) \sin(qR)] e^{-\alpha_{\mu}R} \} \quad (12)$$

## Results and discussions

The differential cross section for the scattering of electrons on In, Ga, Se, and Yb atoms

at energies of 80 eV is calculated and the radii of these atoms are determined:

$R_{\text{In}} = 2,5\text{\AA}$ ,  $R_{\text{Ga}} = 4,0\text{\AA}$ ,  $R_{\text{Se}} = 1,4\text{\AA}$ ,  $R_{\text{Vb}} = 1,4\text{\AA}$ . Figure 1 shows the progress of the differential cross sections calculated by the above theory in comparison with experimental data. It has been seen that it has been measured, and the theoretical curve was shifted to large angles. In contrast, the In atom has two minima and in both diffraction angles the theory and experiment coincide. In addition, the maxima in all three atoms, both in experiment and in theory, coincide. As can be seen from expression (12), taking into account the distortions in both the amplitude and phases in the wave functions of the incident and outgoing electrons allows us to obtain a convenient and simple expression for the atomic form factor. This allows multiple calculations of differential cross sections for numerous atoms and at the same time achieving good agreement with experiment.

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# Finding suboptimistic solution by estimating the unknowns two in the interval knapsack problem

**K.Sh Mammadov**

ANAS Institute of Control Systems, Baku, Azerbaijan

**S.Y.Huseinov**

ANAS Institute of Control Systems, Baku, Azerbaijan

**I.I.Bakshalieva**

ANAS Institute of Control Systems, Baku, Azerbaijan

In the work we consider the following knapsack problems:

$$\max \left\{ \sum_{j=1}^n [\underline{c}_j, \bar{c}_j] x_j \mid \sum_{j=1}^n [\underline{a}_j, \bar{a}_j] x_j \leq [\underline{b}, \bar{b}] x_j = 1 \vee 0, j = \overline{1, n} \right\} \quad (1)$$

this problem is a generalized form of the known knapsack problem. Because, in the special case when ends of the intervals coincide, the same classic problem is obtained. According to one economic nature of problem (1)  $[\underline{c}_j, \bar{c}_j]$  is a price interval that the cost of the j-th object,  $[\underline{a}_j, \bar{a}_j]$  is a price interval that the cost of the j-th facility can receive,  $[\underline{b}, \bar{b}]$  is the allocation interval of allocated funds.

Note that the problem (1) was considered in the papers [1,2, etc.] and solution method with certain meanings have been developed. To select the numbers that represent each interval in which the coefficients are located in problem (1) choosing optimistic and pessimistic strategies corresponding to the problem [2], we reduced it to the following two problems.

$$\max \left\{ \sum_{j=1}^n \bar{c}_j x_j \mid \sum_{j=1}^n \underline{a}_j x_j \leq \bar{b}, x_j = 1 \vee 0, j = \overline{1, n} \right\} \quad (2)$$

$$\max \left\{ \sum_{j=1}^n \underline{c}_j x_j \mid \sum_{j=1}^n \bar{a}_j x_j \leq \underline{b}, x_j = 1 \vee 0, j = \overline{1, n} \right\} \quad (3)$$

We called the problems (2) and (3) as optimistic and pessimistic problems respectively. For constructing approximate (suboptimistic and subpestimistic) solutions of these problems, unlike the known methods, we gave a criterion for selecting unknown two by two. The carried out experiments show that the solution found in this case is by no means worse than the solutions found by known methods.

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# A NEW CONJECTURE TO THAT OF RIEMANN

I Pr. AZIZ ARBAI

PhD in Mathematics, Université Abdelmalek Essaadi, Tetouan.

## Abstract

This article is a reflection on the localization of zeros in the critical region  $\text{Re}(s) \in ]0, 1[$ . We will therefore cite here all the cases where we think of possible zeros in this region, without forgetting to distinguish the case where  $r = 1/2$  and the case where  $r \neq 1/2$ . All this by introducing a new alternative function  $F(s) = S(s)S(1-s)$  to that of "Dirichlet eta"  $S(s) = \sum_{n \geq 1} \frac{(-1)^{n-1}}{n^s}$  using the function  $\varphi$  introduced by Hardy in the functional equation  $S(s) = \varphi(s)S(1-s)$ . A new Conjecture to that of Riemann is therefore announced, which allows us to see that the Riemann's Hypothesis is not true.

**Key words and phrases.** Riemann zeta-function, Hardy's functional equation, Complex number, the symmetric difference...

## 1. INTRODUCTION

This document was created using an alternative function

$$F(s) = S(s)S(1-s)$$

of the "Dirichlet eta" function

$$S(s) = \sum_{n \geq 1} \frac{(-1)^{n-1}}{n^s}$$

Changes that would give us another view of who the zeros are of  $S(s)$  if they ever exist and where they might be located.

**Remark 1.** If  $s = r + ic$

$$\begin{aligned} F(s) &= S(s)S(1-s) = \\ &= \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \cos([\ln(n) - \ln(m)]c)}{n^r m^{1-r}} - i \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{n^r m^{1-r}} \\ F(s) &= S(s)S(1-s) = \sum_{n \geq 1} \frac{(-1)^{n-1}}{n^s} \sum_{m \geq 1} \frac{(-1)^{m-1}}{m^{1-s}} \\ F(s) &= \sum_{n \geq 1} \frac{(-1)^{n-1} e^{-i \ln(n)c}}{n^r} \sum_{m \geq 1} \frac{(-1)^{m-1} e^{i \ln(m)c}}{m^{1-r}} \\ F(s) &= \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} e^{-i[\ln(n) - \ln(m)]c}}{n^r m^{1-r}} \end{aligned}$$

**Remark 2.** (Functional equation of Hardy)

We have  $\forall s \in \mathbb{C}$  such  $\text{Re}(s) \in ]0, 1[$



$$S(s) = \varphi(s)S(1-s)$$

with  $\varphi(s) = 2 \frac{1-2^{s-1}}{1-2^s} \pi^{s-1} \sin\left(\frac{s}{2}\pi\right) \Gamma(1-s)$ .

see [2] & [3]

**Proposition 1.**

$$S(s) = 0 \Rightarrow |\varphi(s) + S^2(s)| = |\varphi(s) - S^2(s)| \Leftrightarrow F(s) \in i\mathbb{R}$$

With  $\varphi$  such  $S(s) = \varphi(s)S(1-s)$ .

**Proof.** First implication is Trivial.

$$\begin{aligned} |\varphi(s) + S^2(s)| &= |\varphi(s) - S^2(s)| \\ \Leftrightarrow \overline{\varphi(s)}S^2(s) + \varphi(s)\overline{S^2(s)} &= 0 \\ \Leftrightarrow \overline{\varphi(s)}S^2(s) \in i\mathbb{R} \quad (S^2(s) \perp \varphi(s)) \\ \Leftrightarrow \overline{\varphi(s)}S(s)\varphi(s)S(1-s) \in i\mathbb{R} \quad (\text{since } S(s) = \varphi(s)S(1-s)) \\ \Leftrightarrow |\varphi(s)|^2 S(s)S(1-s) &\in i\mathbb{R} \\ \Leftrightarrow F(s) = S(s)S(1-s) &\in i\mathbb{R} \quad (\text{as } |\varphi(s)|^2 \in \mathbb{R}) \end{aligned}$$

**Proposition 2.**

$$F(s) = S(s)S(1-s) \in i\mathbb{R} \Rightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

Such  $k \in \{0,1,2,3\}$  and  $\theta(s) = \arg[\varphi(s)]$

**Proof.**  $S(s)S(1-s) \in i\mathbb{R} \Leftrightarrow S(s)S(1-s) = -\overline{S(s)S(1-s)}$

$$\Leftrightarrow S(s)S(1-s) = -\overline{\varphi(1-s)}[\overline{S(s)}]^2 \quad (\text{as } S(1-s) = \varphi(1-s)S(s))$$

also we have

$$\begin{aligned} S(s)S(1-s) &= -\overline{\varphi(s)}[\overline{S(1-s)}]^2 \\ \Rightarrow S(s)^2 &= -|\varphi(s)|^2 [\overline{S(1-s)}]^2 \\ \text{or } S(1-s)^2 &= -|\varphi(1-s)|^2 [\overline{S(s)}]^2 \\ \Rightarrow S(s)^2 &= -|\varphi(1-s)|^2 \varphi(s)^2 [\overline{S(s)}]^2 \\ \Rightarrow \overline{\varphi(s)}S(s)^2 &= -\varphi(s)[\overline{S(s)}]^2 \end{aligned}$$

(since  $\varphi(s)\varphi(1-s) = 1$ )

Or directly from  $S(s)S(1-s) = \varphi(1-s)S(s)^2 \in i\mathbb{R}$

$$\Rightarrow \overline{\varphi(s)}S(s)^2 \in i\mathbb{R}$$

$\Rightarrow$

$$S(s)^2 = iK\varphi(s)$$

(with  $K \in \mathbb{R}$ )

$\Rightarrow$

$$S(s)^2 = \pm i|S(s)|^2 e^{i\theta(s)}$$

(with  $\theta(s) = \arg[\varphi(s)]$ )

$$\Rightarrow S(s)^2 = |S(s)|^2 e^{i\left[\theta(s) + \frac{\pi}{2} + k\pi\right]} \quad (\text{with } k = 0 \text{ or } 1)$$

$$\Rightarrow S(s) = \pm |S(s)| e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

(with  $k = 0$  or  $1$ )

$\Rightarrow$

$$S(s) = |S(s)| e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

(with  $k \in \{0,1,2,3\}$ )

**Remark 3.**

$$1) \quad F(s) = S(s)S(1-s) \in i\mathbb{R} \Rightarrow$$

$$S(1-s) = \varphi(1-s)S(s) = |S(1-s)|e^{i\left[\frac{\theta(1-s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

with  $k \in \{0,1,2,3\}$  the  $k$  same as  $S(s)$ .

2)

$$F(s) = S(s)S(1-s) \in i\mathbb{R} \Leftrightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

as  $\varphi(s)\varphi(1-s) = 1 \Rightarrow \theta(s) + \theta(1-s) \equiv 0[2\pi]$

$$\Rightarrow \frac{\theta(s) + \theta(1-s)}{2} = h\pi \quad (h \in \mathbb{Z})$$

$$S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]} \Rightarrow$$

$$S(s)S(1-s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}|S(1-s)|e^{i\left[\frac{\theta(1-s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2}\right]}$$

$$\Rightarrow F(s) = |S(s)||S(1-s)|e^{i\left[h\pi + \frac{\pi}{2} + k\pi\right]} \in i\mathbb{R}.$$

Claim 1. Let  $\theta(s) = \arg[\varphi(s)]$ , so

$$\left(\arg[S(s)] \equiv \left(\frac{\theta(s)}{2} + \frac{\pi}{4}\right)\left[\frac{\pi}{2}\right] \varepsilon r = \frac{1}{2}\right) \Rightarrow S(s) = 0$$

**Proof.** We have seen that

$$\arg[S(s)] \equiv \left(\frac{\theta(s)}{2} + \frac{\pi}{4}\right)\left[\frac{\pi}{2}\right] \Leftrightarrow F(s) \in i\mathbb{R}$$

$$\Rightarrow$$

$$F(s) = -i \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{n^r m^{1-r}}$$

$$r = \frac{1}{2} \Rightarrow$$

$$F(s) = -i \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{\sqrt{nm}}$$

$$\Rightarrow F(s) = 0$$

as

$$\sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{\sqrt{nm}} = \sum_{\substack{m \geq 1 \\ n \geq 1}} \frac{(-1)^{m+n} \sin([\ln(m) - \ln(n)]c)}{\sqrt{mn}}$$

$$\Rightarrow$$

$$\sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{\sqrt{nm}} = - \sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{\sqrt{nm}}$$

$$\sum_{\substack{n \geq 1 \\ m \geq 1}} \frac{(-1)^{n+m} \sin([\ln(n) - \ln(m)]c)}{\sqrt{nm}} = 0, \forall c \in \mathbb{R}$$

$$F(s) = 0 \Rightarrow S(s)S(1-s) = 0 \Rightarrow S(s) = S(1-s) = 0$$

$$\text{since } S(s) = \varphi(s)S(1-s)$$

**Proposition 3.**

$$S(s) = 0 \Rightarrow g(s) = \overline{\varphi(s)}S^2(s) - \varphi(s)\overline{S^2(s)} = 0 \Leftrightarrow F(s) \in \mathbb{R}$$

With  $\varphi$  such  $S(s) = \varphi(s)S(1-s)$ .

**Proof.** First implication is Trivial.

$$\begin{aligned}\overline{\varphi(s)}S^2(s) - \varphi(s)\overline{S^2(s)} &= 0 \Leftrightarrow \overline{\varphi(s)}S^2(s) = \varphi(s)\overline{S^2(s)} \\ &\Leftrightarrow \overline{\varphi(s)}S^2(s) \in \mathbb{R} \Leftrightarrow F(s) \in \mathbb{R} \\ &\text{since } F(s) = S(s)S(1-s) = \varphi(1-s)S^2(s) \\ &\Rightarrow \varphi(s)F(s) = \varphi(s)\varphi(1-s)S^2(s) = S^2(s) \\ &\Rightarrow |\varphi(s)|^2 F(s) = \overline{\varphi(s)}S^2(s) \in \mathbb{R}\end{aligned}$$

**Proposition 4.**

$$F(s) = S(s)S(1-s) \in \mathbb{R} \Leftrightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + k\frac{\pi}{2}\right]} \Leftrightarrow \arg[S(s)] \equiv \frac{\theta(s)}{2} \left[\frac{\pi}{2}\right]$$

such  $k \in \{0,1,2,3\}$  and  $\theta(s) = \arg[\varphi(s)]$

**Proof.**  $F(s) = S(s)S(1-s) \in \mathbb{R} \Leftrightarrow \overline{\varphi(s)}S^2(s) \in \mathbb{R}$

$$\Leftrightarrow \exists K \in \mathbb{R}/S^2(s) = K\varphi(s)$$

$$\Leftrightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2} + k\frac{\pi}{2}\right]} k \in \{0,1,2,3\}$$

## 2. A Conjecture

**Theorem 1.** Let  $\theta(s) = \arg[\varphi(s)]$

$$\arg[S(s)] \not\equiv \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow S(s) \neq 0$$

*With :  $\not\equiv$  is not congruate*

**Proof.** From the first to the last Proposition:

$$\arg[S(s)] \not\equiv \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow$$

For  $k \in \{0,1,2,3\}$

$$\left( \arg[S(s)] \neq \left( \frac{\theta(s)}{2} + k\frac{\pi}{2} \right) \ \& \ \arg[S(s)] \neq \left( \frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2} \right) \right)$$

$\Rightarrow$

$$\Rightarrow \left( \arg[S(s)] \neq \left( \frac{\theta(s)}{2} + k\frac{\pi}{2} \right) \text{ or } \arg[S(s)] \neq \left( \frac{\theta(s)}{2} + \frac{\pi}{4} + k\frac{\pi}{2} \right) \right)$$

$$\Rightarrow S(s) \neq 0 \text{ (since Proposition 1\&3)}$$

**Corollary 1.**

$$S(s) = 0 \Rightarrow \arg[S(s)] \equiv \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right]$$

**Proof.** The Contraposer of the last theorem.

**Proposition 5.**

$$r = \frac{1}{2} \Rightarrow \arg[S(s)] \equiv \frac{\theta(s)}{2} [\pi]$$

**Proof.** We have

$$S(s) = \varphi(s)S(1-s), \ \varphi(s) = \rho e^{i\theta}, \text{ and } s = r + ic, \text{ so}$$

$$\begin{aligned}
r = \frac{1}{2} &\Rightarrow 1 - s = \bar{s} \\
&\Rightarrow S(1 - s) = \overline{S(s)} \\
&\Rightarrow S(s) = e^{i\theta} \overline{S(s)} \quad \text{and} \quad \rho = 1 \\
&\Rightarrow S^2(s) = e^{i\theta} |S(s)|^2 \\
&\Rightarrow S(s) = |S(s)| e^{i\left(\frac{\theta}{2} + k\pi\right)}, \quad k \in \{0,1\}
\end{aligned}$$

Corollary 2.

$$\arg[S(s)] \neq \frac{\theta(s)}{2} [\pi] \Rightarrow r \neq \frac{1}{2}$$

**Proof.** The Contraposer of the last proposition.

Theorem 2.

$$\arg[S(s)] \neq \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow \left(r \neq \frac{1}{2} \& S(s) \neq 0\right)$$

**Proof.** We have

$$\arg[S(s)] \neq \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow \arg[S(s)] \neq \frac{\theta(s)}{2} [\pi]$$

and (see the last corollary)

$$\arg[S(s)] \neq \frac{\theta(s)}{2} [\pi] \Rightarrow r \neq \frac{1}{2}$$

so

$$\arg[S(s)] \neq \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow \left(r \neq \frac{1}{2}\right)$$

Also, we have (see the last theorem)

$$\arg[S(s)] \neq \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow (S(s) \neq 0)$$

So

$$\arg[S(s)] \neq \frac{\theta(s)}{2} \left[\frac{\pi}{4}\right] \Rightarrow \left(r \neq \frac{1}{2} \& S(s) \neq 0\right)$$

Theorem 3.

$$\forall s = r + ic \in \mathbb{C} \quad \text{such } r \in ]0,1[$$

$$\begin{cases} S(s) \neq 0 \& r \neq \frac{1}{2} \\ \text{or else } F^2(s) \in \mathbb{R} \end{cases}$$

**Proof.**

$$\text{Let } \delta \text{ such } \arg[S(s)] \equiv \delta \left[\frac{\pi}{4}\right]$$

$$\Leftrightarrow \arg[S(s)] = \delta + k \frac{\pi}{4}, \quad k \in \mathbb{Z}$$

- First case: If  $\delta \neq \frac{\theta}{2}$   
so  $\left(r \neq \frac{1}{2} \& S(s) \neq 0\right)$
- Second case: If  $\delta = \frac{\theta}{2} \& k = 2m$   
so  $\arg[S(s)] = \frac{\theta}{2} + m \frac{\pi}{2}$

$$\Rightarrow \arg [S(s)] \equiv \frac{\theta}{2} \left[ \frac{\pi}{2} \right]$$

$$\Rightarrow F(s) \in \mathbb{R}$$

as seen in Proposition- 4

$$F(s) = S(s)S(1-s) \in \mathbb{R} \Leftrightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2}+k\frac{\pi}{2}\right]} \Leftrightarrow \arg [S(s)] \equiv \frac{\theta(s)}{2} \left[ \frac{\pi}{2} \right]$$

- Third case: If  $\delta = \frac{\theta}{2}$  &  $k = 2m + 1$

$$\text{so } \arg [S(s)] = \frac{\theta}{2} + \frac{\pi}{4} + m\frac{\pi}{2}$$

$$\Rightarrow \arg [S(s)] \equiv \frac{\theta}{2} + \frac{\pi}{4} \left[ \frac{\pi}{2} \right]$$

$$\Rightarrow F(s) \in i\mathbb{R}$$

$$\text{as } F(s) = S(s)S(1-s) \in i\mathbb{R} \Leftrightarrow S(s) = |S(s)|e^{i\left[\frac{\theta(s)}{2}+\frac{\pi}{4}+k\frac{\pi}{2}\right]} \quad (\text{seen Remark 2}).$$

In the last two cases ( $F(s) \in \mathbb{R}$  or  $F(s) \in i\mathbb{R}$ )

$$\Leftrightarrow F^2(s) \in \mathbb{R}$$

So  $(S(s) \neq 0 \text{ \& } r \neq \frac{1}{2})$  or else  $(F^2(s) \in \mathbb{R})$

according to the disjunction of the cases.

**Conjecture 1.** If the Riemann Hypothesis is true

$$F^2(s) \in \mathbb{R} \Leftrightarrow r = \frac{1}{2}$$

**Remark 4.** We have

$$\forall s = r + ic \in \mathbb{C}/r \in ]0,1[ \left[ (S(s) \neq 0 \& r \neq \frac{1}{2}) \text{ or else } (S(s) = 0 \text{ or } r = \frac{1}{2}) \right] (P \text{ or else } \bar{P})$$

$$\forall s = r + ic \in \mathbb{C}/r \in ]0,1[ [(S(s) \neq 0 \text{ Es } r \neq \frac{1}{2}) \text{ or else } (F^2(s) \in \mathbb{R})] \text{ (the last theorem)}$$

If R.H. is true, so

$$S(s) = 0 \Rightarrow r = \frac{1}{2}$$

so

$$(S(s) = 0 \text{ or } r = \frac{1}{2}) \Leftrightarrow (r = \frac{1}{2})$$

So, if R.H. is true

$$(S(s) \neq 0 \text{ \& } r \neq \frac{1}{2}) \text{ or else } (r = \frac{1}{2})$$

So, from the last theorem and if the R.H. is true

$$F^2(s) \in \mathbb{R} \Leftrightarrow r = \frac{1}{2}$$

**Proof. (2° proof)** Or better: Let

$$\Omega = \{s \in \mathbb{C} / r = \text{Re}(s) \in ]0,1[ \}$$

$$P = \left\{ s \in D / S(s) \neq 0 \text{ \& } r \neq \frac{1}{2} \right\}$$

$$D = \left\{ s \in \Omega / r = \text{Re}(s) = \frac{1}{2} \right\}$$

$$F = \{s \in \Omega / F^2(s) \in \mathbb{R}\}$$

So we have

$$\Omega = P \triangle \bar{P} \text{ \& } \Omega = P \triangle F \text{ (see the last theorem)}$$

$$\Rightarrow P \triangle \bar{P} = P \triangle F$$

$$\Rightarrow \bar{P} = F$$

with  $\bar{P} = \{ s \in D / S(s) = 0 \text{ or } r = \frac{1}{2} \}$

and  $\Delta$  the symmetric difference

$$\begin{aligned} A \Delta B &= (A \cup B) - (A \cap B) \\ &= (A \cup B) / (A \cap B) \\ &= (A \cup B) \cap \overline{(A \cap B)} \end{aligned}$$

$A \Delta B = A \Delta C \Rightarrow B = C$  (from Idempotent & Regularity property)

If  $R.H.$  is true

$$\begin{aligned} S(s) = 0 &\Rightarrow r = \frac{1}{2} \\ \Rightarrow \bar{P} &= D \\ \Rightarrow & \end{aligned}$$

$$F = D$$

$R.H.$  is true  $\Rightarrow$

$$F^2(s) \in \mathbb{R} \Leftrightarrow r = \frac{1}{2}$$

**Theorem 4.**

Riemann's Hypothesis is not true

**Proof.** We have  $\forall s = r \in ]0,1[ \quad (s \in \mathbb{R})$

$S(s) \in \mathbb{R} \text{ \& } S(1-s) \in \mathbb{R}$  (because  $c=0$ )

Since  $S(s) = \sum_{n \geq 1} \frac{(-1)^{n-1}}{n^s}$  &  $S(1-s) = \sum_{n \geq 1} \frac{(-1)^{n-1}}{n^{1-s}}$

$\Rightarrow F(s) = S(s)S(1-s) \in \mathbb{R}$

So  $\exists r \neq \frac{1}{2} (\& r \in ]0,1[)$  such  $F(s) \in \mathbb{R}$

$\Rightarrow R.H.$  is not true (the contraposer of the conjecture).

### 3. Conclusions

We have a new conjecture that is based on Riemann's Hypothesis (see [1]), and therefore it is a new way to see if this hypothesis is just, otherwise we also have a new useful to determine a counter example. So and in the end, we conclude that the Riemann Hypothesis is not true.

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# A NEW WAY OF LOOKING AT COMPLEX NUMBERS

Pr. Aziz ARBAI

Abdelmalek Essaadi University, Navarre place, San Francisco 3 -Tangier - 9000, MOROCCO

Dr. Amina BELLEKBIR

University of Sciences, Abdelmalek Essaadi University, Tetouan, Morocco

## Abstract

A new way to teach and to solve problems in complex numbers, as how to use the Moivre Formula, Newton's Binomial and Euler formula for the linearization. We will also share new results like The "Magic Formula" of the second root of any complex number, and the true method to solve the equation of second degree in general case (with complex coefficients) with the explicit formula of the solution and an algorithm to program it.

## 1. A SIMPLE TABLE:

In this section, we will introduce for the first time a simple table to simplify the calculations using Newton's binomial formula in the Moivre formula or Euler formula for the linearization.

### 1.1. The Moivre formula:

For all  $n \in \mathbb{Z}$ , the formula:  $(\cos \theta + i \sin \theta)^n = \cos (n\theta) + i \sin (n\theta)$  is used in particular to express  $\cos (n\theta)$  and  $\sin (n\theta)$  as a function of  $\cos \theta$  and  $\sin \theta$ .

#### Example-1:

Write  $\cos (5x)$  as a function of  $\cos (x)$  and  $\sin (x)$

According to the Moivre formula, we have

$$\cos (n\theta) + i \sin (n\theta) = (\cos \theta + i \sin \theta)^n$$

For example, for  $n = 5$  and  $\theta = x$ ,

$$z = \cos (5x) + i \sin (5x) = (\cos x + i \sin x)^5$$

We notice that  $\cos (5x)$  is exactly the real part of the first member of the equality (and of  $z$ ), so it is enough to expand the 5 th power (i.e. to distribute all) in the second member and extract its real part.

$$\begin{aligned} \cos (5x) &= \operatorname{Re} [\cos (5x) + i \sin (5x)] \\ &= \operatorname{Re} [(\cos x + i \sin x)^5] \end{aligned}$$

**Remark 1.** It is the same for the general case, we always need to develop the power  $n$  in  $(\cos \theta + i \sin \theta)^n$  to extract the real part, hence the need for another very important formula called Newton's Binomial:

$$(a + b)^n = \sum_{k=0}^n C_n^k a^k b^{n-k}$$



With  $C_n^k = \frac{n!}{k!(n-k)!}$ ,  $n! = n \times (n-1)! = n \times (n-1) \times \dots \times 2 \times 1$

By convention we take  $0! = 1$

$$C_n^n = \frac{n!}{n!(n-n)!} = \frac{n!}{n!0!} = 1,$$

$$C_n^0 = C_n^n,$$

$$C_n^1 = \frac{n!}{1!(n-1)!} = C_n^{n-1} = n$$

In the general case:

$$C_n^{n-k} = C_n^k$$

**Claim 1.** To facilitate product calculations, powers and a summation should be done at the end, so, we draw up the following table:

Table-1: (the Simple table)

| $k$      | $C_n^k$  | $a^k$        | $b^{n-k}$  | $\prod_{b^n}$   |
|----------|----------|--------------|------------|-----------------|
| 0        | 1        | 1            | $b^n$      | $nab^{n-1}$     |
| 1        | $n$      | $a$          | $b^{n-1}$  |                 |
| $\vdots$ | $\vdots$ | $\vdots$     | $\vdots$   |                 |
| $k$      | $*$      | $\vdots$     | $\vdots$   |                 |
| $\vdots$ | $\vdots$ | $\downarrow$ | $\uparrow$ | $\vdots$        |
| $n-k$    | $*$      | $\vdots$     | $\vdots$   |                 |
| $\vdots$ | $\vdots$ | $\vdots$     | $\vdots$   |                 |
| $n-1$    | $n$      | $a^{n-1}$    | $b$        | $na^{n-1}b$     |
| $n$      | 1        | $a^n$        | 1          | $a^n$           |
|          |          |              |            | result = $\sum$ |

Therefore, to calculate

$$(\cos x + i \sin x)^5 = \sum_{k=0}^5 C_5^k \cos^k(x) (i \sin x)^{5-k}$$

we put the following table:

| $k$ | $C_5^k$ | $\cos^k(x)$ | $(i \sin x)^{5-k}$ | $\prod$                     |
|-----|---------|-------------|--------------------|-----------------------------|
| 0   | 1       | 1           | $i \sin^5(x)$      | $i \sin^5(x)$               |
| 1   | 5       | $\cos x$    | $\sin^4(x)$        | $5 \cos x \sin^4(x)$        |
| 2   | 10      | $\cos^2(x)$ | $-i \sin^3(x)$     | $-10 i \cos^2(x) \sin^3(x)$ |
| 3   | 10      | $\cos^3(x)$ | $-\sin^2(x)$       | $-10 \cos^3(x) \sin^2(x)$   |
| 4   | 5       | $\cos^4(x)$ | $i \sin x$         | $5 i \cos^4(x) \sin x$      |
| 5   | 1       | $\cos^5(x)$ | 1                  | $\cos^5(x)$                 |
|     |         |             |                    | result = $\sum$             |

Consequently,

$$\begin{aligned}
 (\cos x + i \sin x)^5 &= i \sin^5(x) + 5 \cos x \sin^4(x) + \\
 &\quad -10 i \cos^2(x) \sin^3(x) + \\
 &\quad -10 \cos^3(x) \sin^2(x) + \\
 &\quad +5 i \cos^4(x) \sin x + \cos^5(x) \\
 (\cos x + i \sin x)^5 &= [\cos^5(x) + 5 \cos x \sin^4(x) + \\
 &\quad -10 \cos^3(x) \sin^2(x)] + \\
 &\quad + i [\sin^5(x) + 5 \cos^4(x) \sin x + \\
 &\quad -10 \cos^2(x) \sin^3(x)] \\
 &= \operatorname{Re}(z) + i \operatorname{Im}(z)
 \end{aligned}$$

Conclusion:

$$\cos(5x) = \cos^5(x) + 5\cos x \sin^4(x) - 10\cos^3(x)\sin^2(x)$$

## 2.1. Linearization:

It is about writing the product  $\cos^p(\theta)\sin^q(\theta)$ , with  $p \in \mathbb{N}$  and  $q \in \mathbb{N}$ , as a sum of terms of the form  $\cos(n\theta)$  or  $\sin(m\theta)$ , with  $n \in \mathbb{N}$  and  $m \in \mathbb{N}$ .

We replace  $\cos$  and  $\sin$  using Euler's formulas:

Example-2:

$$\cos \theta = \frac{e^{i\theta} + e^{-i\theta}}{2}, \sin \theta = \frac{e^{i\theta} - e^{-i\theta}}{2i}$$

Linearize  $\cos^3(x)\sin^2(x)$ .

We have:

$$\begin{cases} \cos x = \frac{e^{ix} + e^{-ix}}{2} \\ \sin x = \frac{e^{ix} - e^{-ix}}{2i} \end{cases}$$

So

$$\begin{aligned} \cos^3(x)\sin^2(x) &= \left(\frac{e^{ix} + e^{-ix}}{2}\right)^3 \left(\frac{e^{ix} - e^{-ix}}{2i}\right)^2 \\ &= -\frac{1}{32}(e^{ix} + e^{-ix})^3(e^{ix} - e^{-ix})^2 \end{aligned}$$

Although,

$$\begin{aligned} (e^{ix} - e^{-ix})^2 &= (e^{ix})^2 - 2e^{ix}e^{-ix} + (e^{-ix})^2 \\ &= e^{i2x} - 2 + e^{-i2x} \end{aligned}$$

and

$$(e^{ix} + e^{-ix})^3 = \sum_{k=0}^3 C_3^k (e^{ix})^k (e^{-ix})^{3-k}$$

Therefore, as we notice, we have to apply Newton's Binomial formula again and draw up "the Simple table" like we did for example-1.

| $k$ | $C_3^k$ | $(e^{ix})^k$ | $(e^{-ix})^{3-k}$ | $\Pi$        |
|-----|---------|--------------|-------------------|--------------|
| 0   | 1       | 1            | $e^{-i3x}$        | $e^{-i3x}$   |
| 1   | 3       | $e^{ix}$     | $e^{-i2x}$        | $3e^{-ix}$   |
| 2   | 3       | $e^{i2x}$    | $e^{-i}$          | $3e^{ix}$    |
| 3   | 1       | $e^{i3x}$    | 1                 | $e^{i3x}$    |
|     |         |              |                   | $\sum (\Pi)$ |

Thus

$$(e^{ix} + e^{-ix})^3 = e^{-i3x} + 3e^{-i} + 3e^{ix} + e^{i3x}$$

Consequently,

$$\begin{aligned}
\cos^3(x)\sin^2(x) &= -\frac{1}{32}(e^{-i3x} + 3e^{-i} + 3e^{ix} + e^{i3x}) \times \\
&\times (e^{i2x} - 2 + e^{-i2x}) \\
&= -\frac{1}{32}(e^{-ix} - 2e^{-i3x} + e^{-i5x} + 3e^{ix} - 6e^{-ix} + 3e^{-i3x}) + \\
&- \frac{1}{32}(3e^{i3x} - 6e^{ix} + 3e^{-i} + e^{i5x} - 2e^{i3x} + e^{ix}) \\
&= -\frac{1}{32}(e^{-ix} - 6e^{-ix} + 3e^{-i3x} + 3e^{ix} - 6e^{ix} + e^{ix} - 2e^{-i3x}) + \\
&- \frac{1}{32}(3e^{-i3x} + 3e^{i3x} - 2e^{i3x} + e^{i5x} + e^{-i5x}) \\
&= -\frac{1}{32}(-2e^{-i} + -2e^{ix} + e^{-i3x} + e^{i3x} + e^{i5x} + e^{-i5x}) \\
&= -\frac{1}{32}\left(-4\left(\frac{e^{-ix} + e^{ix}}{2}\right) + 2\left(\frac{e^{-i3x} + e^{i3x}}{2}\right) + 2\left(\frac{e^{i5x} + e^{-i5x}}{2}\right)\right) \\
&= -\frac{1}{32}(-4\cos x + 2\cos(3x) + 2\cos(5x))
\end{aligned}$$

Conclusion:

$$\cos^3(x)\sin^2(x) = \frac{1}{8}\cos x - \frac{1}{16}\cos(3x) - \frac{1}{16}\cos(5x)$$

## 2. The Magic Formula of ARBAI:

We suppose that  $z \in \mathbb{C} \setminus \mathbb{R}$  and we cannot write  $z$  explicitly in exponential or geometric form. Hence,  $\exists(a, b) \in \mathbb{R}/z = a + ib$  (which means  $z$  is a complex not real with  $b \neq 0$ ).

Thereafter, we write  $z^{\frac{1}{2}}$  in the algebraic form  $z^{\frac{1}{2}} = x + iy$  and we try to find a couple  $(x, y) \in \mathbb{R}^2$  such that  $(x + iy)^2 = a + ib$ .

This step is a bit long, especially with the distressing calculations that repeats every time when practical work, especially when it comes to teach students how to find  $z^{\frac{1}{2}}$  by hand, mostly when we are solving an equation of second degree with complex coefficients or a second-degree differential equations.

This article aims to find finally "the Magic Formula of Arbai"  $z^{\frac{1}{2}}$  in function of  $z$  (and so  $\Delta^{\frac{1}{2}}$  in function of  $\Delta$ ) and therefore result in a direct algorithm, exact and very fast for us to determine the solutions of equation of second degree with complex coefficients.

### 2.1. The second root:

2.1.1. If  $z \in \mathbb{R}$ :

$$z^{\frac{1}{2}} = \pm i^{\frac{1-\text{sign}(z)}{2}} \sqrt{|z|}$$

Where:

If  $z \geq 0$  then  $\text{sign}(z) = +$  and  $|z| = z$

If  $z \leq 0$  then  $\text{sign}(z) = -$  and  $|z| = -z$

2.1.2. If  $z \notin \mathbb{R}$ : which means that  $z \in \mathbb{C} \setminus \mathbb{R}$

$$z^{\frac{1}{2}} = \pm \frac{\frac{|z| + z}{2}}{\sqrt{\frac{|z| + \operatorname{Re}(z)}{2}}}$$

See [1], [2]

Where

$|z| = \sqrt{\operatorname{Re}(z)^2 + \operatorname{Im}(z)^2}$  ( $z$ 's modulus) or  $|z| = \sqrt{z\bar{z}}$

$\operatorname{Re}(z)$  (The real part of  $z$ )

$\operatorname{Im}(z)$  (The imaginary part of  $z$ ).

**Proof.**

$$\begin{aligned} \left( \pm \frac{\frac{|z| + z}{2}}{\sqrt{\frac{|z| + \operatorname{Re}(z)}{2}}} \right)^2 &= \frac{|z|^2 + 2|z|z + z^2}{2(|z| + \operatorname{Re}(z))} = \frac{z\bar{z} + 2|z|z + z^2}{2(|z| + \operatorname{Re}(z))} \\ &= \frac{z}{2} \left( \frac{\bar{z} + 2|z| + z}{|z| + \operatorname{Re}(z)} \right) = \frac{z}{2} \left( \frac{2|z| + 2\operatorname{Re}(z)}{|z| + \operatorname{Re}(z)} \right) \\ &= z \end{aligned}$$

Because  $\bar{z} + z = 2\operatorname{Re}(z)$  and  $z\bar{z} = |z|^2$ .

**Claim2.**

If  $z \in \mathbb{R}$  then  $z^{\frac{1}{2}} = \pm i^{\frac{1 - \operatorname{sign}(z)}{2}} \sqrt{|z|}$

If  $z \notin \mathbb{R}$  then  $z^{\frac{1}{2}} = \pm \frac{\frac{|z| + z}{2}}{\sqrt{\frac{|z| + \operatorname{Re}(z)}{2}}}$

**2.2. A new way to solve an equation of second degree:**

Let the equation:

$$\begin{aligned} az^2 + bz + c &= 0 \\ a \neq 0 &\Rightarrow z^2 + \frac{b}{a}z + \frac{c}{a} = 0 \\ \Leftrightarrow z^2 + 2\frac{b}{2a}z + \frac{b^2}{4a^2} - \frac{b^2}{4a^2} + \frac{c}{a} &= 0 \\ \Leftrightarrow \left( z + \frac{b}{2a} \right)^2 &= \frac{b^2 - 4ac}{4a^2} \end{aligned}$$

Let  $\Delta \in \mathbb{C}$  such that  $\Delta = b^2 - 4ac$ .

$$\left( z + \frac{b}{2a} \right)^2 = \frac{\Delta}{4a^2} = \left( \frac{\Delta^{\frac{1}{2}}}{2a} \right)^2$$

With  $\Delta^{\frac{1}{2}}$  a second root of  $\Delta$  (in  $\mathbb{C}^*$  we have always two second root  $\pm \Delta^{\frac{1}{2}}$ ).

So

$$z = \frac{-b \pm \Delta^{\frac{1}{2}}}{2a}$$

We have two cases:

(1) First case:

If  $\Delta \in \mathbb{R}$

$$\Delta^{\frac{1}{2}} = \pm i^{\frac{1-\text{sign}(\Delta)}{2}} \sqrt{|\Delta|}$$

Therefore, we can generalize:

$$z = \frac{-b \pm i^{\frac{1-\text{sign}(\Delta)}{2}} \sqrt{|\Delta|}}{2a} \text{ if } \Delta \in \mathbb{R}$$

Where:

If  $\Delta \geq 0$  then  $\text{sign}(\Delta) = +$  and  $|\Delta| = \Delta$

If  $\Delta \leq 0$  then  $\text{sign}(\Delta) = -$  and  $|\Delta| = -\Delta$

(2) Second case:

If  $\Delta \notin \mathbb{R}$  (i.e.  $\Delta \in \mathbb{C} \setminus \mathbb{R}$ )

$$\Delta^{\frac{1}{2}} = \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \text{Re}(\Delta)}{2}}} \text{ and } z = \frac{-b \pm \Delta^{\frac{1}{2}}}{2a}$$

So

$$z = \frac{-b \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \text{Re}(\Delta)}{2}}}}{2a}$$

With  $\|\Delta\| = \sqrt{\text{Re}(\Delta)^2 + \text{Im}(\Delta)^2}$  ( $\Delta$ 's modulus) or  $\|\Delta\| = \sqrt{\Delta \bar{\Delta}}$

$\text{Re}(\Delta)$  (The real part of  $\Delta$ )

$\text{Im}(\Delta)$  (The imaginary part of  $\Delta$ ).

Claim 3.

$$\begin{aligned} \text{First case: If } \Delta \in \mathbb{R} \text{ then } z &= \frac{-b \pm i^{\frac{1-\text{sign}(\Delta)}{2}} \sqrt{|\Delta|}}{2a} \\ \text{Second case: If } \Delta \notin \mathbb{R} \text{ then } z &= \frac{-b \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \text{Re}(\Delta)}{2}}}}{2a} \end{aligned}$$

2.3. Algorithm:  $\rightarrow a, b, c$

$\rightarrow \Delta = b^2 - 4ac$

$\rightarrow$  If  $\Delta \in \mathbb{R}$  So  $z = \frac{-b \pm i^{\frac{1-\text{sign}(\Delta)}{2}} \sqrt{|\Delta|}}{2a}$  end

$$\begin{aligned} \rightarrow \delta &= \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \operatorname{Re}(\Delta)}{2}}} \\ \rightarrow z &= \frac{-b \pm \delta}{2a} \quad \text{end} \end{aligned}$$

→ Else,

**Example 1:**

Calculate all second root of  $z = 21 + 20i$  :

It is impossible to write it explicitly in exponential or geometric form.

By applying our formula:

We have

$$z^{\frac{1}{2}} = \pm \frac{\frac{|z| + z}{2}}{\sqrt{\frac{|z| + \operatorname{Re}(z)}{2}}}$$

$$|z| = \sqrt{(21)^2 + (20)^2} = \sqrt{441 + 400} = \sqrt{841}$$

Then

$$|z| = 29$$

Therefore,

$$\begin{aligned} z^{\frac{1}{2}} &= \pm \frac{\frac{29+21+20i}{2}}{\sqrt{\frac{29+21}{2}}} = \pm \frac{25+10i}{\sqrt{25}} \\ \text{Then,} \quad z^{\frac{1}{2}} &= \pm(5 + 2i) \end{aligned}$$

**Example 2:**

Solving in  $\mathbb{C}$  the equation:

$$z^2 - (2 + i)z + 2i = 0$$

We have

$$\Delta = (2 + i)^2 - 4 \times 2i = 4 - 1 + 4i - 8i$$

⇒

$$\Delta = 3 - 4i$$

$$\Delta \in \mathbb{C} \setminus \mathbb{R} \Rightarrow \Delta^{\frac{1}{2}} = \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \operatorname{Re}(\Delta)}{2}}} \text{ and } z = \frac{-b \pm \Delta^{\frac{1}{2}}}{2a}$$

$$\|\Delta\| = \sqrt{9 + 16}$$

$$\|\Delta\| = 5$$

So

$$\Delta^{\frac{1}{2}} = \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \operatorname{Re}(\Delta)}{2}}} = \pm \frac{\frac{5 + 3 - 4i}{2}}{\sqrt{\frac{5 + 3}{2}}}$$

$$\Delta^{\frac{1}{2}} = \pm \frac{4 - 2i}{2} = \pm(2 - i)$$

$$z = \frac{(2 + i) \pm (2 - i)}{2}$$

$$S = \{i, 2\}$$

We can verify that

$$(z - i)(z - 2) = z^2 - (2 + i)z + 2i.$$

### 3. CONCLUSION:

Ultimately,

(1) To facilitate the calculations when applying Moivre formula, or Euler formula for Linearization using Newton's binomial and without involving Pascal's triangle formula (because there are at the same time products, powers and a summation to be done at the end), we draw up the table-1 (the Simple table).

(2) We give the general formula that gives us the second roots (square root) of a complex number.

So, let  $\alpha \in \mathbb{C} \setminus \mathbb{R}$ ,

Then

$$X^2 = \alpha \Leftrightarrow X = \pm \frac{\frac{\|\alpha\| + \alpha}{2}}{\sqrt{\frac{\|\alpha\| + \operatorname{Re}(\alpha)}{2}}}$$

Or

$$\alpha^{\frac{1}{2}} = \pm \frac{\frac{\|\alpha\| + \alpha}{2}}{\sqrt{\frac{\|\alpha\| + \operatorname{Re}(\alpha)}{2}}}$$

(3) We have a new method and new way to resolve an equation of second degree with complex coefficients.

There are two cases:

$$\Delta \in \mathbb{R} \left( z = \frac{-b \pm i \frac{1 - \operatorname{sign}(\Delta)}{2} \sqrt{|\Delta|}}{2a} \right) \text{ or not } \left( z = \frac{-b \pm \frac{\frac{\|\Delta\| + \Delta}{2}}{\sqrt{\frac{\|\Delta\| + \operatorname{Re}(\Delta)}{2}}}}{2a} \right)$$

with  $\Delta = b^2 - 4ac$ .

Therefore, we gave all the fast and efficient methods and formulas to solve an equation of second degree with complex coefficients.

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# HYPOTHESIS DISCUSSION ON THE EXPERIMENTS OF A LARGE SAMPLE OF TOSSING OF THE COIN

ABHAY KRISHAN

Guest Faculty, Netaji Subhash University of Technology (NSUT) West Campus, Delhi-110073 (India)

## ABSTRACT

A coin is tossed and the outcome experiment worked for the existence of the biased condition or unbiased condition. There are possible different conditions to check for biased or unbiased one, with a testing of chi-square distribution. For the first experiment, a coin is tossed 10,000 times and it is evaluated whether a coin is biased or not. For the second experiment, a biased coin condition is given and to check the range of the standard error of the observed outcomes. For the last experiment, total number of tosses the coin is less for two different conditions, for an un-weighted coin probability information from both the sets of data. The hypothesis testing on these experiments allow to get the relevant condition outcomes, with the information of the sampling distributions. These three experiments have a difference to check for the biased or unbiased condition outcomes, to check a particular range of the outcomes with the hypothesis testing and also have the condition of the exact sampling distributions. These are different samples of the tossing of the coin with different experiments, to check the conditions theoretically, to get the standard errors in different conditions, and a change in the data sets distribution, that allows to estimate the probability distribution with a random data variations.

**KEYWORDS:** - Null Hypothesis, Chi-square, un-weighted coin.

## INTRODUCTION

There are different classes of the distributions for the sampling. The samplings distribution allows to comment upon the data. The group of individuals under study is called population. A fine subset of statistical individuals in a population is called sample.

Purposive sampling is one in which the sample units are selected with definite purpose in view. A random sample is one in which each unit of population has an equal chance of being included in it. Simple sampling is random sampling in which each unit of the population has an equal chance say,  $p$  of being included in the sample and that this probability is independent of previous drawings. Thus a simple sample of size  $n$  independent trials with constant probability ' $p$ ' of success for each trial. For the stratified sampling, the entire homogeneous population is divided into a number of homogeneous groups, called strata, which differ from one another

but each of these groups is homogeneous within itself. The units are samples at random from each of these stratum, the sample size in each stratum varies according to the relative importance of the stratum in the population. The sample which is the aggregate of the sampled units of each of the stratum, is stratified sample, and the technique of drawing this sample is known as stratified sampling.

## EXPERIMENTATIONS

There are three different classes of the experiments for the theoretical results with the Hypothesis. The three experiments are:-

- The coin is tossed 10,000 times and it turned up head 5,265 items. Discuss whether the coin may be regarded as unbiased one.
- A biased coin is tossed 400 times and head resulted 240 times. Find the standard error of the observed proportion of heads and deduce that the probability of getting a head in a single throw of the coin lies almost certainly between 0.53 and 0.67.
- A coin is tossed 20 times, resulting in 6 heads and 14 tails. Using the  $\chi^2$  test, estimate the probability that the coin is un-weighted. Suppose another set of tosses of the same coin is made and 8 heads and 12 tails are obtained. What is the probability of having an un-weighted coin based on the information from both sets of data?

## EXPERIMENT SOLUTIONS

The Hypothesis solution is designed for the different conditions in the problems.

- The coming of head 5,265 times is called a success.

$n=10,000$ ;  $X$  = Number of success = 5,265

Under the null Hypothesis ( $H_0$ ) that the coin is unbiased one,

$$P = \text{probability of success} = \text{probability of getting head} = \frac{1}{2}$$

Alternate Hypothesis,  $H_1$ :  $p \neq \frac{1}{2}$ , which means dice is biased

We have  $Z = \frac{X - nP}{\sqrt{nPQ}} \sim N(0, 1)$ , since  $n$  is large.

$$\text{Now } Z = \frac{5,265 - 10,000 \times (\frac{1}{2})}{\sqrt{10,000 \times (\frac{1}{2}) \times (\frac{1}{2})}} = \frac{265}{50} = 5.3$$

Since  $|Z| > 3$ ,  $H_0$  is rejected and we conclude that the tossed coin is almost certainly biased.

Since tossed is not unbiased,  $P \neq \frac{1}{2}$ . The probable limits for 'P' are given by:

$$\hat{P} \pm 3\sqrt{\hat{P}\hat{Q}/n} = p \pm 3\sqrt{pq/n}, \text{ where } p = \frac{5,265}{10,000} = 0.5265 \text{ and } q = 1 - 0.5265 = 0.4735$$

Probable limits for population proportion of success:

$$\hat{P} \pm 3\sqrt{\hat{P}\hat{Q}/n} = 0.5265 \pm 3\sqrt{0.5265 \times 0.4735 / 10,000} = 0.5265 \pm 3(0.003438) = 0.5162, 0.5368$$

Hence, the probability of getting the head for tossing a coin almost lies certainly between 0.5162 and 0.5368.

b. The coming of head 240 times is called a success.

$n=400$ ;  $X$ = Number of success= $240$

Under the null Hypothesis ( $H_0$ ) that the coin is unbiased one,

$P$ =probability of success=probability of getting head= $\frac{1}{2}$

Alternate Hypothesis,  $H_1$ :  $p \neq \frac{1}{2}$ , which means dice is biased

We have  $Z = \frac{X-nP}{\sqrt{nPQ}} \sim N(0, 1)$ , since  $n$  is large.

$$\text{Now } Z = \frac{240 - 400 \times \left(\frac{1}{2}\right)}{\sqrt{400 \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right)}} = \frac{40}{10} = 4$$

Since  $|Z| > 3$ ,  $H_0$  is rejected and we conclude that the tossed coin is almost certainly biased.

Since tossed is not unbiased,  $P \neq \frac{1}{2}$ . The probable limits for 'P' are given by:

$$\hat{P} \pm 3\sqrt{\hat{P}\hat{Q}/n} = p \pm 3\sqrt{pq/n}, \text{ where } p=0.6 \text{ and } q=1-0.6=0.4$$

Probable limits for population proportion of success:

$$\hat{P} \pm 3\sqrt{\hat{P}\hat{Q}/n} = 0.6 \pm 3\sqrt{0.6 \times 0.4/400} = 0.6 \pm 0.0735 = 0.53, 0.67$$

Hence, the probability of getting the head for tossing a coin almost lies certainly between 0.53 and 0.67.

c. For each set of data, we may take only two observations: the number of heads and the number of tails. Thus  $n=2$ . Further, we impose one restriction on the data: the number of tosses is fixed. Thus,  $k=1$  and the number of degree of freedom is

$$F=n-k=2-1=1$$

The value of interest are:

**Table 1**

| Status | Observed | Expected |
|--------|----------|----------|
| Heads  | 6        | 10       |
| Tails  | 14       | 10       |

For these values  $\chi^2$  is calculated as

$$\chi^2 = \frac{(6-10)^2}{10} + \frac{(14-10)^2}{10} = 3.20$$

Consulting chi-square tables

We find  $P=0.078$ , that is 8% chance that this distribution is just the result of random fluctuations and the coin may be un-weighted.

Now, consider the additional information we gain about the coin from the second set of observations. When we have four observations: the number of heads and tails in each set. There are only two restrictions on the data: the total number of tosses is fixed in each set. Thus, the number of degrees of freedom is

$$F=n-k=4-2=2$$

For the second set of data the values of interest are:

**Table 2**

| Status | Observed | Expected |
|--------|----------|----------|
| Heads  | 8        | 10       |
| Tails  | 12       | 10       |

Chi-squared is now calculated on the basis of all the four observations:

$$\chi^2 = \frac{(6-10)^2}{10} + \frac{(14-10)^2}{10} + \frac{(8-10)^2}{10} + \frac{(12-10)^2}{10} = 3.20$$

Consulting chi-square tables,

We find  $p=0.15$ . So, with the additional information we find a stronger likelihood that the tosses are following a random variation and that the coin is un-weighted.

## CONCLUSION AND FUTURE SCOPE

There is discussion of three theoretical observations of the hypothesis. First two have a different condition of the tossing a coin with the large number of samples. The third is with a limited number of samples with a different conditions. All the Hypothesis results evaluated successfully with a desired range. For the future, it is also possible to link the hypothesis with a different classes of samples with the variation of different observations.

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## Political Sciences

### Cyberzagrożenia jako rodzaj agresji hybrydowej – doświadczenie Rzeczypospolitej Polskiej w zakresie zapobiegania i przeciwdziałania takim zjawiskom

Hranovskyi Mykola

student studiów doktoranckich Katedry Nauk Politycznych i Filozofii Instytutu Edukacyjno-Naukowego „Instytut Administracji Publicznej” Charkowskiego Narodowego Uniwersytetu im. V. N. Karazina, Charków, Ukraina

Karamyshev Dmytro

doktor nauk z administracji publicznej, profesor Katedry Polityki Społecznej i Humanitarnej Charkowskiego Narodowego Uniwersytetu im. V. N. Karazina, Charków, Ukraina

**Adnotacja.** W dzisiejszym świecie istnieje tendencja do znacznego wzrostu liczby cyberataków, które stają się coraz bardziej wyrafinowane i nieprzewidywalne. Kwestia zapewnienia bezpieczeństwa cybernetycznego stała się niezwykle istotna dla krajów świata, ale środki przeciwdziałania wyzwaniom i zagrożeniom w tym obszarze są nadal istotne dla społeczności światowej. W związku z powyższym przedstawiono krótką analizę działań mających na celu zapobieganie i przeciwdziałanie cyberzagrożeniom na przykładzie Rzeczypospolitej Polskiej.

**Słowa kluczowe:** cyberbezpieczeństwo, cyberatak, obiekty infrastruktury krytycznej państwa, incydent, współpraca międzynarodowa w zakresie ochrony cyberprzestrzeni.

**Sformułowanie problemu.** Jednym z kluczowych problemów, z jakimi spotykają się państwa świata, jest problem ochrony informacji przed wyzwaniami i zagrożeniami w cyberprzestrzeni. Znaczenie kwestii bezpieczeństwa cybernetycznego jest dziś niewątpliwe, ponieważ każdy współczesny człowiek stoi przed koniecznością korzystania z systemów i technologii informatycznych, od sieci społecznościowych, zamieszczania informacji o swoich danych osobowych w Internecie po korzystanie z banku konta, systemy e-commerce itp.

**Analiza najnowszych badań i publikacji.** Badanie problematyki bezpieczeństwa cybernetycznego jako elementu ochrony informacji państwa we współczesnych warunkach jest przedmiotem uwagi wielu naukowców: S. Morgana, A. Klimburga, M. Schmidta, M. Gedekera, M. Libitskiego, J. Nye, I. Zubarev, M. Bezkorovainy, P. Olchowska, J. Garbiński, O. Krokowska, D. Dubov, M. Ozhevan, V. Furashev, V. Buryachok, V. Butuzov, V. Tolubko, O. Dovgan, V. O. Khoroshko, S. V. Tolyupa, M. Balyuk, V. Doroshko i inni. Mimo dużej ilości opracowań w tym zakresie, kwestia zapewnienia cyberbezpieczeństwa jako integralnego elementu systemu bezpieczeństwa informacji, zwłaszcza w warunkach wojny hybrydowej wciąż pozostaje otwarta.

Ponieważ Polska zajmuje się rozwiązywaniem tego problemu systematycznie i na poziomie krajowym, zwracając szczególną uwagę na zapobieganie i przeciwdziałanie cyberzagrożeniom, sugeruje się zapoznanie się z analizą polskich doświadczeń w rozwiązywaniu istniejących problemów z zakresu prewencji i przeciwdziałania cyberzagrożeniom.

**Celem** niniejszego artykułu jest analiza aktualnego stanu zwalczania cyberataków w krajach UE, w szczególności w Rzeczypospolitej Polskiej.

**Prezentacja głównego materiału badawczego.** 1 sierpnia 2018 r. Prezydent RP podpisał ustawę o Krajowym Systemie Cyberbezpieczeństwa [3]. Ustawa ta wdraża dyrektywę Parlamentu Europejskiego i Rady (UE) 2016/1148 Dyrektywę (UE) 2016/1148 w sprawie środków zapewniających wysoki ogólny poziom

bezpieczeństwa sieci i systemów informatycznych w UE (tzw. Dyrektywa (dyrektywa NIS) (zwana dalej dyrektywą NIS) [2].

Zobowiązuje państwa członkowskie UE do zagwarantowania minimalnego poziomu krajowych zdolności w zakresie cyberbezpieczeństwa poprzez tworzenie właściwych organów i pojedynczych punktów kontaktowych dla cyberbezpieczeństwa, tworzenie zespołów reagowania na incydenty bezpieczeństwa komputerowego (CSIRTs computer security) oraz przyjmowanie krajowych strategii cyberbezpieczeństwa. Ustawa o krajowym systemie cyberbezpieczeństwa weszła w życie 28 sierpnia 2018 r. Jednak dla pełnego wdrożenia dyrektywy NIS w Polsce konieczne było przyjęcie dodatkowych uchwał Rady Ministrów RP jako aktów wykonawczych w szczególności szereg Uchwał: z dnia 11 września 2018 r. „W sprawie wykazu usług kluczowych oraz progów istotności skutku zakłócającego incydentu dla świadczenia usług kluczowych” z dnia 02.10.2018 r. „W sprawie zakresu działania oraz trybu pracy Kolegium do spraw Cyberbezpieczeństwa”, z dnia 16.10.2018 r. „W sprawie rodzajów dokumentacji dotyczącej cyberbezpieczeństwa systemu informacyjnego wykorzystywanego do świadczenia usługi kluczowej”, z dn. 31.10.2018 r. „W zakresie progów uznania incydentu za poważny” [6].

Dyrektywa NIS zobowiązuje do zapewnienia cyberbezpieczeństwa w obszarach usług, które mają kluczowe znaczenie dla wspierania krytycznych działań społeczno-gospodarczych państwa.

Sektory te obejmują: energetykę, transport, bankowość, instytucje finansowe, opiekę zdrowotną, infrastrukturę wodną i cyfrową. Ustawa wprowadziła koncepcję systemu cyberbezpieczeństwa, który ma na celu zapewnienie cyberbezpieczeństwa oraz zapobieganie i przeciwdziałanie cyberzagrożeniom [4] na poziomie krajowym, w tym nieprzerwane świadczenie usług kluczowych i usług cyfrowych, poprzez osiągnięcie odpowiedniego poziomu bezpieczeństwa systemów informatycznych służących do świadczenia tych usług oraz zapewniających obsługę incydentów. Podmioty wchodzące w skład Krajowego Systemu Cyberbezpieczeństwa (NSC):

- kluczowi operatorzy;
- dostawcy usług cyfrowych;
- instytucje państwowe;
- Kompetentne władze;
- CSIRT na poziomie krajowym,
- Pojedynczy punkt kontaktowy w kwestiach bezpieczeństwa cybernetycznego;
- Podmioty świadczące usługi w zakresie cyberbezpieczeństwa.

Dzięki nowemu prawu pojawiły się również nowe pojęcia: incydenty (krytyczne, poważne, znaczące, w strukturze państwa), usługi (kluczowe i cyfrowe), zarządzanie podatnością czy incydentami.

Incydent to zdarzenie, które ma lub może mieć negatywny wpływ na cyberbezpieczeństwo. Kilka ich typów zostało zidentyfikowanych przez prawo. Incydent krytyczny – prowadzi do naruszenia bezpieczeństwa lub porządku publicznego, interesów międzynarodowych lub gospodarczych, funkcjonowania instytucji publicznych, praw i wolności obywatelskich, zdrowia lub życia ludzi. Takie przypadki są klasyfikowane przez odpowiednie zespoły CSIRT – omówione poniżej. Poważny incydent – może to spowodować znaczne obniżenie jakości lub przerwę w ciągłości usługi klucza. Incydent istotny – istotnie wpływa na świadczenie usługi cyfrowej. Incydent w strukturze państwa może spowodować obniżenie jakości lub przerwanie zadania publicznego realizowanego przez organ państwowy.

Wystąpienie incydentu może zakłócić działanie usługi cyfrowej – świadczonej drogą elektroniczną oraz usługi kluczowej – ważnej dla wspierania krytycznych działań społecznych lub gospodarczych. Lista usług kluczowych zawarta jest w Rozporządzeniu Rady Ministrów RP z dnia 11 września 2018 r. w sprawie wykazu usług kluczowych oraz progów znaczenia destrukcyjnego skutku zdarzenia dla świadczenia usług kluczowych.

W związku z nowymi aktami prawnymi operatorzy usług kluczowych również zostają rozdzieleni (załącznik nr 1 do Ustawy) i nakładają na nich obowiązki, w tym:

- systematyczna ocena ryzyka i zarządzanie incydentami, wdrażanie odpowiednich środków technicznych i organizacyjnych, zbieranie informacji o zagrożeniach cyberbezpieczeństwa i podatności na incydenty, zarządzanie incydentami oraz stosowanie środków zapobiegania i ograniczania wpływu incydentów na bezpieczeństwo systemów informatycznych;
- opracowanie, zastosowanie i aktualizacja dokumentacji dotyczącej cyberbezpieczeństwa systemu informatycznego służącego do świadczenia usługi kluczowej oraz ustanowienie nadzoru nad tą dokumentacją;

- tworzenie wewnętrznych struktur odpowiedzialnych za cyberbezpieczeństwo lub zawarcie umowy z podmiotem gospodarczym świadczącym usługi cyberbezpieczeństwa;
- zapewnienie audytu bezpieczeństwa systemu informatycznego co najmniej raz na 2 lata.

W przypadku awarii, zgodnie z prawem, należy go serwisować. Odnosi się to do czynności polegającej na wykrywaniu, rejestrowaniu, analizowaniu, klasyfikowaniu, ustalaniu priorytetów, podejmowaniu działań naprawczych i ograniczaniu konsekwencji incydentu. Ustawa określa trzy organy na poziomie krajowym, które zajmują się reagowaniem na incydenty komputerowe i zarządzaniem nimi. Zgodnie z terminologią przyjętą w dyrektywie NIS 2016/1148 nazywane są CSIRT. W Polsce są to „CSIRT GOV”, „CSIRT MON”, „CSIRT NASK”.

CSIRT GOV, czyli Rządowy Zespół Reagowania na Incydenty Bezpieczeństwa Komputerowego pod przewodnictwem funkcjonariusza na poziomie Szefa Agencji Bezpieczeństwa Wewnętrznego – którego zadaniem jest opracowywanie i koordynowanie przeglądu incydentów zgłaszanych przez kluczowe podmioty sektora publicznego w sektorze finansów publicznych, jednostki zgłaszające się do i nadzorowane przez Prezesa Rady Ministrów (m.in. RCB), KNF, UZP, URE, PGRP, Narodowy Bank Polski, Bank Gospodarki Narodowej (Bank Gospodarstwa Krajowego) oraz podmioty objęte ustawą o zarządzaniu kryzysowym, czyli podmioty, których systemy teleinformatyczne (ICT) lub sieci teleinformatyczne są ujęte w jednolitym wykazie obiektów, instalacji, urządzeń i usług wchodzących w skład infrastruktury krytycznej, CSIRT MON to System Reagowania na Incydenty Komputerowe Ministerstwa Obrony Narodowej RP. Określona struktura koordynuje rozpatrywanie incydentów zgłaszanych przez podmioty podległe lub podlegające Ministrowi Obrony Narodowej oraz przedsiębiorców o szczególnym znaczeniu gospodarczym i obronnym.

CSIRT NASK zarządzany jest przez Naukową i Akademicką Sieć Komputerową i reaguje na incydenty zgłaszane przez instytuty badawcze, Polską Agencję Żeglugi Powietrznej (PAŻP) lub osoby fizyczne.

CSIRT zapewniają spójny i kompletny system zarządzania ryzykiem na poziomie krajowym, realizując zadania przeciwdziałania zagrożeniom cyberbezpieczeństwa o charakterze międzysektorowym i transgranicznym – znajdują się w europejskiej sieci CSIRT i przekazują informacje o incydentach innym państwom oraz inne punkty kontaktowe. Zespoły realizują te zadania we współpracy ze sobą, z organami właściwymi do spraw cyberbezpieczeństwa, ministrem właściwym do spraw IT oraz pełnomocnikami. Monitorują zagrożenia i incydenty cyberbezpieczeństwa na poziomie krajowym oraz oceniają związane z nimi ryzyko. Mogą również wysyłać powiadomienia o wykrytych zagrożeniach.

Zespoły CSIRT są zobowiązane do informowania siebie nawzajem oraz Rządowego Centrum Bezpieczeństwa o krytycznym incydencie, który może spowodować kryzys bezpieczeństwa lub porządku publicznego. Zespoły wspólnie opracowują podstawowe elementy procedur obsługi incydentów, w których współpracują ze sobą.

Ustawa wprowadza również pojęcie grupy branżowej ds. cyberbezpieczeństwa, czyli zespołu utworzonego przez organ właściwy dla danego sektora lub podsektora. Zespół ten jest odpowiedzialny za obsługę lub wspieranie obsługi incydentów w swoim sektorze lub podsektorze.

Innym organem utworzonym przez nowe prawo jest Zespół ds. Incydentów Krytycznych, który pełni rolę wspierającą w radzeniu sobie z incydentami krytycznymi zgłaszanymi przez sieć CSIRT. W skład zespołu wchodzi przedstawiciele Rządowego Centrum Bezpieczeństwa, a także CSIRT MON, CSIRT NASK oraz szef Agencji Bezpieczeństwa Wewnętrznego. Na jej czele stoi dyrektor rządowego centrum bezpieczeństwa.

Zgodnie z dyrektywą europejską utworzono Pojedynczy Punkt Kontaktowy, który podlega Ministerstwu Cyfryzacji i odpowiada za:

- stworzenie ram prawnych funkcjonowania strefy cyberbezpieczeństwa RP, w tym zapewnienie ich spójności;
- pełnienie funkcji komunikacyjnej w celu zapewnienia współpracy z podmiotami odpowiedzialnymi za cyberbezpieczeństwo;
- gromadzenie i przetwarzanie informacji otrzymywanych m.in. przez kluczowych operatorów usług;
- kontrola przestrzegania wymagań organizacyjnych i technicznych przez podmioty świadczące usługi cyberbezpieczeństwa;
- przekazywanie, na żądanie odpowiedniego CSIRT, powiadomienia o poważnym incydencie lub istotnym incydencie z udziałem co najmniej dwóch państw członkowskich UE do pojedynczych punktów kontaktowych innych państw członkowskich UE;



- zapewnienie udziału przedstawiciela RP w Grupie Współpracy;
- zapewnienie współpracy z Komisją Europejską w zakresie cyberbezpieczeństwa;
- koordynacja współpracy organów właściwych w sprawach cyberbezpieczeństwa RP z właściwymi organami państw członkowskich UE;
- współpraca z innymi organami, na przykład organami ścigania i właściwym organem w kwestiach ochrony danych [5].

Podmiotem odpowiedzialnym za koordynację działań i realizację polityki rządu w zakresie zapewnienia cyberbezpieczeństwa w RP jest Pełnomocnik Rządu ds. Cyberbezpieczeństwa (jego funkcję pełni Sekretarz Stanu Ministerstwa Cyfryzacji RP Polski). Do głównych zadań Rzecznika Rządu należy w szczególności analiza i ocena funkcjonowania krajowego systemu cyberbezpieczeństwa, kontrola procesu zarządzania ryzykiem krajowego systemu cyberbezpieczeństwa, wydawanie wniosków dotyczących projektów rozporządzeń i innych dokumentów rządowych mających wpływ na realizację zadań z zakresu cyberbezpieczeństwa, wydawanie zaleceń i inicjowanie krajowych ćwiczeń z zakresu cyberbezpieczeństwa. Pełnomocnik ma obowiązek przedłożyć Radzie Ministrów sprawozdanie za poprzedni rok kalendarzowy, zawierające informacje o bieżących działaniach w zakresie cyberbezpieczeństwa w kraju, do dnia 31 marca każdego roku. Rada ds. Bezpieczeństwa Cybernetycznego została powołana przy Radzie Ministrów. Jest to organ doradczy i konsultacyjny zajmujący się planowaniem, nadzorem i koordynacją zespołów CSIRT, grup branżowych zajmujących się cyberbezpieczeństwem oraz właściwych organów. Powołanie Rady miało na celu wspieranie większej spójności systemowej i przejrzystości, a także nadanie odpowiedniej rangi kwestiom cyberbezpieczeństwa, a także zapewnienie formułowania spójnych instrukcji i planów przeciwdziałania zagrożeniom cyberbezpieczeństwa. Natomiast art. 90 określa w drodze uchwały termin realizacji Strategii do 31 października 2019 r. Dokument określa cele strategiczne i odpowiadające im działania polityczne mające na celu osiągnięcie i utrzymanie wysokiego poziomu bezpieczeństwa cybernetycznego RP. Zaistniała potrzeba oceny i rewizji obowiązującego dokumentu strategicznego na rok 2019, tj. Krajowych Ram Polityki Cyberbezpieczeństwa RP na lata 2017-2022, przyjętych Uchwałą nr 52/2017 Rady Ministrów z dnia 27 kwietnia, 2017 oraz odpowiedni Plan Działań na rzecz wdrażania Krajowych Ram Polityki Cyberbezpieczeństwa RP na lata 2017-2022. Stale zmieniające się warunki związane z bezpieczeństwem, zwłaszcza w cyberprzestrzeni, wymagają szybkiej i zdecydowanej reakcji agencji rządowych. Zdaniem Kancelarii Premiera: projekt uchwały ma na celu stworzenie strategii cyberbezpieczeństwa. Strategia ma charakter polityczno-strategiczny, natomiast na poziomie operacyjnym jej realizacja zapewni szczegółowy plan działania. Plan działań opisuje podmioty zaangażowane w realizację Strategii oraz środki jej realizacji. Przy opracowywaniu Strategii wykorzystano najlepsze praktyki i rozwiązania zaproponowane przez Międzynarodowy Związek Telekomunikacyjny oraz doświadczenia innych krajów [1].

## Działalność Ministerstwa Cyfryzacji RP

Celem Ustawy o Krajowym Systemie Cyberbezpieczeństwa, przygotowanej przez Ministerstwo Cyfryzacji RP, było opracowanie ustawodawstwa, które pozwoliłoby na implementację Dyrektywy NIS i stworzenie skutecznego systemu bezpieczeństwa teleinformatycznego na poziomie krajowym. W celu realizacji określonych aktów normatywnych Rzecznik Rządu współdziała z różnymi wyspecjalizowanymi strukturami, np.:

- z kompetentnymi organami w zakresie szkolenia personelu;
- z CSIRT w sprawie wytycznych;
- z organami samorządu lokalnego w dziedzinie edukacji i e-learningu;
- z partnerami technologicznymi w zakresie wymiany informacji o nowych zagrożeniach i technologiach.

Naukowo-akademicka sieć komputerowa – Państwowy Instytut Badawczy (Naukowa i Akademicka Sieć Komputerowa – Państwowy Instytut Badawczy (NASK) zlecił działania mające na celu podniesienie poziomu świadomości w zakresie cyberzagrożeń wśród pracowników administracji państwowej. Przewiduje się realizację dwóch zadań:

1. Budowa platformy szkoleń elektronicznych (e-CTP - CyberTrainingPlatform) dla pracowników administracji publicznej, w tym jednostek samorządu terytorialnego.

Testy platformy powinny odbyć się do końca tego roku w urzędach państwowych, a platforma zostanie w pełni uruchomiona w 2020 roku. Urzędy zostaną zaproszone do konsekwentnego korzystania z e-learningu zgodnie z ustalonym harmonogramem. Planuje się, że platforma będzie tymczasowo dostępna dla konkretnej administracji państwowej i w tym czasie nie będzie dostępna dla innych. Podjęto również decyzję o stworzeniu call center, które będzie obsługiwać wspomnianą platformę.

2. Prowadzenie specjalistycznych szkoleń w regionach dla przedstawicieli poszczególnych pododdziałów strukturalnych organów państwowych i samorządowych w ramach ustawy o Krajowym Systemie Cyberbezpieczeństwa (NSC).

Celem szkoleń jest podniesienie poziomu bezpieczeństwa w organach administracji państwowej i samorządu terytorialnego poprzez podniesienie poziomu świadomości i budowanie kompetencji w zakresie cyberbezpieczeństwa. Planowana jest organizacja czterech spotkań informacyjnych (organizowanych na bazie czterech wybranych/gotowych do współpracy lokalnych administracji państwowych), które obejmą łącznie około czterystu urzędników szczebla regionalnego odpowiedzialnych za cyberbezpieczeństwo. Oba zadania projektowe wspierane przez trzy zespoły NASK: Akademię NASK, Szkołę Informatyczną oraz NASK CSIRT. Koordynację zapewni departament cyberbezpieczeństwa Ministerstwa Cyfryzacji.

Kolejnym aspektem rozwojowej działalności NPP jest współpraca technologiczna. Jest to szczególnie ważne ze względu na umowy dwustronne z partnerami technologicznymi oraz wymianę informacji (podatności, zagrożeń, narzędzi monitorowania cyberbezpieczeństwa). To jednak nie wszystkie wysiłki na rzecz stworzenia potężnego systemu cyberbezpieczeństwa w Polsce.

W ramach projektu badawczego powstała Krajowa Platforma Cyfrowa, która przewiduje stworzenie prototypu złożonego, zintegrowanego systemu monitorowania, obrazowania i ostrzeżeń o zagrożeniach cyberprzestrzeni państwa, oceny potencjalnych skutków i skoordynowanego reagowania do incydentów komputerowych na poziomie krajowym. Przy pomocy tego projektu Minister Cyfryzacji zapewnia rozwój lub utrzymanie systemu teleinformatycznego obsługującego:

- wymianę informacji w celu współpracy podmiotów wchodzących w skład krajowego systemu cyberbezpieczeństwa;
- tworzenie i przyjmowanie rekomendacji dotyczących działań podnoszących poziom cyberbezpieczeństwa;
- zgłaszanie i obsługa incydentów, ocena ryzyka na poziomie krajowym;
- ostrzeżenia o zagrożeniach cyberbezpieczeństwa.

Ponadto NASK opracowuje podręczniki obejmujące tematykę organizacji NASK, zasad zgłaszania spraw oraz ochrony danych osobowych. Publikowane są również na stronach internetowych MC i mają na celu szerokie rozpowszechnianie wiedzy i budowanie kompetencji.

Kolejną inicjatywą jest „Partnerstwo na rzecz cyberbezpieczeństwa” – narzędzie dobrowolnej współpracy i wymiany doświadczeń oraz informacji o zagrożeniach i incydentach w cyberbezpieczeństwie. Głównym narzędziem partnerstwa jest: wymiana informacji z zakresu cyberbezpieczeństwa, o incydentach i istotnych zagrożeniach, które wychodzą (wg informacji Partnera) poza zdarzenia wewnętrzne,

zapewniając odpowiednią reakcję i postępowanie w rozwiązywaniu problemów. W ramach udziału w programie uczestnicy mogą:

- przekazywać informacje o incydentach NASK;
- informować koordynatora programu (NASK) o zaobserwowanych zagrożeniach;
- dzielić się wiedzą z zakresu cyberbezpieczeństwa;
- zainicjować tworzenie grupy docelowej.

W ramach programu, na który obecnie składa się ponad pięćdziesiąt umów trójstronnych, podpisano siedem umów z jednostkami samorządu terytorialnego na szczeblu wojewódzkim (lokalnej administracji państwowej).

**Wnioski.** Cyberprzestrzeń jest uważana za piątą sferę działań wojennych, równie krytyczną dla operacji wojskowych jak ląd, morze, powietrze i przestrzeń kosmiczna. To sfera obejmująca wszystko: od sieci informacyjno-telekomunikacyjnych, infrastruktury i danych przez nie obsługiwanych po systemy komputerowe, procesory i urządzenia do sterowania.

Zapewnienie cyberbezpieczeństwa w Polsce i budowanie jej zrównoważonego systemu to proces ciągły. Warto zauważyć, że pomimo pojawiających się wyzwań i trudności staje się bardziej świadomy i zaplanowany. Oprócz tych wskazanych po audycie Wyższej Izby Kontroli (HCC) możemy również mówić o braku dostatecznej liczby ekspertów na rynku, trudnościach w harmonizacji aktów regulacyjnych i prawnych związanych z różnorodnością sektorów, różnych interpretacjach prawa i ustalonych wymagań. Niemniej realizacja Strategii jesienią tego roku oraz działania Ministerstwa Cyfryzacji mogą przyspieszyć wypracowanie odpowiednich mechanizmów zapewnienia cyberbezpieczeństwa w RP.

Zapewnienie cyberbezpieczeństwa w Europie, w szczególności w Polsce, oraz zbudowanie skutecznego systemu zwalczania cyberzagrożeń to długi i systematyczny proces, dołączenie się do którego na zasadach partnerskich, było by warto dla krajów, które w dalszym ciągu są celem cyberataków. W nowoczesnych warunkach komponent informacyjny nabiera coraz większego znaczenia i staje się jednym z najważniejszych elementów zapewnienia bezpieczeństwa narodowego państwa.

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**Mykola Hranovskyi** – graduate student of the Department of Political Science and Philosophy of the Educational and Scientific Institute "Institute of Public Administration" of Kharkiv National University named after V. N. Karazin, Kharkiv, Ukraine.

**Dmytro Karamyshev** – Doctor of Science of Public Administration, Professor of the Department of Social and Humanitarian Policy of Kharkiv National University named after V. N. Karazin, Kharkiv, Ukraine.

**Cyber threats as a kind of hybrid aggression - the experience of the Republic of Poland in preventing and counteracting such phenomena.**

**Annotation.** *In today's world, there is a tendency to significantly increase the number of cyber attacks, which are becoming more and more sophisticated and unpredictable. The issue of ensuring cybersecurity has become extremely important for the countries of the world, but measures to counter the challenges and threats in this area are still important for the global community. Therefore, a short analysis of activities aimed at preventing and counteracting cyber threats, based on the example of the Republic of Poland, is presented.*

**Key words:** *cybersecurity, cyber attack, critical objects of state infrastructure, international cooperation in the field of cyberspace protection.*

# FOREIGN POLICY ELITE OF KAZAKHSTAN AND THE EU IN THE TRADE AND ECONOMIC SPHERE: SUCCESSES AND PROSPECTS

Leila Abdrazakova

Doctoral student, KazUIR&WL, Kazakhstan, Almaty

**Annotation.** This article analyzes the role of the foreign policy elite of Kazakhstan and the EU in the trade and economic sphere. The key moment in the development of partner trade relations is that the Republic of Kazakhstan is the second major trading partner after Russia. In the current modern realities, an example of the development of stable partnerships is a high indicator, thanks to the tactics developed and the work of the Kazakhstani foreign policy elite. The European direction in the foreign economic policy of the Republic of Kazakhstan is one of the most important due to the geopolitical weight of the European Union in the international system, economic potential and a number of other factors.

**Key words:** Kazakhstan and the EU, foreign policy elite, trade and economic relations, projects and strategies.

If we go back to the origins of the EU-RK partnership, then we need to start from January 25, 1995, when in Brussels President N. Nazarbayev and Chairman of the EU Council L. Juppe signed the Partnership and Cooperation Agreement between Kazakhstan and the European Communities, which entered into force on July 1 1999. This document consolidated the legal foundations of a multilateral political, economic and cultural-humanitarian partnership with the world's largest economic integration union. Since then, the European Union has been Kazakhstan's second largest trading partner after the Russian Federation. And Kazakhstan is defined as one of the main trading partners of the EU in Central Asia[1].

The purpose of this article: to study the role of the foreign policy elites of Kazakhstan and the EU, the features and prospects for the development of joint trade programs between Kazakhstan and the European Union at the level of the international economy.

The subject of the study is the activity of the foreign policy elite of both sides in the implementation of trade projects and agreements concluded from the beginning of the partnership between Kazakhstan and the European Union to the present day.

This article discusses issues related to economic partnerships, in particular the trade programs of the European Union with Kazakhstan, the interaction of foreign policy elites. The relevance of this study lies in the fact that the European direction, at the moment, in the foreign

economic policy of Kazakhstan is one of the most important and in demand due to the significant geopolitical weight of the European Union in the international arena, the economic potential of Europe and other factors and the implementation of these projects with the participation foreign policy elites.

The beginning of the 2nd stage of the history of relations between the Republic of Kazakhstan and the EU can be considered December 21, 2015, when the signing of the Agreement on Enhanced Partnership and Cooperation between the Republic of Kazakhstan on the one hand and the European Union and its Member States on the other hand took place in the capital of our country (Enhanced Partnership and Cooperation Agreement, or CPAA). On March 25, 2016, the First President of Kazakhstan - Elbasy Nursultan Nazarbayev signed the Law on the ratification of the SRPS. On December 12, 2017, the EPAA was approved by the European Parliament. Then this document was ratified separately by all EU member states. As a result of this process, on January 20, 2020, the issue of ratification received a positive conclusion within the EU Council. And on March 1, 2020, the Enhanced Partnership and Cooperation Agreement between the Republic of Kazakhstan and the EU comes into full force. To recount the history of the new agreement in more detail, First President Nursultan Nazarbayev first voiced a proposal to raise the level of the basic political document to the EPAA during a meeting with President of the European Commission José Manuel Barroso in December 2006 in Brussels.

During the talks, Elbasy gave a number of weighty arguments in favor of this initiative. First, over the years of diplomatic relations, both Kazakhstan and the European Union have gone through important political, economic and social changes. Secondly, a broader framework was needed to increase the intensity, scope and depth of bilateral interaction, including additional areas of cooperation. Thirdly, it was necessary to update and modernize the trade, investment and economic blocs, taking into account Kazakhstan's accession to the World Trade Organization, Kazakhstan's membership in the Asia-Europe Forum (ASEM) and the creation of the Eurasian Economic Union. Fourthly, Kazakhstan and the EU have the opportunity to create a fundamentally new legal framework for unlocking the full potential of cooperation, joining forces in ensuring global and regional security, combating modern threats and challenges, creating an even more favorable mutual business climate to boost business and facilitate contacts. between citizens.

As a result, at the said meeting, Elbasy and the President of the European Commission came to an agreement that the mutual cooperation between our country and the EU in its current form does not fully reflect the maturity of the partnership achieved in recent years, as well as the increasing importance of Kazakhstan in the political and economic arena. Brussels recognized that effective reforms were implemented in our country, which brought Kazakhstan to a new stage of political liberalization and diversification of the national economy with an emphasis on industrial and innovative development, and also ensured the status of a key and

priority partner of the EU in Central Asia. In other words, the successful evolution of relations with Kazakhstan predetermined the European Union's support for the idea of the First President of the Republic of Kazakhstan to conclude an ambitious and qualitatively new agreement for a reliable, mutually beneficial, effective and equal partnership in the long term.

The European Union and the Republic of Kazakhstan have demonstrated complete unanimity on the issue of the American military action in Afghanistan and support the international campaign against terrorism. The EU is extremely concerned and concerned about the threats of instability in the Central Asian region. Despite the fact that Kazakhstan is located far from Afghanistan and at the moment the unfolding situation in Afghanistan does not pose a direct threat to the republic, the EU will continue to strive to help this state as the most steadily developing and most economically active country in Central Asia.

The problems of terrorism, extremism, the influx of refugees, illegal migration and, in particular, the most urgent problem of drug trafficking are topical in relations between the EU and Kazakhstan. Consultative ties are being strengthened on the entire spectrum of common problems in the interests of strengthening European and Kazakh security. In addition to natural economic interests, maintaining stability in the region, economic development and the promotion of pluralism, democracy and market relations are priority tasks for the countries of Europe in the Republic of Kazakhstan. In this regard, the European direction of Kazakhstan's foreign policy should be considered as a strategic one.

The EU countries initially showed their economic interests and goodwill towards Kazakhstan, as a result of which today they are a key partner of Kazakhstan on security issues, as well as one of the main partners and investors in the economy. Under the new conditions, the EU countries have taken targeted measures to spread and assert their influence in the region. This was served by large-scale economic assistance programs and the strengthening of the OSCE regime. Europe also achieves its goals through international and European organizations and institutions (OSCE, Council of Europe, European Parliament, European Commission, UN Refugee Commission and so on).

In addition, the EU programs have powerfully launched their activities in Kazakhstan: TEMPUS, INCO-COPERNICUS, in charge of the field of education, TACIS, affecting the economy and the scientific and technical sphere, INTAS, affecting the field of science. The following facts are eloquent: approximately one in ten projects in Kazakhstan receives financial support from these programs, which have been operating in Kazakhstan since 1993.

In general, in the European direction, the policy of the Republic of Kazakhstan in the period after the events of September 11, 2001 did not undergo fundamental changes, putting security issues at the head of the vector of partnership, which had previously been one of the main topics of cooperation within the framework of Kazakhstan - the EU. Kazakhstan and the European Union have great potential for the development of trade, economic and political

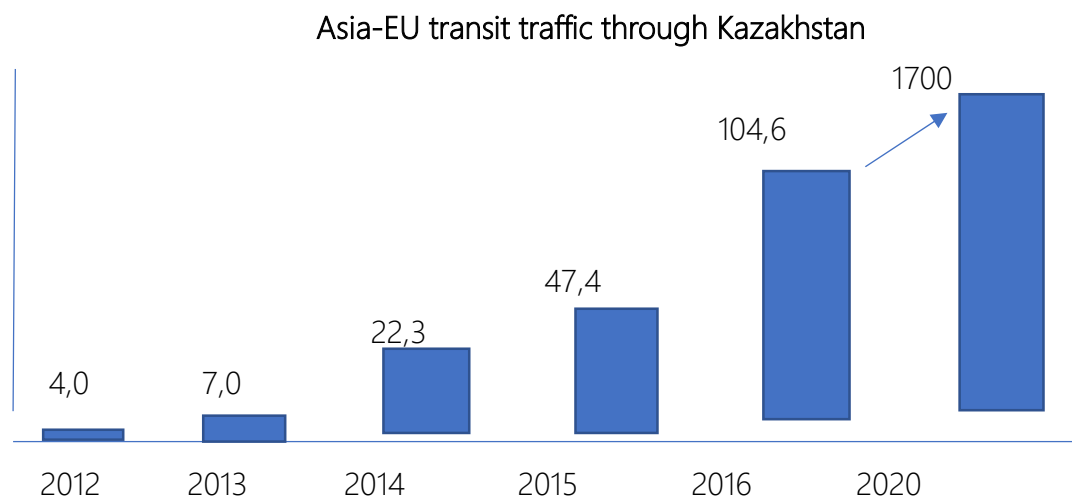


relations. As for the Kazakh side, Kazakhstan associates its foreign policy and foreign economic interests with the development of long-term relations with the European Union.

Thus, the joint development of the economy between the two regions led to the freedom of the market economy of Kazakhstan and the creation of common trade projects. After the very recognition by the European Union of the economy of Kazakhstan as a market economy, a number of advantages of this regime appeared related to providing an opportunity for exporters from Kazakhstan to prove that they operate in a market economy, and not a state economy. In addition to recognition, the European Council has revised the criteria for an individual approach to Kazakhstani companies on the anti-dumping issue.

Priority directions in the development of economic relations between the two regions were reflected in the message of the First President of the Republic of Kazakhstan - N. Nazarbayev. The message discussed the "Strategy "Kazakhstan-2050" : a new political course of an established state" , which proposed the development of a special trade project "Global infrastructure integration" . This project was aimed at facilitating the conditions for the creation of joint ventures in the region of Europe and Central Asia. According to the plan, in connection with this project, the lists of priority infrastructure projects already completed in the transport and logistics sphere of cooperation were to be expanded[2].

Another project created under the leadership of the European Union and Kazakhstan, aimed at the formation and expansion of the transport and trade corridor Western Europe-Western China as part of the international project "Kazakhstan - the New Silk Road"[3]. Kazakhstan has made significant investments in the creation and strengthening of this project as a transit corridor (more than 4 billion dollars). The following is the cumulative growth rate of transit container traffic under the project.



You can see how significantly our exports have grown, which was our main goal when creating the project. “Everything should be subordinated to the key task of promoting our exports only to those world markets where there will be long-term demand for our products and services” [4].

If we rank the members of the seven by their share in the foreign trade turnover of Kazakhstan, then Italy is the undisputed leader with a share of 10.4% in 2019 and 8.8% for 10 months of last year. At the same time, Italy traditionally acts as the main direction of Kazakhstani exports, ranking first in terms of its share (14.5% in 2019 and 14.0% in the past). This leadership is achieved mainly through the supply of raw materials from Kazakhstan - crude oil and gas condensate, petroleum products, liquid fuels, ferrous and non-ferrous metals. The share of Italy in imports to Kazakhstan is not so large - for 10 months of last year it amounted to 2.4%. And consumer goods, wine, machinery and equipment are delivered from Italy to our country.

At the same time, the balance of trade with Italy is invariably in favor of Kazakhstan: in 2019 it was at the level of \$6 billion 794.3 million, for 10 months of last year - \$4 billion 727.6 million. The second place in terms of the share in the foreign trade turnover of Kazakhstan among European countries is occupied by the Netherlands - 4.8% in 2019 and 3.9% for 10 months of last year. The basis of Kazakhstani exports to this country is oil and oil products, ferroalloys, titanium and titanium alloy products. Medicines, machinery and equipment, high-tech instruments and devices, agricultural products, including flowers are imported from the Netherlands. The trade balance of Kazakhstan with this country is also developing with a positive balance, the size of which in 2019 amounted to \$4 billion 158.5 million, and for 10 months of last year - \$2 billion 416.3 million.

The third is France, whose share in the foreign trade turnover of Kazakhstan was formed in the year before last at the level of 4.5%, and in the past 10 months - 3.1%. However, at the same time, France is significantly ahead of the Netherlands in terms of the volume of supplies of its goods to Kazakhstan - respectively \$695.6 million against \$234.7 million in 2019 and \$654.6 million against \$173.6 million in the past for January-October.

This situation is explained by a significant diversification of the import of French products to Kazakhstan, including electrical, electronic and mechanical equipment, consumer goods, medicines and cosmetics, cars, food, building materials. The key components of Kazakhstan's exports to this country are oil, metals, metal products and chemical products. For the fourth place among the European states there is a stubborn struggle between Germany and Spain with varying success. So, at the end of 2019, Spain took the lead with a share in Kazakhstan's foreign trade turnover of 2.5%, while Germany had 1.9%.

However, according to the data for 10 months of last year, Germany took the lead with 2.3% against 1.5% for Spain. But, unlike the latter country, with which Kazakhstan has a positive trade balance, the situation with Germany looks different - imports from it significantly exceed the volume of deliveries of Kazakhstani goods there. So, in 2019, exports from Kazakhstan to Germany amounted to \$298.9 million, with imports from it of \$1 billion 491.9 million, and last year for 10 months - respectively, \$187.1 million and \$1 billion 428.6 million.

Such a paradoxical situation can be explained by Germany's less dependence on the supply of hydrocarbons and other raw materials from Kazakhstan, since Russia has traditionally been its leading supplier among the CIS countries in this area. The significant volume of imports of goods from Germany (according to this indicator, it leads among European countries) is explained by its significant diversification, including engineering products, pharmaceutical products, food products and much more. It is noteworthy that direct investments by German investors, unlike other leading EU countries, also go mainly to the non-primary sector of the Kazakhstani economy - the processing industry, the chemical industry, the production of building materials, transport and the agro-industrial complex. The statistical progress of another EU country - Romania, whose share in Kazakhstan's foreign trade has been growing rapidly in recent years, is explained by the increase in supplies of Kazakh oil to the Petromidia plant, which is part of the KMG International group controlled by the national company KazMunayGas.

Therefore, the trade balance with this country develops with a significant advantage in favor of Kazakhstan. Last year, over 10 months, the volume of Kazakhstani exports to Romania reached \$1 billion 70.6 million, while imports from there amounted to only 0.06 million. - last year it accounted for 1.6%, and the year before - 1.9%. The European states that are not members of the EU, the key partner of Kazakhstan is Switzerland, whose share in its foreign trade turnover in 2019 amounted to 2.9%, and for 10 months of last year - 2.0%. Energy resources, precious stones and metals, jewelry, coal, copper, aluminum, wheat, flax seeds and alcohol are supplied from Kazakhstan to this country. And products of the pharmaceutical, watch, engineering, agricultural and chemical industries, precious stones and metals, and jewelry are imported from Switzerland. The balance in trade with this partner is in favor of Kazakhstan: in 2019, its size amounted to \$2 billion 543.8 million, and for 10 months of last year - \$1 billion 167.8 million.

Summing up the review of Kazakhstan's economic relations with the international community, we emphasize that at the moment the European vector of Kazakhstan's cooperation is a priority for it in the field of foreign trade and attracting foreign investment in the national economy. The key player here is the European Union, while the creation of the Eurasian Economic Union did not cause much damage to Kazakhstan's much earlier cooperation with the first of them, contrary to the well-known fears of politicians and experts. Moreover, it can be argued that with the creation of the EAEU, Kazakhstan received an additional platform for intensifying cooperation with Europe, even in the context of its sanctions confrontation with Russia in recent years. Another such platform is the Chinese international initiative "One Belt, One Road", which gives Kazakhstan the opportunity to significantly increase its transit potential in Eurasia and increase the supply of goods to Europe.

An important advantage of the European economy in comparison with the EAEU is its superiority in scale and more comfortable conditions for the activities of foreign investors. In this regard, Kazakhstan's experience of entering the European market through the purchase of oil refining capacities in Romania deserves further development in relations with those EU and European states that still remain on the periphery of national economic interests. At the same time, we are not talking only about oil expansion to the European market - in the current conditions, increasing the export of agricultural products there, where Kazakhstan's positions and opportunities for increasing its production are also significant, is of particular importance. This area is also important because Europe is now actively developing alternative energy sources in order to reduce dependence on energy imports. The stable negative balance in trade with Germany, which occupies a leading position in the transition to such sources, just acts here as a kind of warning for Kazakhstan that one cannot always rely only on the export of hydrocarbon raw materials.

Today, thanks to the sustainable development of the EU RK partnership and the Kazakhstan - New Silk Road project, domestic producers and exporters have the right to ensure in any individual case that their production costs and prices are not under pressure from the state. The benefit is that the price of what is produced by national producers and exporters is based on true production costs and prices. In the absence of such evidence, estimates are made on the basis of costs and prices prevailing in a comparable third country with a market economy [5].

At the end of 2017, the volume of trade between Kazakhstan and the European Union reached \$50 billion, which is more than 40% of the country's foreign trade, President Nazarbayev noted in his speech at the ceremony of accepting credentials from the new head of the EU Delegation to Kazakhstan, Aurelia Bouchez.

According to published data, in the first decade of 2018, the volume of trade between Kazakhstan and the EU amounted to more than \$38 billion, which is 31.9% more than in the same period in 2016 (\$28.8 billion).

At the moment, some positive results have been achieved in cooperation between the Republic of Kazakhstan and the EU. Thus, there are several directions [6]:

- Mutual trade;
- Investment activities;
- Cooperation in the oil and gas and energy sectors;
- Interactions in the field of transport.

In the structure of Kazakhstan's exports to the EU countries, certain commodity groups occupy a dominant place. These are the following three products:

- Mineral fuel;
- Oil and oil products;
- Ferrous and non-ferrous metals.

That is about 90% of domestic exports to the EU countries. However, over the past few years, there has been a decline in the dynamics of exported goods. In turn, European imports to Kazakhstan account for 24% of total imports. The EU commodity service is dominated by machinery, equipment, vehicles, chemical and industrial products, and metallurgical products.

In parallel with another major program aimed at the development of trade in the oil and gas sector of Kazakhstan - the program «Ino-gate». International transportation of oil and gas to Europe” . It is aimed at identifying the integration of various modules of transportation of Kazakh oil into the Transcaucasian system. In addition, for the implementation of this program at the interstate level, the Framework Agreement "On the institutional framework for the creation of an interstate oil and gas transportation system" was adopted. The implementation of this Agreement will contribute to the establishment of uniform rules and mechanisms that ensure the efficient operation of the interstate oil and gas transportation system in accordance with the norms and practices in force in the international oil and gas industry. The joint projects developed by the European Union will in the future become an important factor in the development of the energy sector of Kazakhstan, the modernization of the oil and gas transportation infrastructure and the attraction of large-scale investments in the basic sectors of the economy[7].

In general, the picture of the market is as follows, there is an increase in the level of imports from EU countries, rather than goods exported to the EU. An analysis of exports and imports shows that in the structure of imports, unlike exports, there is no predominance of individual product groups, it is more unstable. At the same time, the proportion of food products, vehicles, chemical and industrial products is growing, and there is an unfavorable trend of increasing imports over exports. There is also a tendency for countries to tighten customs measures to protect the domestic market from imported goods during the downturn. Thus, in order to avoid economic problems with a trading partner like the EU, it is necessary to improve the system of measures to create a favorable investment market. For further fruitful

partnership, it is necessary to create conditions under which the attractiveness of European investors and partners will increase.

The EU is an example of the deepest economic integration, and is also the main trading partner of Kazakhstan. The primary task directly related to the formation of the EU was the creation of a customs union of the EU countries, which served as the basis for building a common market. With its creation, the formation of a single internal market came to the fore, the creation of which is associated with the practical implementation of four freedoms: the freedom of movement of goods, services, capital and persons, as well as the formation of an economic and monetary union within the EU. With the signing of the Lisbon Reform Treaty of 2007, a new stage in the evolution of EU law begins[8].

The implementation of trade relations between Kazakhstan and the EU implies not only the existence of specialized legislative regulation and the formation of the necessary structures and institutions, but also the development of interregional relations with the participants of which are, among other things, the subjects of the Republic of Kazakhstan.

The timeliness of the use of measures to protect the domestic market in Kazakhstan is updated with the pace of integration of the Kazakh economy into the international trading system, which, among other things, leads to a partial opening of the domestic market for foreign goods and, of course, increased competition on their part. A striking example is the abolition of import customs duties on goods from the CIS countries. As a result of bringing the free trade regime in the field of application of customs duties between Kazakhstan and the CIS countries, various goods from these countries began to be supplied to the Kazakhstani market at such prices and in such quantity that national enterprises producing the same products were not able to compete with imports from the CIS countries and were forced to incur losses, reduce sales in their own market, freeze investment programs in their production, and launch production of other, more competitive products[9].

At the same time, it is natural that Kazakhstan should, if possible, actively participate in all new EU initiatives that positively affect the political and economic growth of Kazakhstan.

Kazakhstan is ready to use its potential to stabilize the global and European hydrocarbon markets, President Kassym-Jomart Tokayev said in a telephone conversation with President of the European Council Charles Michel. This was reported on the official website of Tokayev.

“Kassym-Zhomart Tokayev also expressed concern about the threats to energy security in the world. Kazakhstan, according to him, is ready to use its hydrocarbon potential in order to stabilize the situation in the world and European markets,” the message says[10].

The head of Kazakhstan also called on the European Union to cooperate in the development of new transcontinental transport corridors. “Kazakhstan could contribute by playing the role of a kind of “buffer market” between East and West, South and North,” Tokayev stressed. On June 29, 2022, at the Caspian Summit in Ashgabat, the President of the Republic proposed the creation of a Caspian food hub to increase mutual trade. On June 3, the

European Union approved the sixth package of sanctions against Russia, which includes a partial embargo on oil supplies.

European countries have agreed to ban the purchase, import or transport of crude oil and certain petroleum products from Russia to the EU (phasing out Russian oil will take from six months for crude oil to eight months for other petroleum products). EU member states with a high dependence on Russian supplies received temporary benefits. The head of EU diplomacy, Josep Borrell, said that the reduction in oil and gas imports from Russia is causing serious difficulties in many EU countries and in some sectors of the economy.

In conclusion, the European Union has invested in the Kazakh economy more than 105 billion of the 215 billion US dollars of total foreign investment, which corresponds to half of all investments in the development of our country. Thus, over the 11 months since 2015, the foreign trade turnover between Kazakhstan and the European Union exceeded \$28.5 billion, which corresponds to 50.4% of the total foreign trade turnover of the Republic of Kazakhstan for this period.

From 2007 to the first half of 2017, the gross inflow of direct investment from the countries of the European Union into the economy of Kazakhstan amounted to about 110 billion dollars. It is very important for Kazakhstan, which pursues a multi-vector policy and well-coordinated work of the foreign policy elite, to continue to maintain a balance between the Eurasian Economic Union, the World Trade Organization and the European Union. According to the Enhanced Partnership and Cooperation Agreement, the energy sector remains an important component of cooperation in the economy. At the same time, it is planned to increase cooperation with European countries within the framework of the implementation of the Nurdy Zhol infrastructure development program and the second stage of the Industrial and Innovative Development Program.

We should pay attention to a few points that stem from the great importance that First President Nursultan Nazarbayev attaches to the Enhanced Partnership and Cooperation Agreement between Kazakhstan and the European Union. The full-scale use of the potential of the SRPS is fully in line with the national interests of Kazakhstan. Taking into account the huge potential of the European Union and the significant experience it has accumulated in various fields, the new document will contribute to the implementation of the ambitious plans of our country. First of all, here we mean the main goals of the Strategy "Kazakhstan-2050", promulgated by Elbasy in 2012, as well as the most important program and system tasks that the Head of State Kassym-Jomart Tokayev sets for the Government.

In this regard, in the coming period, it is important to use all the tools of the SRPS to actively involve the European side in the implementation of development programs in the Republic of Kazakhstan, increase the volume of mutual trade, attract investment and create new jobs in our country, develop areas such as digitalization of the economy, energy efficiency, transport and logistics, export of agricultural products, improving the education system, tourism



and so on. With cutting-edge technology and cutting-edge innovation, European companies are well positioned to expand their involvement in specific projects in Kazakhstan as part of the country's ongoing modernization process.

From 2020 to the present, the importance of Kazakhstan for Europe as a priority for economic development in terms of stable foreign policy framework and influence of foreign policy elite is becoming more noticeable. The European Union allows the participation of European companies in the modernization of key industries and infrastructure of Kazakhstan, the attraction of advanced investments and technologies, and the establishment of joint ventures.

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## Chemical Sciences

### Compositions based on elastomers (Butadiene-nitrile rubber)

Abdullayeva Irada Gurban

Azerbaijan State Oil and Industry University

Bakhshaliyev Elgun

Azerbaijan State Oil and Industry University

In modern times, the chemistry of high molecular compounds is one of the independent fields of science that is developing at a great speed. Currently, there is no field of human activity in which high molecular complex materials based on polymers are not used.

Humans have been in contact with high molecular compounds in their daily lives since the beginning of their existence. Thus, cellulose, which is the basis of the tree, natural rubber, which is the juice of the Hevea tree, wool, silk, linen and cotton, starch, which is the basis of leather, potato and wheat, etc. are natural polymers. All these have always been one of the most important resources for human life.

Polymers are also widely distributed in non-living nature. The main part of the earth's surface is silicon 4-oxide and aluminum oxide in the form of polymers.

Quartz, rock crystal, amethyst are polymers of silicon 4-oxide, and corundum, ruby, sapphire are polymers of aluminum oxide. Naturally occurring diamond, graphite is carbon in polymer form. Only at the beginning of the 20th century, after it became possible to chemically synthesize these substances, as well as to study their properties, polymers began to be separated as independent substances. The main reason is that polymers have different complex properties than small molecule compounds.

Scientists and specialists in the field of polymer industry, especially in the field of industrial synthesis and processing, began to pay more and more attention to the formation of a new technical and economic policy in the world. Because modern industry - automobile, aviation, shipbuilding, space, military, mechanical engineering, electrical engineering, etc. development, it is necessary to develop new types of polymer composite materials that meet the requirements of different work levels.

The recent development of the chemical industry has led to the use of high molecular compounds as raw materials in the preparation of irreplaceable composite materials with high

productivity in the fields of shipbuilding, medicine, construction, mechanical engineering, electrical engineering, agriculture and device manufacturing.

The results of achievements in the fields of exploitation of products made on the basis of high molecular compounds allow synthesizing polymers (oligomer, rubber) with any complex parameters and giving preliminary feedback on the preparation, processing and exploitation of basic compositions. This leads to the expansion of the limits of their fields of application.

In modern times, from the mixture (modification) of rubbers with oligomers and polymers, new polymer-type materials with complex properties, i.e. high physico-chemical, physico-mechanical and operational properties, including strength, dielectric strength, heat resistance, adhesion, properties and purposeful new compositions based on them due to the relevance of its development, it is constantly in the focus of research. The improvement of the physical-mechanical and operational indicators of the rubber compositions made on the basis of the rubber mixture further expands the areas of use of the products made from them.

Currently, one of the most widely used polymer materials is thermoplastic elastomers (TEP) obtained by dynamic vulcanization (DVEP) method. This composition was made possible by mixing different polymers produced in the polymer industry.

Based on the change of the micro and macro structure of the processed composite materials in the research work, it was possible to significantly influence its main properties. Such compositions are often made on the basis of a mixture of polyolefins and diene rubbers, but one of the negative qualities of this mixture is that they are unstable in oil and gasoline environments. This significantly limits their fields of application [1-4].

The effect of butadiene-nitrile rubber and vulcanizing substances (dicumyl peroxide and sulfur) on the technological process of production of elastoplasts made on the basis of a mixture of low-density polyethylene and polypropylene by extrusion was considered. It was determined that dynamic vulcanized elastoplasts with high properties, including resistance to oil and gasoline, can be obtained with a minimal amount of vulcanizing agents (dicumyl peroxide-0.5 mass % and sulfur 1-5 mass %) [5-6].

The effect of technological parameters of pressure casting on the basic physical and mechanical properties of dynamically vulcanized thermoelastoplast nanocomposites based on polypropylene and different brands of butadiene-nitrile rubber was considered in the study. A single screw casting unit with 4 temperature zone material cylinders was used as equipment. The rotation of the nozzle ensures a uniform dispersion of the mixed components of the mixture

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Polypropylene copolymer with 1-3 mass % maleic anhydride was used as a compatibilizer to increase the compatibility of the polymer components. The effect of the temperature regime of the material cylinder of the casting machine and the casting pressure on the breaking stress, relative elongation, modulus of elasticity during bending and volume compression was studied.

It has been shown that the defined technological parameters of the casting lead to an increase in strength indicators and a significant decrease in volume compression of dynamically vulcanized thermoelastoplastic nanocomposites. The effect of mold temperature and holding time under pressure on the tensile stress and relative elongation of nanocomposites was considered. The optimal conditions for cooling them in the form of a press have been determined. The effect of dynamically vulcanized thermoelastoplast nanocomposites with different types of butadiene-nitrile resins on the breaking stress and relative elongation was studied [7].

The possibility of obtaining polymer foam materials based on multicomponent polymer mixtures is one of the promising directions for the sorption of oil and oil products from the soil surface for the creation of porous sorbents [8]. At this time, one of the main requirements for the quality of such sorbents is elastoplastic properties, so such materials are generally considered thermoplastic and have rubber properties [9].

Thus, when conducting research on the creation of multicomponent polymer mixtures, problems such as technological compatibility and the possibility of purchasing foam polymer materials based on them arise. To improve the technological compatibility of polymer mixtures, compatibilizers or modifiers are used in the extrusion or injection molding process, which ensure a high degree of miscibility in the alloy. In addition, the production of polymer foam materials based on multicomponent polymer mixtures is associated with technological difficulties, which consists in the fact that each polymer component has its own melting point, viscosity, rheological properties and foamability.

The aim of the study was to study the effect of the ratio of components on the volume mass and macrostructure of foamed polymers obtained on the basis of butadiene-nitrile-rubber (SKN-40), polyvinyl chloride (PVC) and acrylonitrile butadiene mixtures. As a result of the analysis of the macrostructure, the diameter of the pores, the thickness of the walls of the pores and the number of pores per volume unit were determined. The effect of the temperature regime of the pressure casting process on the strength indicators of the foamed polymer was studied. It was determined that in the extrusion pressure range of 4.0-20 MPa, the pore diameter, the number of pores per unit volume, and the thickness of the pore walls vary with a certain regularity.

Thus, as a result of the study of the production technology of foam polymers from multicomponent polymer mixtures based on PVC + SKN + ABS, 1) the effect of technological parameters of extrusion and the regularity of the ratio of components in the foam polymer,

changes in the morphological parameters of its density and macrostructure were revealed. The obtained data show the possibility of obtaining polymer foam materials with predefined structural properties; 2) the effect of injection molding temperature on the stability properties of foamed polymers, such as tensile, flexural and compressive strength; 3) it has been shown that by increasing the casting temperature and changing the ratio of components in the composition of foam polymers, they can significantly affect the change in strength properties over a wide range [10].

Butadiene-acrylonitrile-butylacrylic resin obtained from the copolymerization of butadiene, acrylonitrile and butylacrylic is characterized by the presence of  $-\text{CN}$ ,  $-\text{COOH}$  groups and high resistance to oil and heat. In order to further increase the resistance of the polymer material to heat and ozone, homogeneous hydrogenation in toluene was carried out in the presence of the Wilkinson  $\text{RhCl}(\text{PPh}_3)_3$  catalyst. The effect of catalyst thickness, reaction time, hydrogen pressure during conversion and selected product was studied. The degree of hydrogenation was measured by proton nuclear magnetic resonance and infrared spectroscopy. Thermal stability of hydrogenated and dihydrogenated copolymers was studied by gravimetric analysis method, and ozone resistance was studied in CCD camera. It has been shown that the maximum saturation level is a critical factor for the ozone resistance and thermal stability of hydrogenated rubber [11].

Thermoaggressiveness of butadiene-nitrile rubbers (Terban 3406 and Zetrol 20001) and butadiene-nitrile rubber BNKS-40 AMH hydrogenated compound-based rubbers were studied. It was determined that the increase in the exposure time of rubber to aggressive environments is due to the corrosion of its composition at high temperatures [12].

5 different NBK / HNTs / Silica and NBK / HNTs / CB blends (for 100 wt h rubber) 100/5/0, 100/4/1, 100/ 3/2, 100/2/3, 100/0/5 ratio was used. In two types of rubber, when the amount of silica and CB increased, the breaking strength and modulus of elasticity (M100) increased, the tensile elongation and maximum bending moment increased. When studying the bonding effect of rubber with filler, it was found that CB filler is stronger than silica [13].

To increase the mechanical and tribological properties of butadiene-nitrile resin, its surface layer was chemically modified with a sulfuric acid-based oxidizing solution. The influence of sulfuric acid concentration and loading time on the mechanical and tribological properties of butadiene-nitrile rubber-based rubber was studied. In addition, the surface morphology of the rubber during fracture and friction was studied by scanning electron microscopy, and the effect of the modified surface on the properties of NBR rubber was studied. It was found that gradually increasing the loading time of 50% sulfuric acid solution improves the mechanical and tribological properties of rubbers. Sulfuric acid increases the surface density and hardness of NBR rubber samples with high viscosity, and therefore the cracks formed on the surface of the samples significantly deteriorate the mechanical and tribological properties of the rubber sample [14].

In the study, thermal and thermal properties of butadiene-nitrile resins prepared with the presence of keratin waste zinc oxide or zinc nanooxide were tested. Derivatigraphy, differential scanning calorimetric methods were used and the oxygen index was determined. The effect of modified montmorillonite on the properties of elastomeric protein composite material was studied. Thermal stability and burning composition depend on the method of preparation of the material and the amount of additional keratin. It weakens the combustion of the composite material made on the basis of butadiene-nitrile rubber of keratin waste [15].

The chemical structure of NBR/LDH mixture was studied by Fourier-transform IR-spectroscopy, SEM morphology, PEM and other methods. It was found that SSS chemical bonding of the modified organic LDHs and the rubber matrix occurs during the vulcanization process, which leads to an increase in the interfacial strength of the vulcanizate. The fracture resistance of LDH-modified NBR/SSS rubbers is twice as high as that of unfilled rubber vulcanizate [16].

Butadiene-nitrile rubber and kaolin-based nanocomposite material is characterized by a sharp decrease in solvent absorption compared to unfilled or even partially filled (with montmorillonite) HNBR. This is because there is a strong interaction between them. Diffusion and sorption of chloroform in HNBR-kaolin nanocomposite material was investigated. Diffusion results were analyzed using a simple Fick model [17].

Using a large group of dispersed fillers - asbestos, aluminum oxide, titanium oxide, boron nitride, etc., polymer compositions with complex thermophysical and mechanical properties, which are used in the construction and repair of various types of equipment, have been developed [18].

In the preparation of the elastomer composition (based on butadiene-nitrile rubber), DF-ZN perlite obtained from petrochemical waste was included as an additive. The effect of DF-ZN perlite on the formation of complex indicators of the composition was studied [19].

The complex effect of nitrile-butadiene rubber thickness and pressure casting technological mode on the main properties of low-density polyethylene and polypropylene elastoplastics based on thermoplastic polyolefins was considered. The use of dicumyl peroxide as a binder in the "Monotrem" process made it possible to obtain dynamic vulcanized elastoplasts with improved physical-mechanical and technological properties.

In the process of obtaining elastoplasts, first of all, the compatibility of polymer mixtures and the ability to mix in melt mode are very important. Therefore, in some cases, compatibilizers containing their components and functional polymers are included in the composition of polymer mixtures in order to obtain a satisfactory technological compatibility. Given the various possibilities to modify the structure and properties of DWEP, it is of interest to study the effect of the ratio of the components of the mixture, compatibilizer and vulcanizer on the final properties of the polymer material.

On the other hand, there is very little information in the world literature about the effect of technological aspects of composites, including their main properties without injection molding. In this regard, the purpose of this work is to study the influence of the technological mode of pressure casting, the type of active components and the thickness of DVEP on the process characteristics.

The research object was used: low-pressure polyethylene (LDPE) - breaking stress 13.3 MPa, relative elongation 512 %, melting temperature 1020C and PTR = 1.3 g / 10 min. PP 1500P brand polypropylene - melting temperature 1600C, breaking stress 32.0 MPa, flexural modulus 1400 MPa, relative elongation 50%, melt flow index at 1900C temperature 2.2 g/10 min.

SKN-40 nitrile-butadiene rubber was used as an elastomer.

Dicumyl peroxide (DP) is a light yellow powder, temp. = 400C, used as a binder for polymers.

Methacrylic acid (MAK) with 32% slag component was used as compatibilizer. The abbreviated gelak copolymer is called PEMAK. The procedure for the synthesis and determination of the composition of the copolymer is given.

When studying the process of injection molding of polymer composite systems, the choice of equipment for processing different types of products is of little importance. The most popular in recent years are twin-screw injection molding machines, which act as mixers for multicomponent polymer materials.

Thus, such aggregates are more effective in organizing the mass production of polymer materials.

In order to study the influence of the technological aspects of processing on the properties of the composite material, the influence of the design of the screw of the DE3132.250Ts1 single-screw die casting machine, which allows effective mixing of the components of the composition was studied.

However, taking into account that LDPE and PP are practically incompatible with SKN, a compatibilizer based on calak copolymer-PEMAK was added to the mixture. The addition of a compatibilizer is believed to help improve the compatibility of the polar resin with polyolefins.

For this, it is interesting to conduct a preliminary study on the effect of the thickness of the elastomeric component (SKN) on the strength properties of polymer mixtures - tensile strength ( $\sigma_t$ ), stress at break ( $\sigma_p$ ) (Fig. 1). The action mechanism of the compatibilizer is based on achieving sufficiently satisfactory mixing and uniform dispersion of the mixture components during the process of thermomechanical impact in the cylinder I of the molding machine.



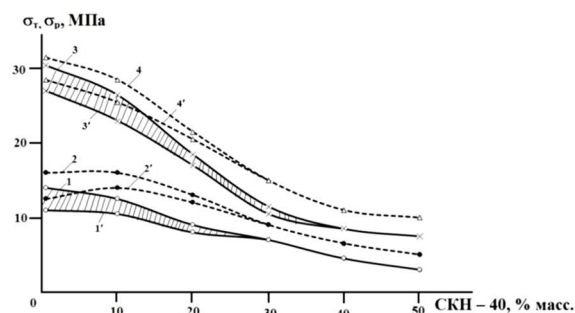


Figure 1. SKN hardness to tensile strength ( $\sigma_t$ )

(1,2,3,4) and the effect on breaking stress ( $\sigma_p$ ) (1', 2', 3', 4'), LDPE + SKN polymer mixtures (1,1'), PP + SKN (3,3') and dynamic vulcanizates, LDPE + SKN + 0.5% mass PD (2,2') and PP + SKN + 0.5% mass PD (4,4').

On the other hand, in the presence of compatibilizing macromolecules, in the process of cooling the polymer mixture at the interface, the necessary wetting and adhesion relationship is ensured, which allows to improve the strength properties [20-27].

The influence of construction agents on the change of physical and mechanical properties of elastoplasts is of interest. Dicumyl peroxide and sulfur were used as stimulants. The concentration of the exciter should be chosen so that the construction process proceeds in a dispersed phase consisting mainly of elastomeric components. It is this approach to construction that allows us to talk about dynamic vulcanization of elastomers. Thus, it is possible to use polypropylene methacrylate acid copolymer as compatibilizer to improve the compatibility of polar SKN resin with non-polar RPP [28-30].

The modification of ASPE with methacrylate acid (MAK) or acrylic acid (AC) (MATPE) was achieved in a mechanochemical synthesis process. The difference of this method is that the modification of ASPE is carried out in hot rolls at a temperature of 1500C in the alloy. The concentration of acrylic and methacrylic acids in ASPE was studied by IR-spectroscopy analysis method. In the form of two samples from MASPE: MAK 11 mass % (MASPE1) and 18 mass % (MASPE2). ASPE samples modified with acrylic acid: EC content 7.3 wt % (AASPE1) and 19.8 wt % (AASPE 2).

Mixing of the components was carried out in a rolling mill at 1900C for 7 minutes: first ASPE PP, then ASPE:PP:SKN-40 with 100:15:5 (mass%). To improve the compatibility of the indicated polymers, chemically modified MASPE and AASPE were incorporated into the polymer alloy at 0.5–7.0 wt% as compatibilizers.

The use of structure formers and compatibilizers in incompatible polymer compositions leads to an increase in their physico-mechanical properties and technological properties and improvement of processing [31].

The study of the conducted scientific research shows once again that it is possible to use composite materials made on the basis of butadiene-nitrile rubber for various purposes in various fields of industry.

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University of Norway

PO Box 1012 Blindern

0224 Oslo