

DEUTSCHE internationale Zeitschrift

für zeitgenössische Wissenschaft

**Nº56**  
**2023**



**DIZZW 2020**

**DEUTSCHE internationale Zeitschrift**  
für zeitgenössische Wissenschaft

**ISSN (Print) 2701-8369**  
**ISSN (Online) 2701-8377**

**Deutsche internationale Zeitschrift  
für zeitgenössische Wissenschaft**

...  
**№56 2023**

**German International Journal  
of Modern Science**

...  
**№56 2023**

Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft ist eine internationale Fachzeitschrift in deutscher, englischer und russischer Sprache.

Periodizität: 24 Ausgaben pro Jahr  
Format - A4

Alle Artikel werden überprüft.

Freier Zugang zur elektronischen Version des Journals

German International Journal of Modern Science is an international, German/English/Russian/Ukrainian language, peer-reviewed journal.

Periodicity: 24 issues per year  
Format - A4

All articles are reviewed.

Free access to the electronic version of journal.

- Edmund Holst (Salzburg) AT
- Michaela Meissner (Köln) DE
- Klara Amsel (Liège) BE
- Briana French (Cambridge) GB
- Joleen Parsons (Manchester) GB
- Dragomir Koev (Sofia) BG
- Stanislav Štěpánek (Praha) CZ
- Valeriya Kornilova (Kyiv) UA
- Dmitriy Aksenov (Lviv) UA
- Valentin Bragin (Moscow) RU
- Mirosław Bednarski (Warsaw) PL
- Daniela Villa (Florence) IT
- Mattia Molteni (Rome) IT
- Sylwia Krzemińska (Ljubljana) SI
- Käte Kraus (Vienna) AT
- Eleonora Lehmann (Berlin) DE
- Alexander Dressler (Marseille) FR
- Zdzisław Małecki (Warsaw) PL
- Adrián Borbély (Budapest) HU

- Edmund Holst (Salzburg) AT
- Michaela Meissner (Köln) DE
- Klara Amsel (Liège) BE
- Briana French (Cambridge) GB
- Joleen Parsons (Manchester) GB
- Dragomir Koev (Sofia) BG
- Stanislav Štěpánek (Praha) CZ
- Valeriya Kornilova (Kyiv) UA
- Dmitriy Aksenov (Lviv) UA
- Valentin Bragin (Moscow) RU
- Mirosław Bednarski (Warsaw) PL
- Daniela Villa (Florence) IT
- Mattia Molteni (Rome) IT
- Sylwia Krzemińska (Ljubljana) SI
- Käte Kraus (Vienna) AT
- Eleonora Lehmann (Berlin) DE
- Alexander Dressler (Marseille) FR
- Zdzisław Małecki (Warsaw) PL
- Adrián Borbély (Budapest) HU

## Artmedia24

Anschrift: Industriestraße 8,74589 Satteldorf  
Deutschland.

**E-mail:** info@dizzw.com

**WWW:** www.dizzw.com

**Chefredakteur:** Reinhardt Roth

**Druck:** Einzelfirma Artmedia24, Industriestraße  
8,74589 Satteldorf Deutschland

## Artmedia24

Address: Industriestrasse 8,74589 Satteldorf Germany.

**E-mail:** info@dizzw.com

**WWW:** www.dizzw.com

**Editor in chief:** Reinhardt Roth

**Printing:** Artmedia24, Industriestrasse 8,74589 Satteldorf Germany.

Der Redaktionsausschuss der Zeitschrift ist nicht  
verantwortlich für die veröffentlichten Materialien.

Für den Inhalt der Artikel sind die Autoren verant-  
wortlich

Die Meinung der Redaktion spiegelt nicht unbedingt  
die Meinung der Autoren wider.

Bei Nachdrucken muss die Zeitschrift zitiert werden.

Das Material wird im eigenen Wortlaut des Autors  
veröffentlicht.

Editorial board of journal is not responsible for the  
materials published there.

Authors are responsible for the content of articles.

Opinion of editorial board may not coincide with the  
opinion of authors.

In case of materials reprinting - link to journal is re-  
quired.

Materials are publishing in author's edition.

Edition: № 56/2023 (May) – 56<sup>th</sup>

Passed in press in May 2023

Printed in May, 2023

**Printing:** Artmedia 24, Industriestrasse 8,  
74589 Satteldorf, Germany.

artmedia<sup>24</sup>

© Artmedia24

© Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft / German International Journal  
of Modern Science

## CONTENT

### CHEMICAL SCIENCES

**Babayeva F. A., Abasov S.I.**

CATALYTIC ACTIVATION DEHYDROALKYLATION  
BENZENE PROPANE TO SYSTEMS PT,  $\text{REO}_x/\text{Al}_2\text{O}_3 +$   
H-ZEOLITE .....4

### EARTH SCIENCES

**Kislyakov V.E., Zubov P.A., Tsimbalyuk N.A.**

DISTRIBUTION OF THE PARTICLES OF THE FINE  
TAILINGS DURING THE DREDGING OF PLACER  
DEPOSITS .....6

### ECONOMIC SCIENCES

**Arakelyan A.**

RICHARDSON MODEL AS A MEANS FOR THE  
MILITARY EXPENDITURES POLICY ADJUSTMENT AND  
ITS ARMAMENTS CONSEQUENCES .....11

**Tuleyeva G., Baimedetov S.**

THE MAIN DIRECTIONS OF DEVELOPMENT OF  
LENDING TO SMALL AND MEDIUM-SIZED  
BUSINESSES .....21

**Tsutskiridze G., Charaia V.**

THE IMPACT OF NON-INTEREST INCOME ON THE NET  
NON-INTEREST MARGIN IN THE CONDITIONS OF  
SHARP CURRENCY FLUCTUATIONS AND THE TREND  
OF GEL DEVALUATION .....24

**Raluca Andreea Ghețu, Petre Brezeanu**

THE IMPACT OF SOME ELEMENTS OF PUBLIC  
GOVERNANCE ON THE LEVEL OF FISCAL PRESSURE BY  
STATES TYPE .....34

### JURISPRUDENCE

**Musayev E.**

FEATURES AND CHARACTERISTICS OF INFORMATION  
CRIMES IN AZERBAIJAN CRIMINAL LAW .....40

### MATHEMATICAL SCIENCES

**Maia Dzadzamia**

EQUIVARIANT FIBER RESOLUTIONS OF CONTINUOUS  
MAPS .....44

### MEDICAL SCIENCES

**Selami Yıldırım**

ENVIRONMENTAL ANALYSIS IN HEALTH  
INSTITUTIONS .....47

**Bondar O.V., Bosenko K.V.,  
Son A.S.**

EVALUATION OF THE EFFECTIVENESS OF COMBINED  
ANESTHESIA IN ONCOLOGICAL ABDOMINAL  
OPERATIONS .....52

**Smolnitchi D.**

CLINICO – MORFOLOGICAL FEATURES OF BURN  
INJURIES CAUSED BY HIGH TEMPERATURES .....56

### PEDAGOGICAL SCIENCES

**Kalybay Arailym Talgat kyzy**

DEVELOPMENT OF SELF-SERVICE SKILLS OF OLDER  
PRESCHOOL CHILDREN THROUGH PLAY ACTIVITIES 61

### PHILOLOGICAL SCIENCES

**Tarasova V.**

PHONETICS AS AN IMPORTANT ASPECT OF  
LEARNING THE RUSSIAN LANGUAGE .....64

**Makhmudova N.A., Asadova G.Yo.**

THE "THE WORLD ACCORDING TO GARP" BY J.  
IRVING AS BILDUNGSROMAN OF THE 1970-S IN  
AMERICAN LITERATURE .....66

### SOCIAL SCIENCES

**Nasruddinov S.M.**

ANTHROPONYMS WITH GEOGRAPHICAL NAMES OF  
THE MASTCHOH DISTRICT OF THE SUGHD REGION .68

### TECHNICAL SCIENCES

**Papcenco A., Bologa M., Grecu G.**

RESEARCH OF THE EFFICIENCY OF THE TECHNOLOGY  
OF EXTRACTION OF JUICE FROM TABLE BEET USING  
ELECTROPLASMOLYSIS AND OF THE ENZYME  
PREPARATION "PECTINASE" .....72

# CHEMICAL SCIENCES

## CATALYTIC ACTIVATION DEHYDROALKYLATION BENZENE PROPANE TO SYSTEMS PT, $\text{REO}_x/\text{Al}_2\text{O}_3 + \text{H-ZEOLITE}$

**Babayeva F. A.,**

Doctor of Chemical Sciences, Associate Professor

*Institute of Petrochemical Processes named Yu.G. Mammadaliyev of Azerbaijan*

**Abasov S.I.**

Doctor of Chemical Sciences, Professor

*Institute of Petrochemical Processes named Yu.G. Mammadaliyev of Azerbaijan*

[DOI: 10.5281/zenodo.7941554](https://doi.org/10.5281/zenodo.7941554)

### Abstract

The involvement of  $\text{C}_1\text{-C}_3$  alkanes in the processes of obtaining valuable products is of great theoretical and practical importance. One of the ways to solve this problem is the possibility of catalytic involvement of these alkanes in the alkylation of aromatic compounds. (Y, M, ZSM-5) for the conversion of  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixtures. The study was carried out on a mechanical mixture of an aluminum-platinum-rhenium catalyst prepared according to a well-known method and H-forms of zeolites (Y, M, ZSM-5).

Formation of products conversion of benzene-propane mixtures MMC (mechanical mixture of catalysts) is accompanied by the occurrence of three reactions: a) the alkylation of benzene; b) the propane dehydrogenation; c) the formation of alkylaromatic hydrocarbons. The course of these reactions depends on the contact conditions of the studied mixtures with MMC. The interaction of propane with benzene proceeds most effectively on a mechanical mixture of catalysts, the components of which are unreduced  $\text{MReO}_x/\text{Al}_2\text{O}_3$  and the H-form of the zeolite, which are carriers of spatially separated redox and acid-base centers. The addition of small amounts of benzene to propane leads to the activation of propane and the formation of hydrogen, the yield of which corresponds to the molar conversion of propane. Depending on the temperature, the distribution of the conversion products of the  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixture is characterized by a change in the yields of IPB, n-PB, the sum of other aromatic  $\text{C}_7\text{-C}_9$  hydrocarbons, and propylene.

**Keywords:** conversion,  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixtures,  $\text{PtReO}_x/\text{Al}_2\text{O}_3 + \text{H-zeolite}$ , isopropyl benzene, alkylaromatic hydrocarbons

Results of studying the conversion of  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixtures MMC showed that only in the presence of benzene MMC has activity in a low temperature ( $\geq 180^\circ\text{C}$ ) conversion of propane. The introduction of small amounts of benzene into propane (for example, 10 mol %) leads to its transformations and the formation of hydrogen, the molar value of which corresponds to the total molar conversion of propane. Eduction of hydrogen in the conversion of benzene-propane mixtures is a total

reflection of the noted reactions. Conversion  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixtures depends on the pretreatment of the catalyst. Eduction hydrogen subjected to standard processing air MMC characterized by a period of activation. This activation period MMC is associated exclusively with the interaction of propane with  $\text{PtReO}_x/\text{Al}_2\text{O}_3$  (APRC) catalyst and, by analogy with methane, may be a consequence of the partial reduction of the metal component of MMC (tab. 1).

Table 1

The effect of the ratio of benzene conversion of propane and a mixture of  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$ .  $T = 250^\circ\text{C}$ ,  $V = 500\text{ h}^{-1}$

Content, mol. %		Conversion, %		The product yield, % C		
$\text{C}_6\text{H}_6$	$\text{C}_3\text{H}_8$	$\text{C}_6\text{H}_6$	$\text{C}_3\text{H}_8$	IPB	$\text{C}_3\text{H}_6$	ArH
125	100	-	0	-	-	-
250	90	12	1.9	3.6	0.5	-
500	75	14	7.2	6.2	0.7	2.2
750	50	23	7.7	6.4	0.4	2.6
1000	0	0	-	-	-	-

It is seen from Table 1, that the yield of conversion products  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixtures depends on their ratio. Changing the molar ratio of  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  from 1 : 9 to 1 : 1 leads to an increase in conversion of benzene and  $\text{C}_9$  growth ArH composition. Varying the volume speed of from 125 to  $1000\text{ h}^{-1}$  changes as the conversion of components of  $\text{C}_6\text{H}_6:\text{C}_3\text{H}_8$  mixture and distribution of the

reaction products (tab. 2) – below than  $500\text{ h}^{-1}$  is increased yield IPB and formations NPB and ArH with slight amounts of propylene. Increasing the volume speed leads to a monotonic decrease of benzene conversion, while the conversion of propane in the range of  $V = 125\text{-}500\text{ h}^{-1}$  is reduced, and then increases again with growth the volume speed of from 500 to  $1000\text{ h}^{-1}$ .

Table 2

The effect of volume speed rate of reactants on the conversion  
of benzene-propane mixture at APRC + HY; T = 250 °C

V, h <sup>-1</sup>	Conversion, %			Product Yield, %		
	C <sub>6</sub> H <sub>6</sub>	C <sub>3</sub> H <sub>8</sub>	IPB	C <sub>3</sub> H <sub>6</sub>	NPB	ArH
125	18.2	2.7	4.3	0.1	0.3	0.4
250	15.8	2.2	4.0	0.4	0.2	0.1
500	11.4	2.0	3.1	0.6	traces	0
750	10.2	2.9	2.8	1.4	0	0
1000	8.5	5.7	2.3	3.9	0	0

Varying the ratio of metal and acid MMC components leads to a change in the transformation products C<sub>6</sub>H<sub>6</sub> : C<sub>3</sub>H<sub>8</sub> mixtures. The data show that the type of zeolite influences the conversion of individual components of the reaction mixture and the yield (selectivity) of the reaction products.

### References

1. Abasov S.I., Babayeva F.A., Tagiyev D.B., Rustamov M.I.. Low-temperature catalytic alkylation of benzene by propane // Applied Catalysis A: General.

2003, N 251, p. 267-274.

2. Babayeva F.A., Abasov S.I., et al. Transformation of benzene-propane mixtures on Pt,ReO<sub>x</sub>/Al<sub>2</sub>O<sub>3</sub> catalytic systems // Georgian Chemical Journal, 2004, v. 4, N. 1, p. 28-34.

3. Abasov S.I., Babayeva F.A., et al. Influence of zeolite nature on low-temperature transformations of C<sub>6</sub>H<sub>6</sub> : C<sub>3</sub>H<sub>8</sub> mixtures on catalytic systems Pt, Re/Al<sub>2</sub>O<sub>3</sub> + H-zeolite // Processes of petrochemistry and oil refining. 2004, N. 3 (18), p. 87-93.

# EARTH SCIENCES

## DISTRIBUTION OF THE PARTICLES OF THE FINE TAILINGS DURING THE DREDGING OF PLACER DEPOSITS

**Kislyakov Viktor Evgenievich,**

*Doctor of Technical Sciences, professor,*

*Siberian Federal University, School of Mining, Geology and Geotechnology, RF*

**Zubov Pavel Andreevich,**

*Laboratory assistant,*

*Siberian Federal University, School of Mining, Geology and Geotechnology, RF*

**Tsimbalyuk Nikolay Aleksandrovich**

*Graduate student,*

*Siberian Federal University, School of Mining, Geology and Geotechnology, RF*

[DOI: 10.5281/zenodo.7941561](https://doi.org/10.5281/zenodo.7941561)

### Abstract

A technique is proposed that allows predicting the spread of light particles along the length of the dredge section, depending on the particle size, during the dredge development of placer deposits.

**Keywords:** dredging method of development, placer deposits, dilution of sands in the bottom.

Currently, Russia has a fairly large-scale raw material base of gold, notable for the fact that it has a high level of development [1]. The gold mining industry has been successfully developing and consistently increasing production volumes over the past 20 years [2]. However, intensive exploitation of placer deposits has led to fact that most of them are currently depleted, and existing technologies cannot solve the main problem of placer gold mining – the natural reduction and deterioration of the raw material base [3-6]. This is due the fact that many easily accessible deposits have already been worked out, there is a deterioration of mining and geological conditions [7-11].

The highest technical and economic indicators in the development of placer deposits of minerals have a dredging method, which has a number of advantages, such as high productivity, minimum cost, the possibility of implementation in difficult hydrogeological conditions. The dredging method of extraction is quite strongly dependent on the coarseness of grading of the sands being developed. The smallest fractions of spent dredge sands fall into the bottom-hole dredge zone, which leads to a decrease in equipment productivity and most importantly, to an increase in dilution [12]. Therefore, it is necessary to understand the process of distribution of various fractions falling from tail sluice into the process water along the length of dredge section.

The particles entering the section are distributed along its bottom, obeying the Gauss distribution law.

Using the method for determining the distribution of the pulp on the alluvium map proposed by A.I. Ogurtsov [13] and the results obtained using measurements, the empirical coefficients of the normal distribution function for the separation of particles in the dredging separation were obtained.

The function of the normal distribution over the relative length for the conditions of fractionation of light particles in the process water of the draining section:

$$(f)t = \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}}, \quad (1)$$

where  $t$  is the parameter of the normal distribution.

$$t = \frac{l_0 - (1 - 1/2 \cdot K'_0)}{\sqrt{K'_2/3 \cdot V^2}}, \quad (2)$$

where  $l_0$  is the relative distance from the discharge site of the light fractions;

$K'_0$  и  $K'_2$  is the empirical coefficients depending on the average diameter of the light particles;

$V$  is the average speed of the process water in the drainage section, m/s.

As a result, the values of empirical coefficients were obtained  $K'_0$  and  $K'_2$  for the conditions of distribution of soil particles with different coarseness of grading (see Fig. 1):

$$K'_0 = -0,01502 \cdot lg^3 d_{cp} + 0,00367 \cdot lg^2 d_{cp} + 0,48413 \cdot lg d_{cp} + 0,96753; \quad (3)$$

$$K'_2 = -0,00391 \cdot lg^3 d_{cp} - 0,01787 \cdot lg^2 d_{cp} - 0,00032 \cdot lg d_{cp} + 0,0518. \quad (4)$$

The obtained models made it possible to calculate for the most common coarseness of grading encountered during the development of placer deposits. The obtained values are presented in Table 1.

Table 1

Values of empirical coefficients $K'_0$ and $K'_2$		
The diameters of the particles of the rock of the lixiviation tails $d_{cp}$ , mm	The value of $K'_0$	The value of $K'_2$
0,0025	-0,0027	0,0005
0,0075	0,0995	0,0093
0,015	0,1879	0,0167
0,03	0,2918	0,0247
0,057	0,3998	0,0321
0,087	0,4762	0,0367
0,13	0,5519	0,0408
0,205	0,6410	0,0448
0,375	0,7631	0,0490
0,75	0,9071	0,0516
2	1,1132	0,0500
4	1,2571	0,0443
7,5	1,3839	0,0352
13	1,4906	0,0239
18	1,5513	0,0155

The obtained values of empirical coefficients are used to determine the Gaussian distribution function of light particles.

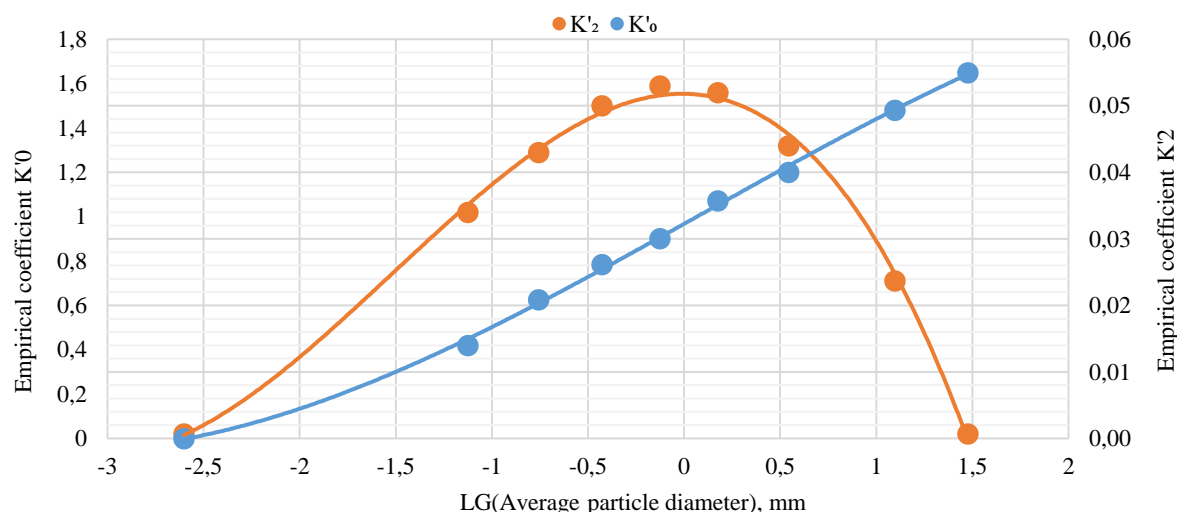


Fig. 1. Graph of the dependence of empirical coefficient  $K'_0$  u  $K'_2$  on  $lg d_{cp}$

Probability density of particle size distribution of the  $i$ -th size along the fine tailings ( $V=0,5$  m/s):

$$F_i = K'_1 \cdot \left( \sqrt{K'_2 \cdot (3 \cdot V^2)^{-1}} \right)^{-1} \cdot f(t), \quad (5)$$

where  $K'_1$  is the empirical coefficient depending on the relative distance of the distribution.

The empirical coefficient was obtained based on the results of data processing, including taking into account the actual distribution of particles of fine tailings during the development of placer deposits:

$$K'_1 = 10^{(-1,48174 \cdot lg l_0 - 2,87885)}. \quad (6)$$

The values of the probability density of the distribution of particles with different average diameters along the length of the fine tailings are obtained. The values are shown in Table 2.

According to available data from placer the North-East Russia and Siberia, coarseness of grading of sands are known [14]. Knowing the values of the maximum

and minimum partial yield for each fraction of the sand size, we determine the distribution of fractions along the length the dredge section. The initial partial yield for fine-grained particles was 100 %, for coarse-grained – 68%. The values for coarse-grained and fine-grained particles are shown in Table 3.



Table 2

Probability density of fractions distribution along the length of the fine tailings

l <sub>0</sub>	The diameter of the particles of the rock of fine tailings, mm													
	0,0025	0,0075	0,015	0,03	0,057	0,087	0,13	0,205	0,375	0,75	2	4	7,5	18
0,1	0	0	0	0	0,009	0,028	0,065	0,134	0,272	0,486	0,868	1,197	1,581	2,598
0,2	0	0	0	0	0,004	0,009	0,018	0,03	0,052	0,081	0,127	0,164	0,208	0,35
0,3	0	0	0	0,001	0,003	0,007	0,01	0,016	0,023	0,031	0,042	0,05	0,059	0,077
0,4	0	0	0	0,001	0,004	0,006	0,008	0,01	0,013	0,016	0,018	0,02	0,02	0,016
0,5	0	0	0	0,002	0,004	0,005	0,006	0,007	0,008	0,008	0,008	0,008	0,007	0,002
0,6	0	0	0,001	0,002	0,004	0,004	0,004	0,005	0,005	0,004	0,004	0,003	0,002	0
0,7	0	0,001	0,002	0,003	0,003	0,003	0,003	0,003	0,003	0,002	0,002	0,001	0,001	0
0,8	0	0,002	0,002	0,002	0,002	0,002	0,002	0,001	0,001	0,001	0,001	0	0	0
0,9	0	0,002	0,002	0,002	0,001	0,001	0,001	0,001	0,001	0	0	0	0	0
1	0,008	0,002	0,001	0,001	0,001	0,001	0	0	0	0	0	0	0	0

Table 3

Fractionation of fractions (partial yield in %) along the length of the fine tailings during the development of coarse-(fine) granular sands

l <sub>0</sub>	The diameter of the particles of the rock of the fine tailings, mm									
	0,0025	0,0075	0,015	0,03	0,057	0,087	0,13	0,205	0,375	0,75
0,1	4,4(32,5)	3,7(10,1)	3,1(20,4)	2,8(25,8)	2,5(4,2)	1(3)	2,5(1)	3(0,5)	1,38(0,55)	1,93(0,32)
0,2	0(0)	0(0)	0(0)	0,1(0,93)	0,63(1,06)	0,43(1,28)	0,37(0,15)	0,44(0,07)	0,22(0,09)	0,23(0,04)
0,3	0(0)	0(0)	0,01(0,05)	0,13(1,17)	0,27(0,46)	0,14(0,42)	0,1(0,3)	0,09(0,26)	0,17(0,07)	0,15(0,02)
0,4	0(0)	0(0)	0,04(0,23)	0,22(2,03)	0,26(0,45)	0,08(0,23)	0,13(0,05)	0,06(0,19)	0,1(0,04)	0,07(0,01)
0,5	0(0)	0(0,01)	0,13(0,85)	0,35(3,23)	0,28(0,47)	0,06(0,19)	0,05(0,14)	0,03(0,09)	0,04(0,2)	0,02(0)
0,6	0(0)	0,04(0,12)	0,34(2,26)	0,48(4,38)	0,27(0,45)	0,02(0,01)	0,02(0,01)	0,01(0)	0,01(0)	0,01(0)
0,7	0(0)	0,3(0,81)	0,64(4,23)	0,52(4,82)	0,23(0,38)	0,05(0,14)	0,06(0,03)	0,04(0,01)	0,02(0)	0,01(0)
0,8	0(0)	0,94(2,58)	0,82(5,42)	0,45(4,19)	0,16(0,27)	0,03(0,09)	0,04(0,2)	0,02(0)	0,01(0)	0,01(0)
0,9	0(0,03)	1,42(3,87)	0,71(4,67)	0,31(2,84)	0,1(0,16)	0,02(0,01)	0,02(0,01)	0,01(0)	0,01(0)	0,01(0)
1	4,4(32,47)	0,99(2,71)	0,41(2,67)	0,16(1,48)	0,05(0,08)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)

Continuation of table 3

l <sub>0</sub>	The diameter of the particles of the rock of the fine tailings, mm									
	0,375	0,75	2	4	7,5	13	18	2(0,4)	1,71(0,34)	0,23(0,05)
0,1	8(0,5)	4(1)	7(0)	5(0,2)	11(0,2)	8(0,2)	2(0,4)	1,71(0,34)	0,23(0,05)	0,05(0,01)
0,2	5,76(0,36)	3,08(0,77)	5,68(0)	4,15(0,17)	9,26(0,17)	6,8(0,17)	2(0,4)	1,71(0,34)	0,23(0,05)	0,05(0,01)
0,3	1,11(0,07)	0,52(0,13)	0,83(0)	0,57(0,02)	1,22(0,02)	0,89(0,02)	0,23(0,01)	0,01(0)	0,01(0)	0,01(0)
0,4	0,49(0,03)	0,2(0,05)	0,28(0)	0,17(0,01)	0,35(0,01)	0,23(0,01)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
0,5	0,28(0,02)	0,1(0,02)	0,12(0)	0,07(0)	0,12(0)	0,06(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
0,6	0,17(0,01)	0,05(0,01)	0,06(0)	0,03(0)	0,04(0)	0,02(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
0,7	0,1(0,01)	0,03(0,01)	0,03(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
0,8	0,06(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
0,9	0,03(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)
1	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)	0,01(0)

According to the data obtained, it can be concluded that with an increase in the average diameter, the distance traveled by the particle relative to the dumping

site decreases. Small particles, on the contrary, overcome a long distance. An example of the distribution is shown in Figure 2.

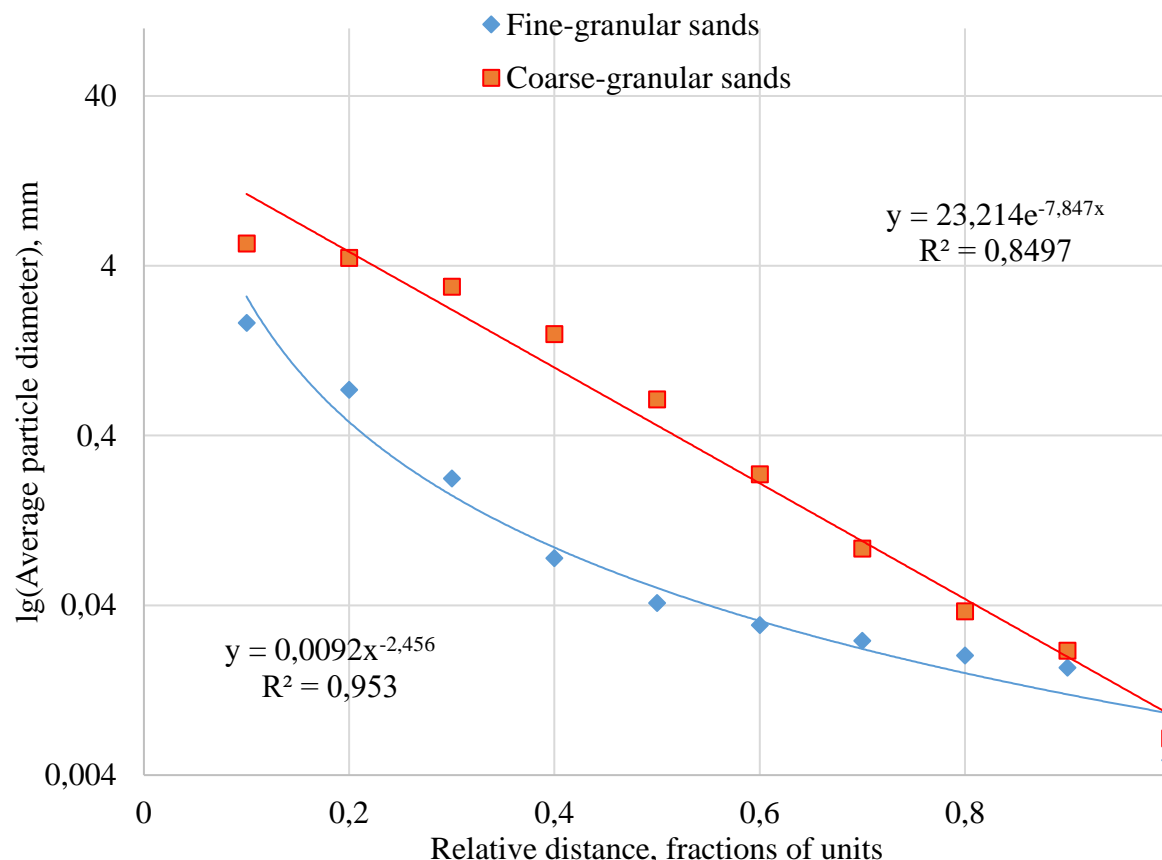


Fig. 2

*Change in the weighted average diameter of the fine tailing fractions along the length of the dredge section*

The dependences of the average diameter of the fine particles on the distance of the tailing propagation were revealed.

For coarse-grained particles:

$$d_{c.B} = 23,214 \cdot e^{-7,847l_0}. \quad (7)$$

For fine-grained particles:

$$d_{c.B} = 0,0092 \cdot l_0^{-2,456}. \quad (8)$$

Thus, the presented technique makes it possible to predict the distribution of fine particles according to the signs of a dredging section, depending on the size. Understanding the distribution of the process includes the ability to build a longitudinal profile at the development and design stage. This knowledge is necessary to clarify the dilution of sands in the bottom hole zone for monitoring the fine tailings and developing its indicators based on measures.

### References

1. On the state and use of mineral resources of the Russian Federation in 2019: state report. Ministry of Natural Resources and Ecology of the Russian Federation. Moscow, p. 494.
2. Victor Tarakanovsky summed up the results of 2022. Gold mining. URL: <https://zolotodb.ru/article/10922> (date of treatment 15/04/2023).
3. Gold production in Russia. Gold mining. URL: <https://zolotodb.ru/article/10922> (date of treatment 03/20/2023).
4. Jonson K., MacKenzie A. (2012). Gold dredging in the Klondike and number 4 Proceedings. Annual Conference. Canadian Society for Civil Engineering, 1, pp. 211–220.
5. Liu Yanga, Sun Jiuyuna. (2011) Study of the Integrated Enviromental Monitoring in Mining Area Based on Image Analysis. Procedia Engineering; 21, pp. 267–272. <https://doi.org/10.1016/j.pro-eng.2011.11.2014>
6. Pyatakov V.G., Talgamer B.L. Prospects for the development of a dredge method for the development of placer deposits. 2019. No. 12. P. 35-38.
7. Overview of the main events in the gold mining industry. Gold and technology. . URL: <https://zolteh.ru/results/obzor-osnovnykh-sobytiy-v-zolotodobyvayushchey-otrasli-po-itogam-aprelyaiyunya-2021-goda> (date of treatment 17/04/2023).
8. Garnett R. H. T. Graphical representation of production results versus estimates in placer mining. Transactions of the Institutions of Mining and Metallurgy. Section B // Applied Earth Science. 2015. Vol. 124. No. 3. P. 175–190.
9. Brown L., Vearncombe J. Critical analysis of successful gold exploration methods. Transactions of the Institutions of Mining and Metallurgy. Section B // Applied Earth Science. 2014. Vol. 123, No. 1. P. 18–24.

10. Stanaway K. J. Ten placer deposit models from five sedimentary environments. Transactions of the Institutions of Mining and Metallurgy. Section B // Applied Earth Science. 2012. Vol. 121. No. 1. P. 43–51.
11. Ershov V.A. Purposeful transformation of alluvial deposits in dredge design // Mining industry Journal. 2010. №5. P. 70-72.
12. Drobadenko V.P., Potapova T.S., Kislyakov V.E. (1992). Hydrotechnical structures in the development of alluvial deposits. Moscow: Nedra, p. 285. (In Russ.)
13. Ogurtsov A.I. (1974). Alluvium of earthworks. Moscow: Stroyizdat, p. 366. (In Russ.)
14. Kislyakov V.E. Improving the efficiency of circulating water supply of flushing installations during the bulldozer development of permafrost placer: Dissertation of candidate of technical sciences: 05.15.09/ Kislyakov Viktor Evgenievich. – Moscow, 1982. – 255p.

# ECONOMIC SCIENCES

## RICHARDSON MODEL AS A MEANS FOR THE MILITARY EXPENDITURES POLICY ADJUSTMENT AND ITS ARMAMENTS CONSEQUENCES

Aram Arakelyan

*Doctor of technical sciences, professor, Head, Department of Mathematical Modeling of Economics, Yerevan State University, 1 Manougian st., Yerevan, Armenia.*

[DOI: 10.5281/zenodo.7941572](https://doi.org/10.5281/zenodo.7941572)

### Abstract

Current paper is devoted to the study of the use of Richardson's model as a means for the adjustment of countries military expenditures policies acting in the region of their interests. As the model we are considering a system of differential equations and are defining a general solution.

Being interested in the study of the application for real world example a simulation Richardson model for five countries is given. Mutual threats between acting countries are considered. Farther, number of threats are defining and considering as constants, assessing outcomes of countries.

**Keywords:** Richadso model, military policy, adjustment, threat, ordinary differential equations.

### 1. Introduction

Richardson was the first who considered countries armaments model. The model he developed provided the analysis of countries armaments processes focused on wars and conflicts. The model is based on mathematical analysis of the insecurity of nations. Richardson's model considered in<sup>1</sup> is a system of differential equations. In current study we will define a model as a system of five differential equations presenting the change of the volume of the military expenses of one country depending from the volume of expenses of other countries.

We showed that proposed approach provides the possibility for the presentation, solving and analyzing model, where individual countries are cooperating and/or mutually infusing in one economic – political region of their interests. It's assumed that these countries are acting in a similar way of Richardson model: one of these countries follows the strategy aimed at depleting the military resources of another country, either acting independently or in the cooperation with other involved in the model country. Countries whose policy is aimed at obtaining a favorable position in the region for solving own goals, cooperating with the countries involved in the conflict, as well as with a group of other countries having their own economic – political interests in the region are also highlighted. It's assumed that countries have their own goals and strategies in relation to influence on each of the countries are considered. Thus, to value the impacts between countries we consider country's military expenses as the assessment of country's state as the outcome of the interaction between countries. Consequently, country's military spending has same meaning as in the Richardson model.

Thus, in current paper we will consider a system of five countries as follows:

i) countries 1 and 2 are infusing each other;

ii) countries 3,4, and 5 are interacting separately or in cooperation with one of 1 2 country are infusing or providing a support.

### 2. Definitions and notations

We will follow the approach considered in<sup>2</sup> proposed an extension of Lotka-Volterra model and use it for the study of Richardson's model given as follows<sup>3</sup>

$$\frac{dp_i}{dt} = g_i p_i(t) + \sum_{1 \leq i, j \leq n, i \neq j} d_{i,j} p_j(t), \quad (1)$$

where i)  $p_i(t)$  is the military expenses of  $i$  – th country, ii)  $g_i p_i(t)$  represents either the growth or decreasing rate of the country, iii)  $d_{i,j}$  is a constant representing the number of the threats of  $j$  – th country to  $i$  – th country, iv) we will assume that depending from the sign in front of the coefficient  $d_{i,j}$  the rate  $d_{i,j} p_j(t)$  could be positive or negative. Let us consider the system of ordinary differential equations as the example of (1) as follows:

$$\frac{dp_i}{dt} = g_i p_i(t) + \sum_{1 \leq i, j \leq 5, j \neq i} d_{i,j} p_j(t) \quad (2)$$

, where  $i = 1, 2, \dots, 5$  Assume that  $t \in [0, T]$ ,  $p_k(0) = p_{k0}$ ,  $k = 1, 2, \dots, 5$ , where as we proposed  $p_k(t)$  is military expenditures of  $k$  – th country,  $k = 1, 2, \dots, 5$ .

**Mutual threats between countries** In this section we'll present threats between countries. Mutual economic political interests of countries and the consequences of their armaments.

<sup>1</sup> Richardson, Lewis F (1960) Arms and Insecurity. Pittsburgh, PA: Boxwood

<sup>2</sup> A.Arakelyan, L.Makaryan Model of territorial conflict and international military cooperation, Journal of Yerevan University Economics, (3), 2021p.56-72

<sup>3</sup> Schrodtt, Philip A (1981) Preserving Arms Distributions in a Multi-Polar World. Monograph Series in World Affairs, Graduate School of International Studies 18(4). Denver, CO: University of Denver Press.

All further references are given without changing the original.

## **I. Iran against Azerbaijan.**

1.1. Russian political scientist and expert on the Middle East and Caucasus Stanislav Tarasov<sup>4</sup> noted that Iran rejects Azerbaijan efforts to violate the border between Armenia and Azerbaijan and create the corridor connecting Azerbaijan with Nakhchivan. He mentioned that the topic "Zangezur corridor" introduced Azerbaijan according to the statement signed between Armenia, Azerbaijan and Russia on November 9, of 2020. As the statement presents the road should be under the control of the Russian federal Security Service. However, Azerbaijan's and Turkey's demands are to kick out Russia and take the road under their control. According to Tarasov, Pashinyan's goal is to normalize relations with Turkey whose president set up a condition for the creation of a corridor between Azerbaijan and Nakhchivan. Due to political and economic conditions, Iran is not satisfied with the existing results concerning the solution of the Karabakh problem and the creation of a corridor between Azerbaijan and Nakhchivan. Iran set up the demand to be a participant of the processes related to negotiations. Currently the Statement has been signed by the presidents of Russia and Azerbaijan and the Prime Minister of Armenia on November 9, 2020. Turkey sought to take part in the process of signing this Statement but Putin rejected such participation. Historically Karabakh is zone of influence of Iran and therefore decisions regarding the creation of communications, the conclusion of a peace treaty between the Armenia and Azerbaijan, the determination of the status of Karabakh cannot be executed without the participation of Iran.

Therefore, Iran does not recognize the Statements of the three sides of Russia, Azerbaijan and Armenia without its participation and is even ready to send troops into the disputed region.

### **1.2. Iran armament politics**

Iran Develops Its First Domestic Hypersonic Ballistic Missile by Nigar Bayramli<sup>5</sup>

Iran is currently under economic and political pressure from the United States, the European Union, Israel and Saudi Arabia, Turkey and Azerbaijan. In particular, the economic and political interests of Iran and these countries clash in relation to the South Caucasus. To resolve conflict situations and create conditions for fruitful participation in resolving conflict situations, Iran is facilitated by the development of the aerospace industry. Development of nuclear technology is explained by the creation of hypersonic missiles, which, unlike those currently available, can carry nuclear weapons along a complex trajectory at a speed of more than five times the speed of sound, making them difficult to intercept. Brigadier General Amir-Ali Hajizadeh, Head of the Aerospace Division of the Islamic

Revolutionary Guards Corps (IRGC), said: "This missile can hit the enemy's anti-missile systems and is a great leap forward in the development of missiles." Iran continues to cooperate with Russia in the field of satellite development, and in particular, in August, the Khayyam satellite, which was built and launched by Russia on behalf of Iran, went into orbit from the Russian-controlled Baikonur Cosmodrome in Kazakhstan. The Iranian space agency said the satellite would be used for agricultural and water resources planning, while the Russian embassy in Tehran said the spacecraft was designed for non-military purposes. Iran's satellite program and its nuclear activities have attracted the attention of the United States, other Western countries and in particular the neighboring countries of the South Caucasus, Turkey, Israel and Saudi Arabia. These states fear that "long-range ballistic technology, which is used to put satellites into orbit, could also be used to launch nuclear warheads. Tehran has repeatedly denied having such intentions." Under the circumstances, these countries note the growing military threat from Iran. In particular, such a threat can be perceived by Azerbaijan and Turkey. Unlike these countries, Iran's success in the field of air technologies and its nuclear program can find significant support and understanding from Russia, which sees Iran as a reliable partner for resolving the conflict in the South Caucasus with the participation of Iran. 1.3. Iran Warns Against 'Border Changes' As Armenia, Azerbaijan Clash, Iran International Newsroom<sup>6</sup>

According to the cited statement, Iran warns against "changing borders" against the background of the clash between Armenia and Azerbaijan. The current situation was the result of a long-term conflict between neighbors Armenia and Azerbaijan. The economic and political interests of Iran justify its policy of unacceptability of changes in the existing borders between the two countries. Iran, according to the official government news website IRNA, said Tehran was "watching this issue closely" and offered help to resolve the differences. Iran said that "the escalation of years of hostilities between the countries of the South Caucasus has raised fears that in the post-Soviet world, in addition to Russia's invasion of Ukraine, a second full-fledged war may break out." In response to Azerbaijan's policy of launching a large-scale war, Iran warned that there should be "no military solution" for the region. The conflict must be resolved through diplomacy.

### **1.3. Iran plays its cards in the South Caucasus**

As noted Yeghia Tashjian's Take, Columns<sup>7</sup> Iran plays its cards in the South Caucasus.

At the beginning of 2022, Iran's foreign policy changed. This was prompted by Russia's awareness of the importance of the North-South trade route. This led to the fact that Iran changed its relations with Azerbaijan, and also increased interaction with Armenia. Given the growing role of Iran in the region, Baku has reduced

<sup>4</sup>Tarasov: Iran may not recognize peace treaty between Yerevan and Baku and send troops (news.am)  
<https://news.am/eng/news/724783.html>

<sup>5</sup> <https://caspiannews.com/news-detail/iran-develops-its-first-domestic-hypersonic-ballistic-missile-2022-11-10-56/>

<sup>6</sup> <https://www.iranintl.com/en/202209137964>

<sup>7</sup> <https://armenianweekly.com/2022/05/25/iran-plays-its-cards-in-the-south-caucasus/>

political pressure on Yerevan. Iran's activity in protecting its geopolitical interests would be based on determining the role of Armenia and Azerbaijan in resolving Iran's regional trade and economic interests. Iran is currently distinguished as a country that has the potential in the field of conducting diplomatic negotiations aimed at creating conditions for the development of the South Caucasus region in conditions of peace that meets the interests of the countries of the region. Relations with the countries of the region and countries with economic and political interests have shown that the ways proposed by Iran to resolve the conflict can satisfy the requirements of the countries of the region and at the same time meet the interests of Iran itself. Detente of relations with Azerbaijan

On March 11, 2022, Azerbaijan and Iran signed an agreement on the creation of new railways, roads and energy supply lines connecting the southern territories of Karabakh/Artsakh seized by Azerbaijan with the exclave of Nakhichevan. Dogowu proposes the creation of a new highway, 55 kilometers long, starting at Zankelan. The agreement involves the creation of two railway bridges and a road bridge across the border river Araks. As a result of this highway will pass through northern Iran and provide a connection to the Nakhichevan village of Ordubad.

"The Iranian political scientist Vali Kaleji in his article "Construction of roads and railways between Zangilan and Nakhchivan: views from Baku and Tehran" emphasizes that this project is of geo-economic importance for Azerbaijan and Iran."

The articles of the agreement on the creation of communication routes passing through the territories of Iran and Azerbaijan provide an opportunity to strengthen Azerbaijan in terms of communication with the regions of Azerbaijan and, very importantly, connect Azerbaijan with Nakhchivan. The most important feature of the agreement proposed by Iran is also that "the 55-kilometer highway through Iran will become an alternative to the Zangezur Corridor," which Azerbaijani President Ilham Aliyev insisted on after the tripartite statement of November 9, 2020. With the help of Iran, this alternative route will take some pressure off Armenia's shoulders, as Baku threatened to gain a corridor through the strategic Syunik region in southern Armenia and cut Armenia's border with Iran." At the same time, Azerbaijan will establish a connection with Nakhichevan through Iran, which in the future will provide additional Iranian levers of influence on Azerbaijan. We also note that the fake Zangezur corridor is a plan developed and discussed in the think tanks of NATO, Turkey and the Zionist regime. Obviously, it is directed against the political and economic interests of Iran, Russia, China and India. Consequently, Iran, Russia, China and India, having military and economic potential, "are able to prevent geopolitical changes on the southern borders of Armenia in order to implement the fake Zangezur corridor in accordance with the UN Charter, which prohibits any change in international

borders." Iran, proceeding primarily from its geopolitical interests, managed to attract Armenia and Azerbaijan to mutually beneficial cooperation. At the same time, Iran's interaction with the countries of the region, taking into account the interests of Russia, China and India, made it possible to reduce the risk of a conflict situation developing and exclude the possibility of a large-scale war on the territories of Armenia and Azerbaijan. "Iran's interaction with Azerbaijan on the alternative 'corridor' removed the military and political pressure on Armenia in connection with the Azerbaijani threat over Syunik, but at the same time left Armenia isolated for some time from regional communication and trade projects." 1.5. Iran will not tolerate any border changes in region, army chief says<sup>8</sup>

Major General Mohammad Bagheri, Chief of Staff of the Iranian Armed Forces, said that Iran would not tolerate any changes in borders in the region. Mohammad Bagheri called on Armenia and Azerbaijan to solve their problems through dialogue.

"As we have repeatedly stated, we will not tolerate changes in the borders of the countries of the region," Bagheri said. "We advise Azerbaijan and Armenia to solve their problems through dialogue." Despite this, Azerbaijani forces launched a massive offensive against Armenia just after midnight on September 13, inflicting artillery and drone strikes on Armenian military positions and civilian settlements. Thanks to Russian promptings late on the evening of September 14, hostilities ceased at 20:00 local time. In turn, the Secretary of the Security Council of Armenia, Armen Grigoryan, shortly after midnight announced that Yerevan and Baku had agreed on a ceasefire mediated by the international community.

1.4. Iran's protests against Azerbaijan's propaganda campaign against Iran

The Iranian Foreign Ministry summoned the ambassador of the Republic of Azerbaijan to Tehran to lodge a protest over the propaganda campaign waged by the country's officials and media against Iran expressed regret over the situation and promised to immediately convey Iran's protest to the authorities in Baku. 1.7. Iran, Russia Start Joint Naval Drill in Indian Ocean<sup>9</sup>

Iran, Russia Start of Joint Naval Drill in Indian Ocean showed significance of the bilateral relations between Kremlin and Teheran. The importance of cooperation between Moscow and Tehran showed additional threat directed to Ankara and Baku setting and continuing aggressive regional political economic behavior against Tehran and Yerevan. In addition Russia maintained the South Caucasus as a region of sphere of influence. "The purposes of this drill are to enhance security of international maritime trade, confront maritime piracy and terrorism, and exchange information." Thus, Russia and Iran became countries which participation in the construction of future political economic policy of South Caucasus. It should be noted that the Iranian army exercised also "expansion of bilateral re-

<sup>8</sup> <https://www.panorama.am/ru/news/2022/09/22/Iranian-army-chief/2733590>

<sup>9</sup> <https://www.themoscowtimes.com/2021/02/16/iran-russia-start-joint-naval-drill-in-indian-ocean-a72979>

lations" with Russia. Iran, China and Russia held a similar drill in the area in 2019, and the Islamic republic participated in "Caucas 2020" drills held in Russia last September. 1.8. Iran Calls Close Relations with Russia "Decisive Response" to US Sanctions<sup>10</sup>

Iranian President Ebrahim Raisi has described close cooperation with Russia as the most "decisive response" to US sanctions, amid mounting evidence of Russia's use of Iranian drones in its war against Ukraine.

IRAN --The head of Iran's Revolutionary Guard Corps Hossein Salami (R) watches a launch of missiles during a military drill in an unknown location in central Iran, January 15, 2021

Iran's Revolutionary Guards began on Monday major military exercises along the country's borders with Armenia and Azerbaijan amid lingering fears of renewed fighting between the two South Caucasus states.

The war games, described by Iranian news agencies as "massive," are taking place near a stretch of the Arax river that separates northwestern Iran from Armenia's Syunik province as well as Azerbaijan's Nakhichevan exclave and districts south of Nagorno-Karabakh recaptured by the Azerbaijani army during the 2020 war. New reports showed available threats against Azerbaijan from Iran proposing more practical and mutually beneficial resolution of the construction of communications means between South Caucasus countries. The Iran's military economic power should be the mean providing acceptance by Azerbaijan and Turkey the proposal of Iranian political and economic regional policy. 1.9. Iran's military starts "massive" drills on Azerbaijani border<sup>11</sup>

Tehran appears alarmed both by Azerbaijan's saber-rattling against Armenia and by a new EU monitoring mission to Armenia's border with Iran. Screenshot of Iranian media footage of its armed forces crossing the Aras River on a pontoon bridge. Iran's military is conducting large-scale military drills on its border with Azerbaijan, including practicing crossings of the Aras River, which defines a large part of the border between the two states. Drills should be a mean showing the threat to Azerbaijan and Turkey against their aggressive policy against Armenia to change Armenian borders as well to build new transport link connecting Azerbaijan's exclave of Nakhchivan with the Azerbaijani mainland, a route that Baku calls the "Zangezur corridor." The route would pass along Armenia's border with Iran, with uncertain consequences for Armenia-Iran commerce.

1.5. In recent days, Iran has threatened to destroy Azerbaijan alongside Israel in a video clip: "Israel don't stray too far from your path"<sup>12</sup>

1.6. As reported earlier today, a large Iranian spy network has been exposed in Azerbaijan: such a state-

ment from the State Security Service is an a priori number one news story.<sup>13</sup> Here we have the complete set of less than gentlemanly methods employed by the Iranian secret services: recruitment of Azerbaijani citizens who go to Iran for education or even medical treatment, attempts to use them to organize religious and political uprisings in Azerbaijan (we saw real examples in Nardaran and Ganja), and so on. This time the Iranian agents were engaged in actual military espionage. Their handlers from Tehran and Qom were interested in the dates of military exercises in the Caspian Sea, the specifications of the Israeli and Turkish UAVs used by Azerbaijani border guards, and the coordinates of the military bases in Salyan, Lankaran and Fizuli... There is a reason why the criminal case was initiated on charges of national treason.

**1.9. Iranian flag flies in front of the UN office building in Vienna (photo credit: REUTERS/LISI NIESNER/FILE PHOTO)**<sup>14</sup>

Iranian agents are scouring the world for dissidents and spying on countries from Azerbaijan to the US. The reports this week show an increasingly dangerous web of Iranian plots all around the world, from the Caucasus to the US and UK.

This is important because the reports sometimes make it appear that one country or another has suddenly found an Iranian regime plot, when in fact the systematic Iranian threat is much larger and more robust than just one network of spies and agents in one place and another network somewhere else.

Iran's global threats are not new phenomena, Iran has often carried out plots all over the world, targeting dissidents, targeting Israel, or other missions. However, as Iran is increasingly in the spotlight for its crackdown on protesters there is more alarm in the West and at international organizations such as the UN regarding Iran's activities.

#### 1.7. Treaty of Gulistan

The **Treaty of Gulistan** (Russian: Гюлистанский договор; Persian: عهدنامه گلستان) was a peace treaty concluded between the Russian Empire and Iran on 24 October 1813 in the village of Gulistan (now in the Goranboy District of Azerbaijan) as a result of the first full-scale Russo-Persian War (1804 to 1813). The peace negotiations were precipitated by the successful storming of Lankaran by General Pyotr Kotlyarevsky on 1 January 1813. It was the first of the series of treaties (the last being the Akhal Treaty) signed between Qajar Iran and Imperial Russia that forced Persia to cede or recognize Russian influence over the territories that formerly were part of Iran.<sup>[1][2]</sup>

The treaty confirmed the ceding and inclusion of what is now Dagestan, eastern Georgia, most of the Republic of Azerbaijan and parts of northern Armenia from Iran into the Russian Empire.

<sup>10</sup> <https://www.azatutyun.am/a/32088258.html>

<sup>11</sup> <https://eurasianet.org/irans-military-starts-massive-drills-on-azerbaijani-border>

<sup>12</sup> <https://aze.media/why-iran-threatens-azerbaijan-together-with-israel/>

<sup>13</sup> <https://aze.media/iran-sows-the-wind-and-crosses-red-lines/>

<sup>14</sup> <https://aze.media/increase-in-iranian-global-threats-spear-headed-by-the-irgc/>

## II. Russian threats against Azerbaijan

2.1. Russian Defense Ministry confirms<sup>15</sup> violation of ceasefire in Artsakh by Azerbaijani Armed Forces and puts forward a demand to Azerbaijan to stop the violation of ceasefire regime. On November 14, 2022 The Russian Ministry of Defense confirmed that the ceasefire regime in Artsakh was violated by the Armed Forces of Azerbaijan. From the Azerbaijani post on November 12, the Azerbaijani side opened fire from small arms on a local resident who was carrying out agricultural work. As a result a resident was injured and agricultural machinery was damaged. In response to this incident, the Russian peacekeeping forces, with the participation of the Azerbaijani side, are conducting investigations at the request of the Russian side. Russia put forward a demand in relation to Azerbaijan to comply with the conditions of the ceasefire regime. 2.2. Russia deploys troops to Nagorno-Karabakh after ceasefire deal signed

Russian peacekeeping troops deployed to the war-ravaged enclave of Nagorno-Karabakh in the early hours of Tuesday (10 November) as part of a Russia-brokered ceasefire deal. Reactions in Yerevan suggest that the deal seals a defeat for Armenia and territorial gains ...

Russia is an ally of Armenia, an impoverished former Soviet republic of less than 3 million people. Moscow already has a military base in the northwest of Armenia, and sent 2,000 troops as peacekeepers to Nagorno-Karabakh, an enclave of Azerbaijan populated by ethnic Armenians, under the accord that ended last year's fighting in the area.

"Two strongholds of the 102nd Russian military base were established in the Syunik region," the Interfax news agency cited Pashinyan as saying in an address to the Armenian parliament, referring to Russia's existing base in Armenia.

"This is an additional security guarantee not only for the Syunik region but for Armenia," Pashinyan was quoted as saying.

Syunik is a strategic strip of Armenia located between Azerbaijan, the Azeri exclave of Nakhchivan, and Iran. The Armenian defence minister said in February that Yerevan wanted Russia to expand its presence and deploy troops closer to Azerbaijan. read more

Pashinyan has remained in office in an acting capacity after resigning as prime minister last month in a dispute with the army over blame for the outcome of last year's war, seen as a humiliating defeat. A new election is set for 20 June. He announced his resignation a day after US President Joe Biden declared Armenians the victims of genocide by Turkey in World War One, recognition Armenians had sought for decades.

2.3. New Russian Naval Doctrine Assigns Expanded Role to Caspian Flotilla<sup>16</sup>

The Russian Navy corvette Veliky Ustyug, a small missile ship in the Caspian Flotilla, takes part in a military parade on the Neva River on Russian Navy Day in 2021 (Source: Peter Kovalev/TASS). One aspect of the new doctrine, however—its elevation of the Russian naval presence in the Caspian—has received far less attention; but it may ultimately be more important. That conclusion reflects the additional threat to contain the aggressive policy directed against the countries of the South Caucasus and in particular Armenia and Iran. Ultimately, the doctrine contributes to the involvement of India and China in the economic and political development of the conflict region in peace. 2.4. Russian Navy Launches Caspian Sea Drills<sup>17</sup> Currently, 1 February 2022 Russia's Navy has launched drills involving 20 warships in the Caspian Sea. The Video published by the Defense Ministry shows the ships from the Caspian Fleet departing from their base in Makhachkala in the republic of Dagestan. The video Drills showed the power of Russian Caspian Fleet forces. "Artillery boat and minesweeper crews will carry out mining support tasks for the deployment of Caspian Fleet forces and defense against anti-submarine and sabotage [attacks] ... The Caspian Fleet sailors will search for mines using trawls and practice destroying them with live-firing from service weapons," the statement said. Russian Navy Launched Caspian Sea Drills called to Turkey and Azerbaijan to be careful and don't initiate new aggressive steps against countries of the conflicting region including Armenia and Iran. Actually, drills were in the context of political economic policy of China and India.

2.5. Iran, Russia Start Joint Naval Drill in Indian Ocean<sup>18</sup>

Iran, Russia Start of Joint Naval Drill in Indian Ocean showed significance of the bilateral relations between Kremlin and Teheran. The importance of cooperation between Moscow and Tehran showed additional threat directed to Ankara and Baku setting and continuing aggressive regional political economic behavior against Tehran and Yerevan. In addition Russia maintained the South Caucasus as a region of sphere of influence. "The purposes of this drill are to enhance security of international maritime trade, confront maritime piracy and terrorism, and exchange information." Thus, Russia and Iran became countries which participation in the construction of future political economic policy of South Caucasus. It should be noted that the Iranian army exercised also "expansion of bilateral relations" with Russia. Iran, China and Russia held a similar drill in the area in 2019, and the Islamic republic participated in "Caucas 2020" drills held in Russia last September.

2.6. Russian, Iranian presidents discuss current issues on bilateral agenda<sup>19</sup>

<sup>15</sup> <https://news.am/eng/news/730119.html>

<sup>16</sup> Paul Goble, Eurasia Daily Monitor Volume: 19 Issue: 125 <https://jamestown.org/program/new-russian-naval-doctrine-assigns-expanded-role-to-caspian-flotilla/>

<sup>17</sup> <https://www.themoscowtimes.com/2022/02/17/russian-navy-launches-caspian-sea-drills-a76426>

<sup>18</sup> <https://www.themoscowtimes.com/2021/02/16/iran-russia-start-joint-naval-drill-in-indian-ocean-a72979>

<sup>19</sup> <https://www.aa.com.tr/en/middle-east/russian-iranian-presidents-discuss-current-issues-on-bilateral-agenda-/2736477>



On 12.11.2022 Russian, Iranian presidents discuss current issues on bilateral agenda. The meeting held in Busra Nur Cakmak.

Russian President Vladimir Putin and his Iranian counterpart Ebrahim Raisi discussed "current issues on bilateral agenda" over phone, a Kremlin statement said Saturday. "The leaders discussed a number of current issues on the bilateral agenda with an emphasis on the continued building up of interaction in politics, trade and the economy, including transport and logistics," said the statement. They agreed that the contacts between Russian and Iranian institutions will be increased, it added. As a result the threat against Turkey and Azerbaijan appeared.

2.7. Russian MP threatened Azerbaijan with a nuclear strike, the Kremlin had to intervene<sup>20</sup>

Deputy of the Russian State Duma Mikhail Delyagin, speaking at the state television of the Russian Federation, called for the "punishment" of Azerbaijan for "aggressive actions" in Karabakh. He also conducted a survey on the topic of whether "is it worth it to hit the oil industry of Azerbaijan with nuclear weapons". The Kremlin press secretary Dmitry Peskov and the official representative of the Russian Ministry of Foreign Affairs, Maria Zakharova, had to intervene in this matter. Only after that Delyagin apologized to the Azerbaijanis. **III. Turkish politics in South Caucasus.**

3.1. Erdogan<sup>21</sup> notes that the situation in the South Caucasus remains unstable. He confirms that Azerbaijan is striving to normalize the situation in the South Caucasus. He stated this at the Summit of the Organization of Turkic States in Samarkand in Uzbekistan. In response to Azerbaijan's victory in the 44-day war with Armenia, he congratulated Azerbaijan and noted Azerbaijan's desire for the establishment of the peace, as well as its just struggle to establish territorial integrity and fulfill the conditions of the November 9, 2020 Statement. 3.2. A key point for Turkey: the deal calls for the opening of a transport corridor between Azerbaijan and Nakhchivan<sup>22</sup>. According to the statement given by P. Zalewski the key point for Turkey is the deal calls for the opening of a transport corridor between Azerbaijan and Nakhchivan, its western exclave. This means a connection between Baku and Nakhchivan, its western exclave. This means a connection between Baku and Turkey. 3.3. Georgia, Azerbaijan and Turkey start joint military exercises<sup>23</sup>.

"Caucasian Eagle-2022" are joint military exercises being carried out by Georgia, Azerbaijan and Turkey. According to the information of the Ministry of Defense of Georgia, the opening ceremony of "Caucasian Eagle-2022" was held on October 11 in the village of Mukhrovani, at the military base of the Ministry of Defense of Georgia. The goal of the exercises is to

achieve better synchronization in the actions of the special operations forces of the three countries, and to improve the effectiveness of command and control in a multinational environment. The units participating in the exercises will share their experience in conducting fire and medical training, combat operations in populated areas and special operations. As a result joint military exercises are threat against Russia, Iran and Armenia 3.4. Armenia facing both external and internal challenges. Expert on Turkey Ruben Melkonyan concluded that Armenia has found itself in a difficult situation, facing both external and internal challenges<sup>24</sup>. He criticized in his book Ideological Constitution of the "Era of Peace" (a review of Jirair Libaridian's book "Armenia-Turkey: Statehood, History, Politics") in Yerevan on Saturday, through pointing to the "fake news campaign" among Armenian society concerning peace with Turkey and Azerbaijan. Currently no prerequisites are in place to achieve it," the expert claimed. Among Armenian authorities suggesting the possibility of peace relations between Armenian-Turkish and Armenian-Azerbaijani and did not take into account the aggressive nature of Azerbaijan and Turkey, he highlighted the "studies of the former chief advisor to first Armenian President Levon Ter-Petrosyan, former Ambassador-at-Large and Deputy Foreign Minister Gerard Jirair Libaridian, summarized in his book Armenia-Turkey: Statehood, History, Politics."

#### **IV. Azerbaijan's threats against Armenia**

4.1. Azerbaijan's troops enter first district handed over by Armenia<sup>25</sup>

The troops of Azerbaijan entered the region bordering on Nagorno-Karabakh. The Armenian armed forces left the area, but nevertheless the Azerbaijani armed forces entered the Aghdam region, one of the three to be ceded, the Azerbaijani Defense Ministry said. Armenia handed over the Kelbajar region, sandwiched between Nagorno-Karabakh and Armenia on November 25, and the Lachin region - by December 1. The changes that took place in Nagorno-Karabakh took place at the end of September 2020 as a result of a large-scale brutal war declared by Azerbaijan to Armenia and lasting for six. Hostilities were stopped on November 9, 2020 as part of the peace agreement concluded between Armenia and Azerbaijan with the participation of Russia. About 2,000 Russian peacekeeping forces have been deployed to the region's capital, Stepanakert, and have set up checkpoints and observation posts along the strategic Lachin corridor linking Nagorno-Karabakh to Armenia. 4.2. Pashinyan slams Azeri shooting at Artsakh farmers<sup>26</sup>

Nikol Pashinyan took to Twitter on Monday to denounce the latest shooting by Azerbaijani soldiers at farmers in Artsakh (Nagorno-Karabakh). He presented

<sup>20</sup> <https://jam-news.net/russian-mp-threatened-azerbaijan-with-a-nuclear-strike-the-kremlin-had-to-intervene>

<sup>21</sup> <https://news.am/rus/news/729766.html>

<sup>22</sup> P. Zalewski

[https://twitter.com/p\\_zalewski/status/1326031395471437824?lang=gl](https://twitter.com/p_zalewski/status/1326031395471437824?lang=gl)

<sup>23</sup> <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises/>

<sup>24</sup> <https://www.panorama.am/en/news/2022/11/12/Armenia-challenges/2755234>

<sup>25</sup> <https://themuslimkashmir.com/2020/11/21/azerbaijans-troops-enter-first-district-handed-over-by-armenia/>

<sup>26</sup> <https://www.panorama.am/en/news/2022/11/14/Pashinyan-Azeri-shooting/2755620>

Azerbaijan's suggestions according to Artsakh (Nagorno-Karabakh) as a territory and its Armenian population as follows:

"Azerbaijan calls Armenians of Nagorno-Karabakh 'our citizens' and, at the same time, shoots at them while they're doing agricultural work," and as a counter suggestion Pashinyan noted "Is this the implementation of Azerbaijan's narrative saying 'the Nagorno-Karabakh issue is solved'?"

4.3. Georgia, Azerbaijan and Turkey start joint military exercises<sup>27</sup>.

"Caucasian Eagle-2022" are joint military exercises being carried out by Georgia, Azerbaijan and Turkey. According to the information of the Ministry of Defense of Georgia, the opening ceremony of "Caucasian Eagle-2022" was held on October 11 in the village of Mukhrovani, at the military base of the Ministry of Defense of Georgia. The goal of the exercises is to achieve better synchronization in the actions of the special operations forces of the three countries, and to improve the effectiveness of command and control in a multinational environment. The units participating in the exercises will share their experience in conducting fire and medical training, combat operations in populated areas and special operations. As a result joint military exercises are threat against Russia, Iran and Armenia

4.4. . New agreement with Moscow: Threats against Azerbaijan from Russian information space to be blocked<sup>28</sup>

The visit of Russian Foreign Minister Sergey Lavrov to Azerbaijan has been significant in many aspects. The most important one of them is, no doubt, signing an agreement on cooperation in the field of provision of international information security between two countries. Minister of Foreign Affairs Jeyhun Bayramov has signed an "Agreement on cooperation between the Government of the Republic of Azerbaijan and the Government of the Russian Federation in the field of provision of international information security" with Sergey Lavrov on June 24.

4.5. Russia Supplies More Weapons to Azerbaijan<sup>29</sup>

The Khrizantema-S anti-tank missile is a type of weapon Russia will be delivering to Azerbaijan

MOSCOW (RFE/RL)—Russia has delivered a new batch of anti-tank missile systems to Azerbaijan as part of lucrative arms deals with Baku that have been strongly criticized by Armenia over the past year.

The Azerbaijani Defense Ministry released over the weekend video of around a dozen self-propelled Khrizantema-S systems unloaded from a Russian cargo ship that docked at Baku's Caspian Sea port.

Khrizantema-S is designed to detect and destroy tanks, armored vehicles, field fortifications and even some low-flying aerial targets with guided missiles. It entered service with the Russian Armed Forces in 2005.

Russia has also sold around \$5 billion worth of tanks, artillery systems and other weapons to Azerbaijan in line with defense contracts signed in 2009-2011. According to the United Nations Register of Conventional Arms, it shipped six heavy artillery systems to the Azerbaijani military last year. Armenian leaders stepped up their criticism of those arms deals following Azerbaijan's April 2016 offensive in Nagorno-Karabakh. They said that the arms supplies run contrary to Russia's military alliance in Armenia and encourage Baku to attempt a military solution to the Karabakh conflict. Russian Prime Minister Dmitry Medvedev rejected the Armenian criticism after visiting Yerevan later in April 2016. He said that that Russia delivers weapons to both Armenia and Azerbaijan and thereby sustains the "military balance" in the conflict. In August, Russian President Vladimir Putin similarly denied that Moscow has increased the risk of another Karabakh war. Speaking after talks in the Kremlin with his Armenian counterpart Serzh Sarkisian, Putin implied that oil-rich Azerbaijan could have purchased offensive weapons from other nations. He also argued that Russia has long been providing substantial military aid to Armenia.

#### V. Azerbaijan's threats against Iran

5.1. Israel may be looking to strengthen ties to Azerbaijan as an Iran counter Azerbaijan threats Iran through the strengthening military ties with Israel. From 2016–2020, Israel accounted for 69 percent of Azerbaijan's major arms imports — a number that represents 17 percent of Israel's arms exports for that same period. TEL AVIV — With all signs indicating a new Iran nuclear deal is in the offing, Israel is looking for new ways to challenge Tehran — including tightening defense ties with Azerbaijan, Iran's northern neighbor. 5.2. Turkey, Azerbaijan are holding joint military exercises The Azerbaijani Defense Ministry said Friday that the air forces of Azerbaijan and Turkey will begin Monday to perform a joint military drill. The Turkish Air Force military personnel and aircraft that will participate in the TurAz Qartalı 2022 (TurAz Eagle 2022) Joint Flight-Tactical Exercises in Azerbaijan, it said. "Tasks on the planning of joint activities of the Air Forces of the two countries, the study of interaction and combat interoperability, as well as the carrying out search-and-rescue measures will be fulfilled during the exercises," it added.

5.3. . Georgia, Azerbaijan and Turkey start joint military exercises<sup>30</sup>.

"Caucasian Eagle-2022" are joint military exercises being carried out by Georgia, Azerbaijan and Turkey. According to the information of the Ministry of Defense of Georgia, the opening ceremony of "Caucasian Eagle-2022" was held on October 11 in the village of Mukhrovani, at the military base of the Ministry of Defense of Georgia. The goal of the exercises is to achieve better synchronization in the actions of the spe-

<sup>27</sup> <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>

<sup>28</sup> <https://apa.az/en/political/new-agreement-with-moscow-threats-against-azerbaijan-from-russian-information-space-to-be-blocked-analysis-379357>

<sup>29</sup> <https://anca.org/russia-supplies-more-weapons-to-azerbaijan/>

<sup>30</sup> <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>

cial operations forces of the three countries, and to improve the effectiveness of command and control in a multinational environment. The units participating in the exercises will share their experience in conducting fire and medical training, combat operations in populated areas and special operations. As a result joint military exercises are threat against Russia, Iran and Armenia

## VI Turkey's threats against Iran

6.1. Turkiye, Azerbaijan are holding joint military exercises

The Azerbaijani Defense Ministry said Friday that the air forces of Azerbaijan and Turkiye will begin Monday to perform a joint military drill. The Turkish Air Force military personnel and aircraft that will participate in the TurAz Qartalı 2022 (TurAz Eagle 2022) Joint Flight-Tactical Exercises in Azerbaijan, it said. "Tasks on the planning of joint activities of the Air Forces of the two countries, the study of interaction and combat interoperability, as well as the carrying out

search-and-rescue measures will be fulfilled during the exercises," it added.

6.2. Georgia, Azerbaijan and Turkey start joint military exercises<sup>31</sup>.

"Caucasian Eagle-2022" are joint military exercises being carried out by Georgia, Azerbaijan and Turkey. According to the information of the Ministry of Defense of Georgia, the opening ceremony of "Caucasian Eagle-2022" was held on October 11 in the village of Mukhrovani, at the military base of the Ministry of Defense of Georgia. The goal of the exercises is to achieve better synchronization in the actions of the special operations forces of the three countries, and to improve the effectiveness of command and control in a multinational environment. The units participating in the exercises will share their experience in conducting fire and medical training, combat operations in populated areas and special operations. As a result joint military exercises are threats against Russia, Iran and Armenia.

## Simulation models

Further we'll consider as initial conditions for the model (2) military expenditures of countries given in the table as follows

Let us use notation of countries as follows

Notation	1	2	3	4	5
Country	Armenia	Azerbaijan	Russia	Iran	Turkey

Further we'll consider as initial conditions for the model (2) military expenditures of countries given in the table as follows

Military expenditures of countries<sup>32</sup>

Country	Armenia	Azerbaijan	Russia	Iran	Turkey
Military expenditures bln	1.39	2.81	65.9	24.5	15.5

Using the nature of threats given above we'll consider matrixes presenting results of threats as follows.

Matrix 1. Threats between countries.

	AM	AZ	RU	R	TU
AM		1	1	1	1
AZ	30		30	30	
RU	1	7		1	1
IR		13	1		3
TU	20		13	15	

Current matrix as a simulation model gives number of imaginary threats between countries and allows to assess values of the coefficients  $d_{ij}$ , where  $i \neq j, i, j = 1, 2, 3, 4, 5$ .

Eigenvalues  $\lambda_i, i = 1, 2, 3, 4, 5$  of the system (2) based on the matrix 2 is as follows:

26.94	-21.99	1.53	-2.61	-0.87
-------	--------	------	-------	-------

And Eigenvectors  $\alpha_{ij}, i, j = 1, 2, 3, 4, 5$  are as follows

AM	AZ	RU	IR	TU
-0.07	0.79	0.24	0.04	0.39
-0.02	0.79	-0.22	0.42	0.38
-0.3	0.11	0.35	0.35	-0.88
0.43	0.14	-0.35	-0.35	-0.82
0.22	0.01	-0.79	-0.79	0.02

Let us denote the general solution of the system (2) as

<sup>31</sup> <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>

<sup>32</sup> <https://worldpopulationreview.com/country-rankings/military-spending-by-country>

$$p_k(t) = \sum_{i=1}^5 C_i \exp(\lambda_i t) \alpha_{ki}, \quad k = 1, 2, \dots, 5. \quad (3)$$

Thus, based on the Matrix 1 we defined assessments for coefficients  $C_i, i = 1, 2, 3, 4, 5$  as follows

8.779977	C1
-12.4622	C2
-65.7823	C3
11.54948	C4
11.19208	C5

As the assessments of military expenditures using (3) and values of eigenvalues and eigenvectors we have

t	AM	AZ	RU	IR	TU
1	1.713845	2.598305	66.24742	24.02705	15.57422
1.01	2.072485	3.065956	65.81962	25.008	15.75408

Assuming that the development of threats given above countries are able to change the policy of threats and make a decision concerning to the military expenditures. Through this assumption we could consider as simulation model based on the matrix presenting threats as follows

Matrix 2. Threats between countries

	AM	AZ	RU	R	TU
AM	0	10	1	1	5
AZ	12	0	2	3	2
RU	2	30	0	2	30
IR	1	20	2	0	10
TU	6	2	2	6	0

As eigenvalues and eigenvectors we have assessments as follows:

Eigenvalues  $\lambda_i, i = 1, 2, 3, 4, 5$  of the system (2) based on the matrix 2 is as follows:

21.84	-14.96	2.38	-3.07	-6.18
-------	--------	------	-------	-------

Eigenvectors  $\alpha_{ij}, i, j = 1, 2, 3, 4, 5$  are as follows

AM	AZ	RU	IR	TU
0.19	0.26	0.79	0.45	0.27
-0.08	0.21	-0.88	-0.33	0.25
-0.27	-0.19	0.89	0.15	0.27
-0.1	-0.04	0.97	-0.19	-0.04
0.13	0.004	-0.97	-0.01	0.2

Thus, based on the Matrix 1 we defined assessments for coefficients  $C_i, i = 1, 2, 3, 4, 5$  as follows

C1	0.803956198
C2	0.285817634
C3	12.76883504
C4	4.468091662
C5	3.794506622

As the assessments of military expenditures using (3) and values of eigenvalues and eigenvectors we have

	t=1	t=1.01
AM	1.367097	2.233588
AZ	2.528327	3.381231
RU	65.84344	66.92612
Ir	25.21085	26.31822
TU	15.49906	16.32015

### Conclusion.

We proposed an approach to study military expenditures of countries acting in conflicting region based on the Richardson model. Taking into consideration existence of five countries having interests in such

region as the region of South Caucasus we proposed a method for the modeling and solution of Richardson model as a case study. Among these countries we distinguished two countries Armenia and Azerbaijan

which have interests and conflicting caused by the disorder of territorial integrity and as a consequence interacting for the exhausting of economic and military resources of one another. The model considers also the group of countries interacting with these two distinguished countries as well having mutual interactions and interests in the region separately from distinguished two countries. The general model is proposed and the solution of this model is given. As the outcome of considered model the simulation model as the example of five countries having interests in the region is considered as simulation model. The simulation model allows to involve changes on the assessment of constants as the military expenditures outcome of interactions between countries. The numerical scheme is produced to provide the solution of general model as well of simulation model. Farther, the simulation model provides the schema for the enhancement of the number of entities of the model, define constants as outcomes of interactions between entities. (countries as considered in Richardson model). We argue that Richardson model allows the enhancements as means to adjust economic military expenditures policy in the region as the region of conflicting policies implementing by countries having opposite interests.

### References

1. A.Arakelyan, L.Makaryan Model of territorial conflict and international military cooperation, Journal of Yerevan University Economics, (3), 2021p.56-72
2. Paul Goble, Eurasia Daily Monitor Volume: 19 Issue: 125 <https://jamestown.org/program/new-russian-naval-doctrine-assigns-expanded-role-to-caspian-flotilla/>
3. Richardson, Lewis F (1960) Arms and Insecurity. Pittsburgh, PA: Boxwood
4. Schrod, Philip A (1981) Preserving Arms Distributions in a Multi-Polar World. Monograph Series in World Affairs, Graduate School of International Studies 18(4). Denver, CO: University of Denver Press.
5. Tarasov: Iran may not recognize peace treaty between Yerevan and Baku and send troops (news.am)
6. P. Zalewski [https://twitter.com/p\\_zalewski/status/1326031395471437824?lang=en](https://twitter.com/p_zalewski/status/1326031395471437824?lang=en)
1. <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>
2. <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>
3. <https://worldpopulationreview.com/country-rankings/military-spending-by-country>
4. <https://apa.az/en/political/new-agreement-with-moscow-threats-against-azerbaijan-from-russian-information-space-to-be-blocked-analysis-379357>
5. <https://anca.org/russia-supplies-more-weapons-to-azerbaijan/>
6. <https://www.panorama.am/en/news/2022/11/12/Armenia-challenges/2755234>
7. <https://themuslimkashmir.com/2020/11/21/azerbaijans-troops-enter-first-district-handed-over-by-armenia/>
8. <https://www.panorama.am/en/news/2022/11/14/Pashinyan-Azeri-shooting/2755620>
9. <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises>
10. <https://jam-news.net/russian-mp-threatened-azerbaijan-with-a-nuclear-strike-the-kremlin-had-to-intervene>
11. <https://news.am/rus/news/729766.html>
12. <https://jam-news.net/georgia-azerbaijan-and-turkey-start-joint-military-exercises/>
13. <https://www.themoscowtimes.com/2022/02/17/russian-navy-launches-caspian-sea-drills-a76426>
14. <sup>1</sup> <https://www.themoscowtimes.com/2021/02/16/iran-russia-start-joint-naval-drill-in-indian-ocean-a72979>
15. <sup>1</sup> <https://www.aa.com.tr/en/middle-east/russian-iranian-presidents-discuss-current-issues-on-bilateral-agenda-/2736477>
16. <https://news.am/eng/news/730119.html>
17. <https://aze.media/why-iran-threatens-azerbaijan-together-with-israel/>
18. <https://aze.media/iran-sows-the-wind-and-crosses-red-lines/>
19. <https://aze.media/increase-in-iranian-global-threats-spearheaded-by-the-irgc/>
20. <https://www.themoscowtimes.com/2021/02/16/iran-russia-start-joint-naval-drill-in-indian-ocean-a72979>
21. <https://www.azatutyun.am/a/32088258.html>
22. <https://eurasianet.org/irans-military-starts-massive-drills-on-azerbaijani-border>
23. <https://www.panorama.am/ru/news/2022/09/22/Iranian-army-chief/2733590>
24. <https://www.iranintl.com/en/202209137964>
25. <https://armenianweekly.com/2022/05/25/iran-plays-its-cards-in-the-south-caucasus/>
26. <https://news.am/eng/news/724783.html>
27. <https://caspiannews.com/news-detail/iran-develops-its-first-domestic-hypersonic-ballistic-missile-2022-11-10-56/>

**THE MAIN DIRECTIONS OF DEVELOPMENT OF LENDING TO SMALL AND MEDIUM-SIZED BUSINESSES****Tuleyeva G.,***Master of Accounting and Audit***Baimedetov S.***Doctor of Philosophy**Dulaty University*[DOI: 10.5281/zenodo.7941581](https://doi.org/10.5281/zenodo.7941581)**ОСНОВНЫЕ НАПРАВЛЕНИЯ РАЗВИТИЯ КРЕДИТОВАНИЯ МАЛОГО И СРЕДНЕГО БИЗНЕСА****Тулеева Г.Т.***Магистр учета и аудита***Баймедетов С.Д.***Доктор PhD**Университет Дулати***Abstract**

Of particular importance in the system of measures to support small businesses is their lending. The current state of the relationship between the banking system and small business can be characterized as not well-established, without certain mechanisms that characterize the stability of the controllability of these processes.

**Аннотация**

Особое значение в системе мер поддержки субъектов малого бизнеса имеет их кредитование. Современное состояние взаимоотношений между банковской системой и малым бизнесом можно охарактеризовать как не устоявшееся, без определенных механизмов, характеризующих устойчивость управляемости этих процессов.

**Keywords:** lending, financing, banking system, small business, subsidies**Ключевые слова:** кредитование, финансирование, банковская система, малый бизнес, субсидирование

Одним из основных факторов развития малого и среднего предпринимательства (МСП) является совершенствование механизма и инструментов кредитования малых и средних предприятий. Это объясняется стабильно высокой потребностью данного сектора экономики в заемных ресурсах, особенно эта потребность возрастает в условиях экономических кризисов [1].

Субъекты МСП отличаются склонностью к осуществлению производства наиболее эффективных инновационных проектов, гибким реагированием на изменение рыночной конъюнктуры; они заполняют ниши, недоступные крупному бизнесу. В малом и среднем предпринимательстве достижение результата в решающей степени зависит от настойчивости предпринимателей, их знаний, профессиональной компетентности, высокой амбициозности, которые в совокупности позволяют эффективно работать даже в очень затруднительной ситуации [2].

Без дополнительного финансирования развитие предприятий в секторе малого и среднего бизнеса ограничено, отчего страдает как банковская сфера, так и экономика страны в целом. Банки готовы предложить своим клиентам более выгодные условия, которые позволили бы кредитовать большее количество предприятий, но те ставки, которые сегодня диктует Центробанк, слишком высоки для МСП. Тем не менее, коммерческие банки играют

важную роль в развитии и функционировании МСП [3].

Зарубежный опыт доказывает, что те проблемы, с которыми сталкиваются наиболее уязвимые категории малых и средних предприятий (микро- и малые предприятия, недавно созданные компании, не обладающие достаточной исторической информацией о результатах своей деятельности, предприятия, которые не могут предоставить обеспечение в необходимом объеме), по крайней мере, отчасти компенсирует деятельность гарантийных фондов и обществ взаимного гарантирования, а также деятельность кредитных кооперативов, предоставляющих малым и средним предприятиям финансирование на более выгодных по сравнению с банками условиях [4].

Народный банк поддерживает МСБ, для этого банк развивает программы кредитования и активно сотрудничает с фондом АО «Фонд развития предпринимательства «ДАМУ». Так как в настоящее время банки заинтересованы в гарантиях со стороны государства в случае неспособности клиентов вернуть полученные средства, данный фонд выдает гарантий для предпринимателей, у кого нет необходимой суммы залога. Соответственно, в банке предприниматель может получить кредит по разным государственным программам, ставке кредитования и сроком. Большинство программ связано с промышленным и аграрным сектором экономики.

Таблица 1.

Виды программ для кредитования МСБ в АО «Народный банк Казахстана».

Название программы	Ставка	Сумма	Цели и сроки
1. Дорожная карта бизнеса 2025 (субсидирование)	6% оплачивается предпринимателем, а разница субсидируется государством	До 20 млн.тг	- инвестиции – 5 лет - пополнение оборотных средств – 3 года
"Еңбек"	6%	до 8 000 МРП (в городах Астана, Алматы, Шымкент, Актау, Атырау) до 6 500 МРП (в других городах, моногородах)	- инвестиции – 5 лет - пополнение оборотных средств – 3 года
Экономика простых вещей (субсидирование)	не более 15%	сумма без ограничений	-на инвестиции – 10 лет, -на ПОС – 3 года
МСБ в обрабатывающей промышленности	не более 6%	не более 1 млрд. 850 млн. тенге, за исключением проектов в сфере пищевой промышленности, по которым лимит отсутствует	- не более 10 - по займам, выдаваемым на приобретение новых, создание и модернизацию основных средств/рефинансирование займов с указанной целью - не более 5 лет - по займам, выдаваемым на пополнение оборотных средств/рефинансирование займов с указанной целью
Дорожная карта бизнеса 2025 (гарантирование)	размер гарантии до 85% от суммы кредита	на инвестиции не более 20 млн. тенге на пополнение оборотных средств не более 5 млн. тенге	-инвестиции -пополнение оборотных средств
Экономика простых вещей (гарантирование)	гарантия до 50% от суммы кредита	сумма до 1 миллиарда	- обрабатывающая промышленность и услуги - переработка в агропромышленном комплексе - производство в агропромышленном комплексе

Примечание—таблица составлена на основе информации с сайта <https://halykbank.kz/>

Все перечисленные выше программы предназначены уже для действующего бизнеса. Необходимо дать поддержку для развития малого бизнеса на старте, ведь по статистике без финансовой поддержки большинство предпринимателей закрывают свои ИП через полгода.

Менеджер банка находят клиенту подходящую для него программу и начинают работу над подачей документов для кредитования. Данный процесс занимает длительное время, особенно если учесть, что программа является государственной. Соответственно для того, чтобы клиент мог получить необходимую сумму для развития бизнеса Народному банку, следует упростить процесс подачи и рассмотрения заявки на залоговый кредит.

На данный момент клиент проходит через следующие основные шаги процесса залогового кредитования:

1. Сбор информации. Клиент собирает необходимый пакет документов, по предоставленному банком перечню;

2. Менеджер банка принимает документы клиента и передает юридическому отделу и службе безопасности;

3. После проверки документов, менеджер делает анализ рисков, проверку деловой репутации заемщика и оценку бизнеса и залогового имущества клиента.

4. Расчет кредитоспособности предприятия. Менеджер рассчитывает товарно-материальные запасы, ликвидность, оборачиваемость и пр. У различных банков свои требования по минимальным значениям этих коэффициентам. Все документы, анализ и оценка предприятия отправляют андеррайтеру в головной офис в Алматы.

5. Согласование сделки. Если клиенту необходима субсидия или гарантирование по государственной программе, то банк передает все копии документов, анализ, сумма кредита и ставка вознаграждения и условия банка в фонд для получения согласия на субсидии и гарантирование. Одобрение фонда также занимает длительное время (до 2 недель).

6. Оформление кредитного договора. Прописываются условия, которые должны выполнять клиент и банк.

7. Целевое использование. Клиент после получения необходимой суммы должен предоставить банку все необходимые документы по целевому назначению кредита.

Изучив проблемы кредитования МСБ в РК предлагаются следующие направления развития кредитования в АО «Народный банк Казахстана»:

- снижение кредитных рисков с помощью системы обеспечения кредитов;
- диверсификация и расширение каналов продвижения кредитных и банковских продуктов и услуг для субъектов МСБ через собственную и партнерскую сети;
- постоянное совершенствование системы риск-менеджмента;
- модификация и усовершенствование способов работы с просроченной задолженностью для увеличения качества кредитного портфеля.

Указанные предложения, будут способствовать совершенствованию механизма кредитования

МСБ, увеличить количество предпринимателей у которых имеются идеи для развития бизнеса, что в конечном итоге повысит конкурентоспособность малого и среднего бизнеса и его роль в казахстанской экономике.

### References

1. Susan S., Chris R., 2017. Business Continuity and Disaster Recovery for Small-and Medium-Sized Businesses. *International Journal of Production Economics*, 5 (3), P. 451–478 // [www.sciencedirect.com](http://www.sciencedirect.com).
2. [Brykov, B.A. Crediting of small and medium-sized businesses: characteristic features, applied models, problems and features of implementation / B.A. Brykov // *Economy. Business. Banks*. – 2017. – №3 (20). – С. 214-225]
3. [Nichiporova V.I. Foreign experience of crediting small and medium-sized businesses// *Bulletin of the Moscow University of Humanities and Economics. Economics series*.-2021.-№2. – pp. 211-220.]
4. Wellalage, N.H.; Fernandez, V. Innovation and SME finance: Evidence from developing countries. *Int. Rev. Financ. Anal.* 2019, 66.



## THE IMPACT OF NON-INTEREST INCOME ON THE NET NON-INTEREST MARGIN IN THE CONDITIONS OF SHARP CURRENCY FLUCTUATIONS AND THE TREND OF GEL DEVALUATION

**Tsutskiridze Giorgi,**

*Prof., Grigol Robakidze University*

**Charaia Vakhtang**

*Prof., Grigol Robakidze University*

[DOI: 10.5281/zenodo.7941592](https://doi.org/10.5281/zenodo.7941592)

### Abstract

Non-interest income is an important source of revenue for financial institutions. It speaks of earnings derived from sources other than interest on loans and deposits. Fees, commissions, profits from the sale of securities, and other forms of revenue fall under this category. In this study, we'll look at non-interest income's significance, its causes, and how it affects the financial performance of the banking industry based on the Georgian example. Given research will analyze the dynamics of possible currency speculation behavior of the banking system, especially in the conditions of sharp currency fluctuations and the trend of devaluation of the local currency. A specific role is devoted to currency speculations using foreign exchange operations, using open positions of net assets (long position) or net liabilities (short position) in foreign currency. It is based on conscious calculations based on the expectation of the future price of the foreign currency. The comparative analysis method is used for the analysis and evaluations.

**Keywords:** Banking, Georgi, Non-interest Income, Currency Fluctuation

### Introduction

We explain that the profit or loss from conversion operations is the net gain from the purchase and sale of currency, and the revaluation of foreign currency funds depends on the exchange rate. As a rule, the result of buying and selling currency is positive, due to the positive margin of buying and selling, on the other hand, the result of the revaluation of currency funds is negative, especially for the devaluation trend of local currencies, because it is calculated in relation to the pre-reporting period. Exchange rate differences that arise in the settlement of monetary items, or in the translation of monetary items at an exchange rate that is different from the exchange rate at the time of initial recognition in the current period, or from the exchange rate used for translation in the financial statements of the previous period, should be recognized in profit or loss in the reporting period in which they arise.

Transactions made in foreign currency at the time of initial recognition must be reflected in the working currency, according to the spot exchange rate between the working currency and the given foreign currency on the day of the transaction. The date of operation is when this operation is first classified for recognition per international financial reporting standards. In practice, they often use the exchange rate close to the current exchange rate at the time of the operation. For example, the average exchange rate of the week or month can be used for all operations performed in a given period.

Accordingly, if the foreign exchange funds in the settlement period will be more than the previous period, i.e. its balance sheet value will be higher, it will be revalued in profit, and vice versa in loss.

Historically, on the trend of devaluation of the GEL against the US dollar, the profit from conversion operations increases, and its growth dynamics depend on the amplitude of the fluctuation.

The purpose of determining the limit of the total open foreign exchange position of the National Bank of

Georgia is to reduce the possible risk in the event of a change in the foreign currency exchange rate as a result of performing foreign exchange operations because such a change can negatively affect the profit, capital, liquidity, and solvency of commercial banks. Foreign exchange position is the difference between a bank's assets and liabilities denominated in foreign currency.

The foreign currency position can be closed or open: a) the foreign currency position is closed when the amounts of the bank's assets and liabilities according to the types of foreign currency are equal to each other; b) The foreign currency position is open when the amounts of the bank's assets and liabilities according to the types of foreign currency are not equal to each other. On the other hand, an open currency position is long when the bank's assets in the same type of foreign currency are greater than its liabilities; And the open currency position is short when the bank's assets in the same type of foreign currency are less than its liabilities;

The total open currency position is the largest among the sum of long open currency positions and the sum of short open currency positions of the bank according to all foreign currencies. Foreign currency contracts include obligations under spot, futures, forward, and swap contracts for buying or selling foreign currency, and rights and obligations stipulated by options in monetary volumes.

In addition, during the calculation of the bank's overall open foreign exchange position, the largest of the sum of the long open foreign exchange positions and the sum of the short open foreign exchange positions in the bank's balance sheet and off-balance sheet statements for all foreign currencies shall be taken, which should not exceed 20 percent of the bank's supervisory capital (NBG, 2022).

Bank speculation is distinguished by high volatility, which contributes to the strengthening of chaos in the economy. However, until the economy is

out of balance and out of control, speculators go unnoticed. Speculators are considered to be all those who open a position in foreign currency, regardless of their motive and the expected exchange rate change in the future. According to international practice, the foreign exchange market allows currency trading by both "speculators" and hedgers, since there is no possibility of strict differentiation of these two categories of foreign exchange market participants.

This applies to Georgian banks, especially large systematic banks, which practically represent a foreign exchange by the size of their assets, despite the restrictions imposed by the National Bank, which are imposed according to the requirements of the rules for establishing, calculating, and protecting the limit of the general open foreign exchange position of commercial banks, they can speculate in foreign exchange with high-profit interest. Both by opening a long position, that is, by accumulating US dollars, counting on the depreciation of the GEL in the future, as well as by opening a short currency position, counting on the strengthening of the GEL in the future, for example, by playing on the sale of currency futures contracts (forward, option, swap). In addition, during high fluctuations, the demand for foreign currency based on negative expectations increases, which increases the trend of devaluation of the GEL and therefore prolongs the correction period.

2014-2015 and 2018-2019 years were taken as the research period when currency fluctuations were relatively high and the exchange rate of the lari against the US dollar was characterized by high volatility. The research is based on official statistics of the National Bank of Georgia and financial reporting forms of banks.

### **Literature review**

Financial institutions depend heavily on non-interest income as a source of income, especially in the present context of low-interest rates and heightened competition. Fees for services including account upkeep, ATM use, credit card processing, asset management, Fintech services (Gamsakhurdia, Koki-auri, 2021; Lashkhi, 2022; Lashkhi et al, 2022), and advisory services are just a few of the ways that banks get non-interest income.

Banks' revenue sources are diversified by non-interest income, which reduces the risk associated with depending primarily on interest income. For instance, Belew et al.'s (2018) study discovered that Nigerian banks of all sizes produced greater non-interest revenue than banks of all sizes.

Non-interest income was important to the banking sector in 2015, as evidenced by the fact that it made up 36.6% of the total revenue of Chinese commercial banks, according to research by Chen et al. (2018). Similarly, to this, research by Gul et al. (2020) discovered that non-interest income accounted for 34% of Pakistani commercial banks' overall revenue in 2017 year. The banking sector in Georgia has also been significantly impacted by the COVID-19 pandemic, also called a Coronomic crisis (Charaia, Papava, 2022), notably in terms of non-interest revenue. The overall non-interest revenue of Georgian commercial banks

declined 10.4% in 2020 compared to 2019 according to research done by the National Bank of Georgia (NBG, 2021). The survey also discovered that commission and fee income will be 15.4% lower in 2020 than it was in 2019.

Kapanadze & Kekelidze, also, Jorbenadze & Bregvadze (2021) studies examine the determinants of non-interest income in Georgian commercial banks using data from 2013 to 2018. The results show that bank size, diversification of banking activities, and operating efficiency are significant determinants of non-interest income. Based on similar findings Javakhadze & Imnaishvili, (2021) suggest that banks should focus on developing new products and services, such as digital banking, to increase non-interest income.

The effect of non-interest income on financial performance has been the subject of several research. Return on assets (ROA), which is derived by dividing net income by total assets, is one of the most widely used metrics of financial success. Return on equity (ROE), which is computed by dividing net income by total equity, is another indicator of financial performance.

According to studies, non-interest income and financial success are positively correlated. Profitability as determined by ROA and ROE has been found to be significantly impacted, in particular, by non-interest income. For instance, research conducted in 2013 by Ongore and Kusa discovered that non-interest revenue significantly improved the profitability of Kenyan commercial banks. Should be mentioned that the COVID-19 pandemic had its impact also on this particular issue too. Hasko et al. (2021) based on 51 banks in Europe (a study based on the time period of January - September 2020) revealed a 10% loss in non-interest revenue compared to the same time in 2019 was primarily brought on by a drop in trading and fee-based income. The effect on financial performance was minimal, though, because banks could rely on government assistance and liquidity infusions. The authors also discovered that smaller and less diversified banks saw a greater degree of NII reduction.

Osuji et al. (2021) show that the pandemic played a crucial role also emerging countries, based on research from 65 banks (January - June 2020), it had a significant effect on both interest income and non-interest income, although NII was more severely affected. While revenue from other sources, such as insurance and investment services, remained mostly consistent, the reduction in NII was primarily caused by a decline in fee-based income and trading income.

A specific example from Uzuner et al. (2021) analyzing Turkish example, based on 15 local banks (January - September 2020), shows that the pandemic had a detrimental effect on non-interest income, which fell by 8.5% compared to the same time in 2019. The primary factor, which was responsible for nearly 70% of the loss, was a decline in fee-based income. However, throughout the epidemic, revenue from credit card operations and insurance services surged.

**Analysis of non-interest income of commercial banks in Georgia**

Despite the open foreign exchange position limits, large international banks are still able to engage in foreign exchange speculation, especially in derivatives trading, by playing on the open foreign exchange position margin. For example, they open a long foreign exchange position and acquire foreign currency assets, closing the positions in the future at a rate that is already profitable for them. A clear example of this was the example of the famous British bank Berings in the 90s of the last century, when the bank traded derivatives and collected foreign exchange contracts on the Tokyo exchange with the possibility of their future appreciation, it went bankrupt due to pure force majeure. If not for the famous Kobe earthquake in Japan, which caused the price of foreign exchange contracts to fall, it burned in time and had to close all contracts at unprofitable prices, and the loss consumed the entire capital of the bank.

It should be noted that in the part of the non-interest income of the leading Georgian commercial banks, there is a record increase in the profit from conversion operations, that is, from the purchase and sale of currency (NBG, 2023c).

It is significant that compared to the same period of 2018, the profit from conversion operations has increased from 200.8 million GEL to 354.5 million GEL, i.e. by 154 million GEL, and in percentage terms, it has increased by a record 77%, i.e. by almost 2/3. But,

most interestingly, in what period is this growth observed? The banking sector received the highest net profit from conversion operations in July 2019 - 70.7 million GEL, which is an absolute record in recent years. Also in August - 46.9 million GEL, and in September - 49 million. Lari. In fact, in just 3 months, the net profit of the banking sector from conversion operations amounted to 167 million GEL, which exceeds even the figure for the first 9 months of last year's profit (155 million GEL). (see Diagram 1)

The most interesting thing in these statistics is that these months, especially July-August, are characterized by the highest fluctuations of the lari, which was largely related to the events of June 20-21, 2019, because the next trend of the devaluation of the lari was due to these revolutionary events and negative expectations. It started on June 25 (NBG, 2023b).

According to the months, in July, not only the income from conversion operations increased significantly, but also its contribution to the net profit rose to a historical maximum and amounted to 86% (Diagram 1), while even in June its rate was one of the lowest in recent years and was 10%. did not exceed What is no less important, the largest part of this profit, 75%, falls on the two leading system-forming banks, namely TBC Bank, and Bank of Georgia (NBG, 2023d).

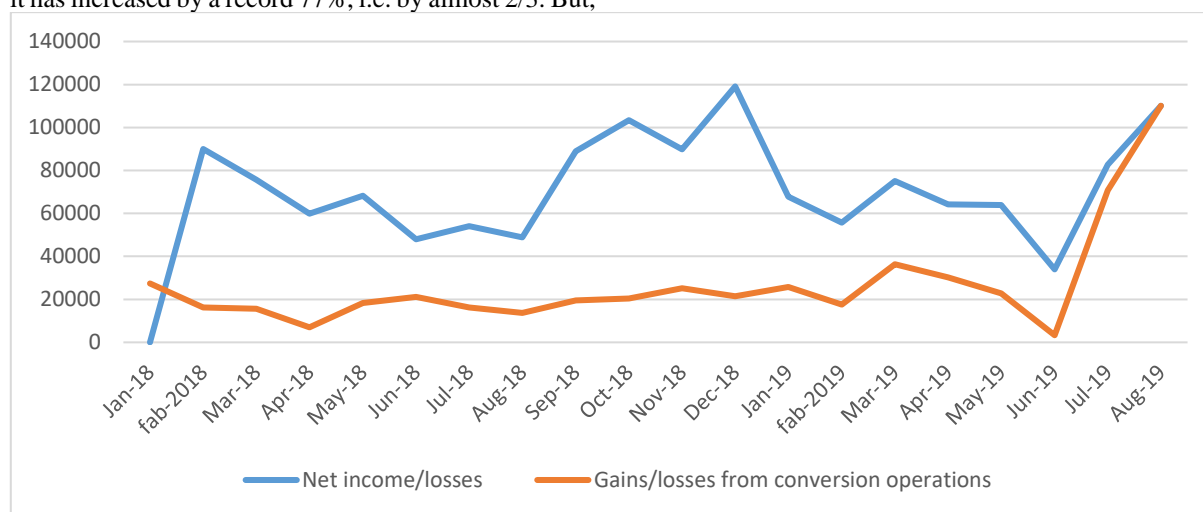


Diagram 1. Income from conversion operation in the Georgian banking system

It can be seen from this that in a revolutionary situation when negative expectations increase. In order to ensure currency risks, requests from legal and natural persons for currency purchase and sale operations and conversions, both in terms of trade operations and servicing of loans taken in foreign currency, are increasing significantly.

In addition, the increase in the profits of banks is also due to the fact that if in stable situations the interest margin between the purchase and sale price of currency does not exceed 1-3 whites, during high currency

fluctuations, along with the increase in the volume of foreign exchange operations, the margin increases even to 5-7 whites. This fact is in line with the expert assessments, according to which the devaluation of the lari and the chaos are arranged by the big banks and they are largely interested in it and less by individual companies, especially in the conditions of the dominance of two banks in the market and the lack of transparency of the "Bloomberg" trading system, currency speculations are also not excluded.

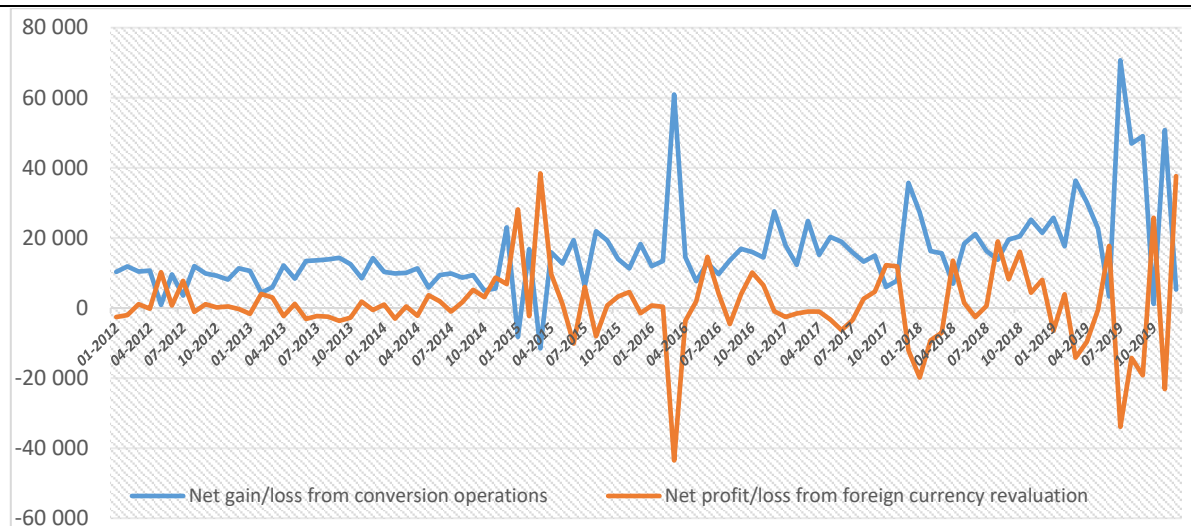


Diagram 2. Net income from conversion and currency exchange operations in Georgia

The relationship between the conversion operations and the profit/loss obtained from the revaluation of foreign exchange funds and the dynamics of the exchange rate is very interesting for analysis. This relationship becomes especially correlated during periods before and during currency fluctuations. In particular, the correlation has the character of a kind of "pit" of a sharply expressed asymmetric graph, when the profits from conversion operations increase sharply, and the losses from the

revaluation of foreign exchange funds also increase sharply. In other relatively stable periods, but during not sharp fluctuations in the devaluation of the GEL, the profits from conversion operations are not high, as well as the losses arising from the revaluation of foreign exchange operations are relatively low. At the same time, in the conditions of the relative strengthening of the GEL, the result obtained from exchange operations and the profit obtained from the revaluation of foreign exchange funds are also positive.

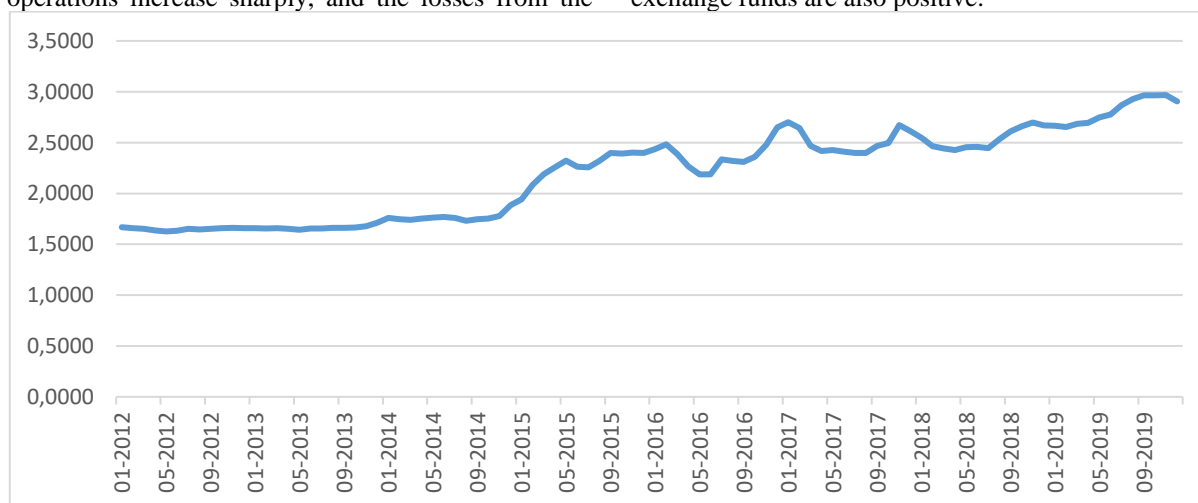


Diagram 3. Average monthly exchange rate, USD/GEL

As can be seen from Diagram 2 and Diagram 3, in the period of 2012-2019 between these two graphs, a pronounced asymmetric shape in terms of profit and

loss was recorded in 2015 during the impact of external shocks and in March-April 2016 and January-February 2018 during the next devaluation trend of lari.

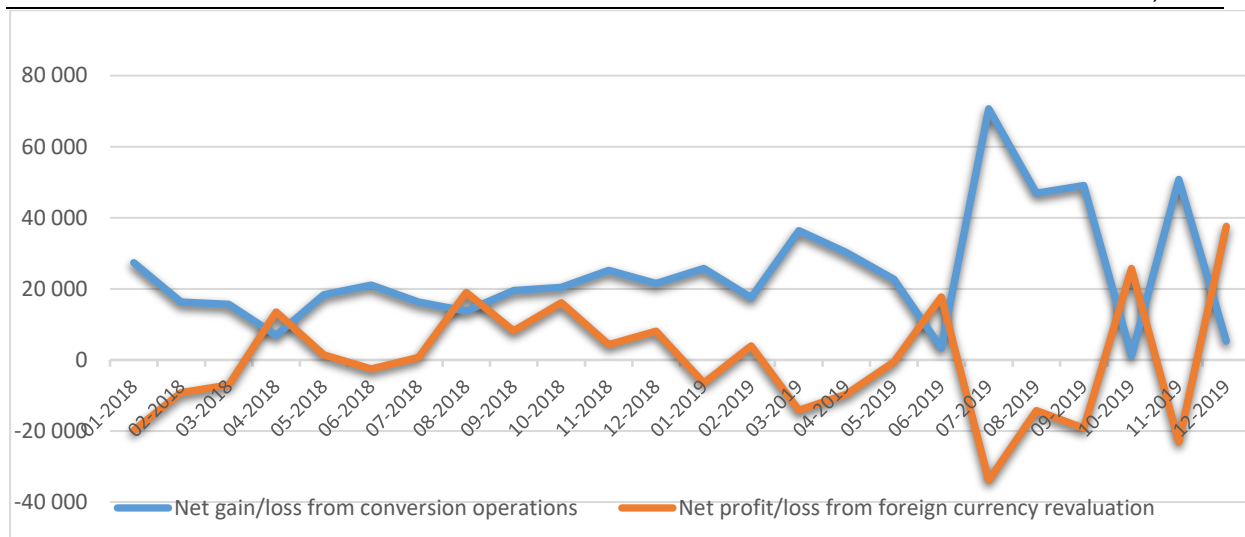


Diagram 4. Indicators of the banking system 2018-2019

In our opinion, the January-December figures of 2018-2019 also give a very interesting picture. The graph shows that in June 2019, the trend changed and the profit from the revaluation of foreign exchange funds broke the year's record and amounted to 17,739 million GEL, while Roder had a loss in the previous months, while the profit from conversion operations was recorded at the lowest level during the year - 3,315 million GEL. (Chart 4)

On the contrary, already in July 2019, when the new trend of devaluation of the Gel started, the profit of the system from conversion operations reached a record level and amounted to 70.69 million GEL, while the loss from the revaluation of foreign exchange funds also reached a record level - 33.8 million GEL. This trend continued in August-September as well, which generated a record profit from conversion operations of 166 million GEL in these three months, and on the other hand, a record loss from the revaluation of foreign exchange funds - 67 million GEL. The asymmetry of the trend in June, which was reflected in a peculiar loop, and the sharply changed trend in the following months raise doubts about currency speculation or playing at the maximum limit of the open currency position.

From this point of view, the month of October is also very interesting, when there was a sharp change in the trend of the previous period, exactly similar to the month of June when the profit from conversion operations rose again to the highest mark since July and amounted to 51 million GEL, while the loss from the revaluation of foreign exchange funds was also recorded at a high of 23 million GEL.

The month of October is significant from the point of view that it was in October that the National Bank lowered the reserve ratio on funds raised in foreign currency by 5%, which should have caused the foreign currency to enter the market up to 700 million US dollars and generally strengthen the GEL. From the graph of the exchange rate of GEL against the US dollar, it can be seen that the monetary effect of the reservation did not work practically. Couldn't influence the exchange rate on the market due to the fact that banks continue to buy US dollars despite the stimulus to supply the dollar supply!

Most importantly, the increase in refinancing loans was recorded in October 2019 (NBG, 2023a), when instead of decreasing as a rule, it increased from 2,050,000,000 GEL to a record 2,350,000,000 GEL! (Diagram 5)

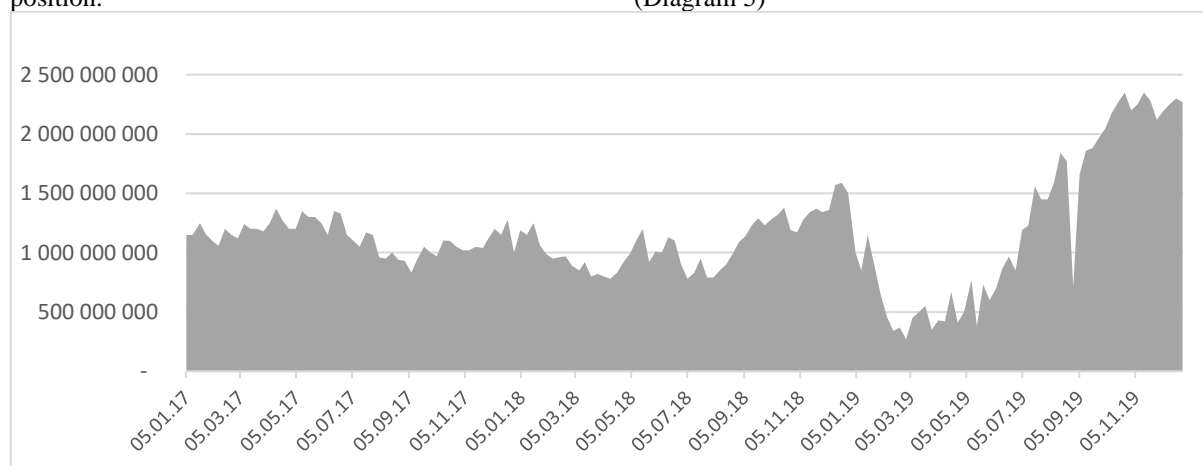


Diagram 5. The volume of refinancing loans in 2017 -2019

To evaluate the analysis of the system, we used a comparative analysis of the non-interest income of the leading 6 Georgian banks in the first 3 quarters. The analysis is performed based on the data of the National Bank, for those system banks whose assets exceed 1 billion GEL and make up 92% of the entire system.

Along with the two leading banks (TBC Bank, and Bank of Georgia), which own 73% of the system, the financial results of Liberty Bank, Kartu Bank, Base Bank, and VTB Bank are also included in the study. (Diagram 6)

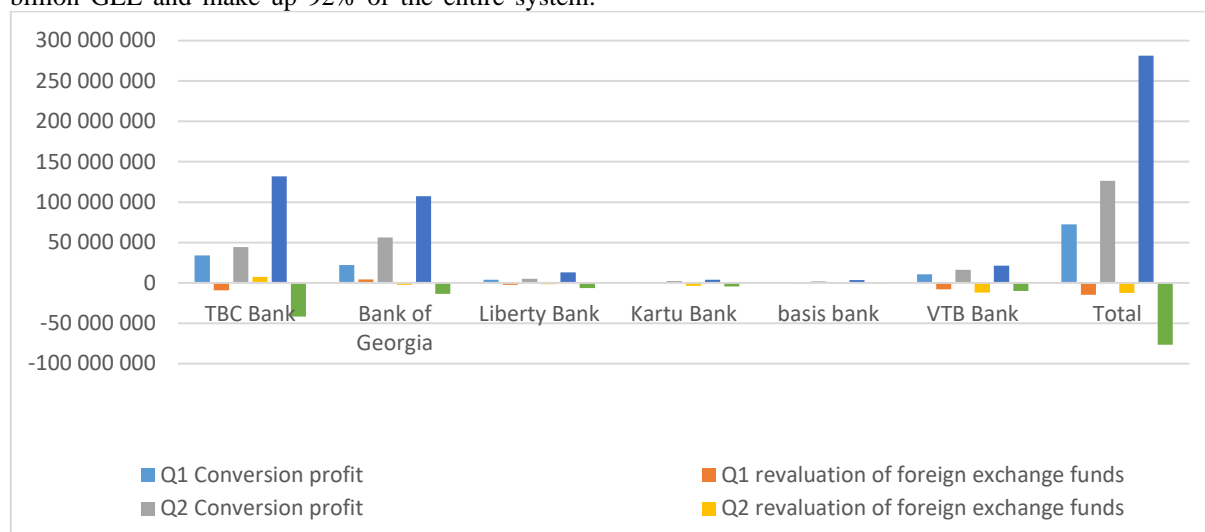


Diagram 6. Financial Results of the Georgian Banks for 2017-2019 Years

It can be seen from the presented graph that in the second quarter, all banks had losses from the revaluation of foreign exchange operations, except for TBC Bank. In addition, it is TBC Bank that has a significant influence on the trend of the system in the month of June, according to which, as we have seen, the conversion profit and the high rate of profit from

the revaluation of foreign exchange funds. Also, according to the 3rd quarter, TBC repeats the trend indicators recorded by the system in July-September, which is reflected in the record conversion profit and also the record loss received from the revaluation of foreign exchange funds.

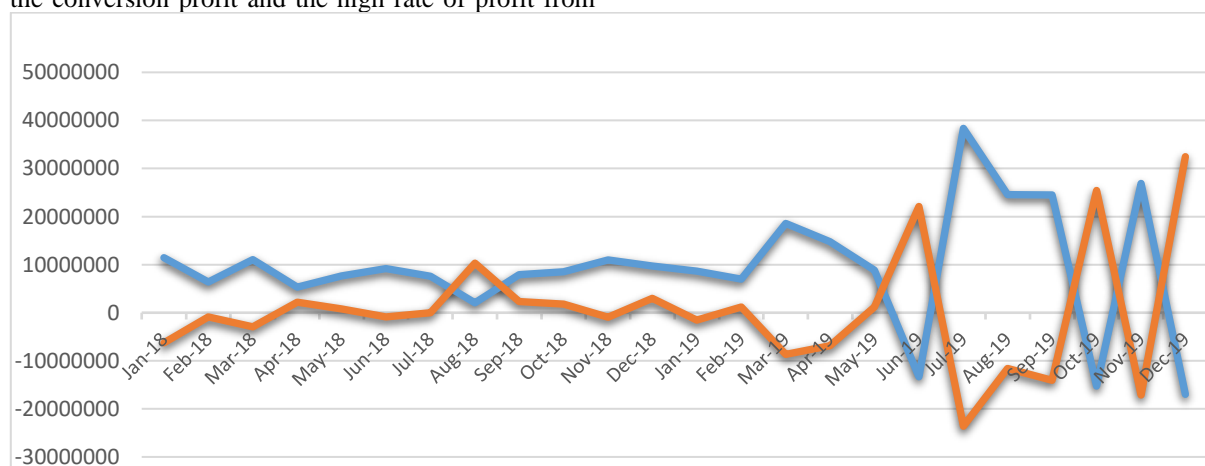


Diagram 7. The results of the two systemic banks for 2018-2019 years

From the presented graphs, it can be seen that of the two largest system-forming banks of the country, which constitute 74% of system assets, TBC Bank practically repeats the systemic trend in 2018-2019, especially in May-November 2019.

It is worth noting that since June, the income from Nostro accounts has increased significantly, especially

in October, when it reached the historical maximum of 7,143 million GEL, if not in 2019, and the profitability was maintained even in November-December. In October, it is important to the extent that the amount released on the market with the reduction of the reserve norm by 5% practically did not affect the exchange rate.



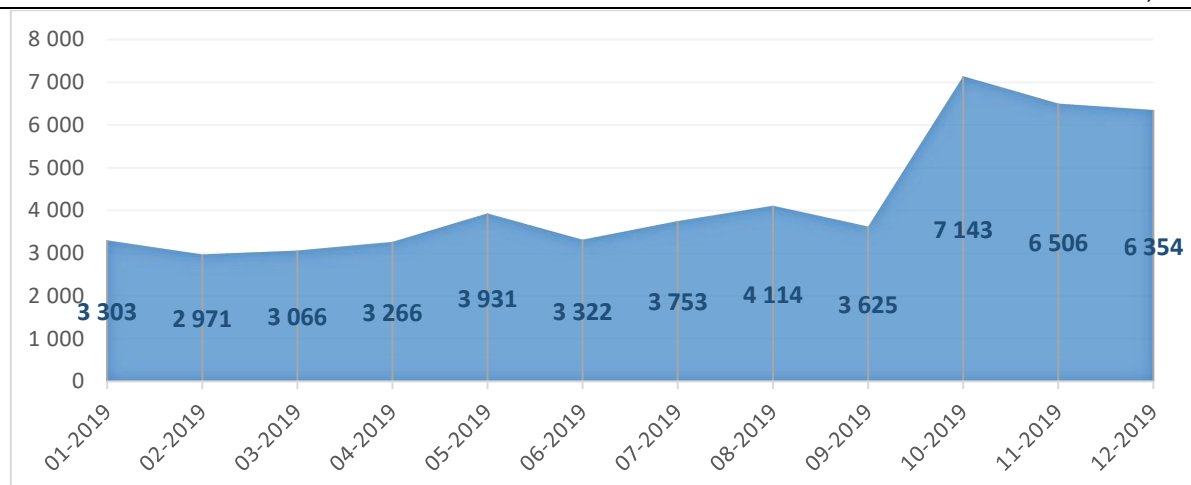


Diagram 8. Earnings from Nostro accounts, 2019

### Net interest income

In the case of high fluctuations and currency devaluation, if it has a medium-term nature, due to the high dollarization of loans, banks' interest incomes also increase namely net interest income.

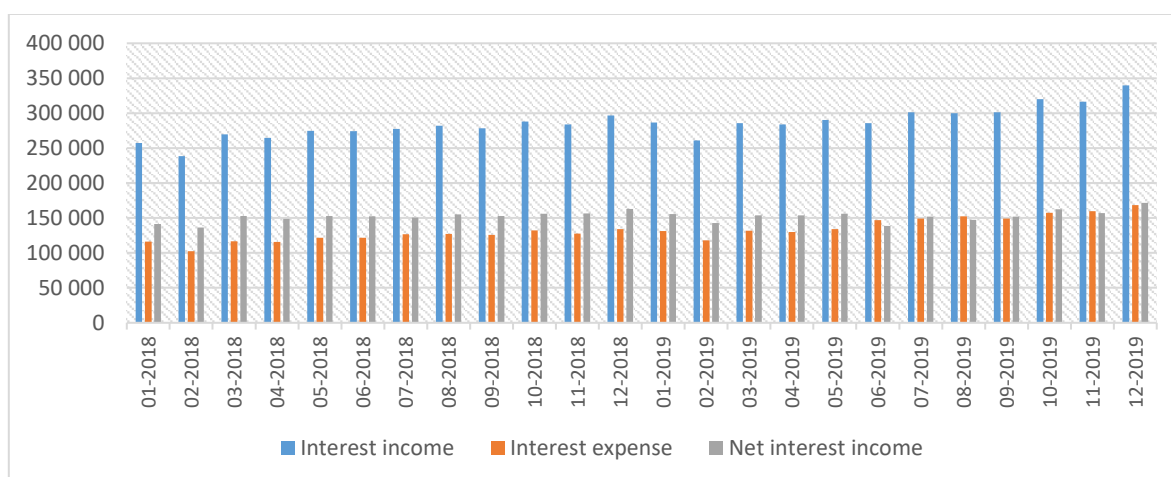


Diagram 9. Interest Income and Expenses in Georgia

As can be seen in Diagram 9, after decreasing in June 2019 compared to May, the interest income started to increase from July, Khdolo reached a record quarterly rate in October-December - 976.6 million GEL, which is 27% of the total annual interest income.

Similarly, net interest income as of the 4th quarter amounted to 490.9 million GEL, which was 27% of the total net interest income.

The trend of 2014-2015 also gives a very interesting picture (Diagram 10).

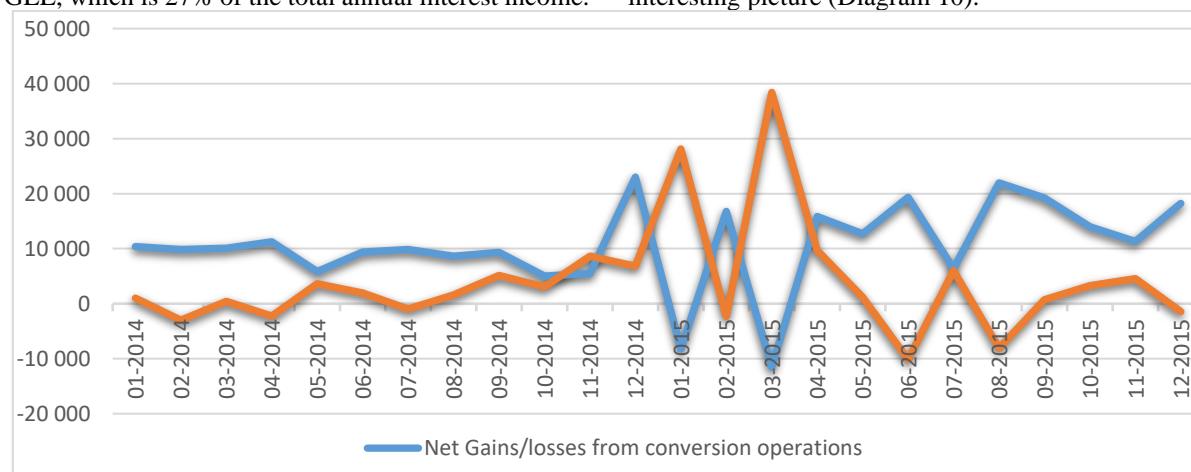


Diagram 10. Indicators of the banking system 2014-2015

Our foreign exchange market has a very small volume, and at the same time, the weather in the interbank foreign exchange market is created by 4-5 banks, and to a large extent by 2 banks, which is why the probability of informal influences on the market is quite high. More than 10 billion dollars of foreign exchange transactions are made on the foreign exchange market every year, although the exchange rate of lari is set only according to interbank foreign exchange market transactions, which do not exceed 1 billion dollars annually.

In 2014, the transactions concluded in the interbank market, including the interventions of the National Bank, amounted to 904 million dollars, that is, the exchange rate of the GEL was determined by transactions of this volume, while in the foreign exchange market in 2014 transactions of more than 13 billion dollars were concluded. This practically means that the exchange rate of GEL is determined not by the market and the economy, but by 2 large banks, with small-volume transactions. Banks trade with each other, on average, up to 100 million dollars per month, as a result of which the exchange rate of the lari is set, and with this exchange rate, more than a billion dollars of currency transactions are made every month. In addition, up to 75% of the total turnover of the interbank foreign exchange market comes to only 5 banks, and from this, it can be seen that there is a high risk that, in addition to operating at the limit of the open foreign exchange position, speculative transactions also take place.

Banks have the leverage and the opportunity to "regulate" the exchange rate of the GEL with transactions worth up to a billion dollars every year, and then, at this rate, to conclude foreign exchange transactions with individuals and legal entities, in total, up to 7 billion.

This is precisely the asymmetric system when the interbank foreign exchange market is not the real determinant of the economy's supply and demand for foreign currency. A number of experts have suggested that the fluctuation of the exchange rate of the lari is part of a far-reaching and well-planned policy. Unfortunately, the actions of the National Bank are often delayed and even today they remind us of the period of Kadagidze, when his individual statements, instead of neutralizing negative expectations, artificially sowed panic in the society.

Unfortunately, during that period, a rather difficult situation was created regarding the exchange rate of the lari in Georgia, which started as early as November 2014. This problem, first of all, causes a lot of damage to the economy, as well as to socially vulnerable, low, and middle classes. In 2014-15, SEB had more than enough reserve money - 3 billion dollars, of which it spent only 200 million dollars. Regulator took 120 million dollars out of 200 million dollars only when there was already panic in the country. For example, we can compare the years 2009 and 2014. In 2009, when the exchange rate of the lari was stable, the National Bank of Georgia provided 112 million dollars to the market, thus practically holding the exchange rate.

Instead, in 2014, when the exchange rate changed significantly, it spent only 100 million dollars. According to the data of the periods of funds spent by the National Bank in 2014, it is clear how SEB does not interfere consciously in the processes in order to maintain the stability of the GEL exchange rate. If in 2009 the National Bank intervened in the foreign exchange market 53 times and thereby maintained stability, in 2014 it intervened only 18 times. Its deliberate action also affects refinanced loans. If until 2013 the maximum loan was 300 million GEL, in 2014, when the exchange rate of the GEL was falling, the National Bank increased it to the historical maximum – of 700 million GEL.

Since August 2014, both positions have been profitable, the profit from conversion operations and the profit from the revaluation of foreign exchange funds, and in December, the record profit was fixed by the sum of both these positions. Moreover, since November 2014, the profit from the revaluation of foreign currency exceeds the profit from conversion operations, and in December-January, this trend goes into asymmetry twice. In particular, with a record rate of conversion profit in December, and January 2015 compared to 2014, it was already in the form of profit from the revaluation of foreign exchange funds and instead, in the form of loss from conversion operations.

In this case, TBC Bank practically repeats the nature of the systemic trend. As for the Bank of Georgia, its trend in December 2014 and January 2015 coincides with TBC Bank, instead, in February-March, it reached a record profit in the revaluation of foreign exchange funds. On the other hand, the loss from conversion operations is also high.

### Conclusion

Based on the fact that in June 2019, the banking system had a low index in conversion operations, and a high profit in currency revaluation correlates with the data of TBC Bank in this period, which indicates that the bank purchased dollars at a high price, that is, it traded with a lower margin than the average system and deliberately went for a loss. Instead, he won the revaluation.

Instead, already in the 3rd quarter, the bank used the negative impact of the revolutionary situation that developed since the end of June on the foreign exchange market, it started to contribute conversion profits, i.e., to play on the artificial devaluation of the exchange rate, which was naturally reflected in the loss of currency revaluation.

True, in October the bank lost in conversion and won in revaluation, similar to June. The fact that the bank followed this strategy is confirmed by the dynamics of the exchange rate and especially the record-high increase in refinancing loans, along with the increased profit from Nostro accounts, the leading operator of which, based on its market share, is TBC Bank. This largely resulted in virtually zero effect of the reduction in reserves on the foreign exchange market.

The financial results obtained from the currency devaluation at the end of 2014 and the first half of 2015 should be evaluated in the same way, both on the



example of TBC Bank and the second largest bank - "Bank of Georgia".

Therefore, it can be seen that, in certain periods, banks focus on long currency positions, that is, they collect foreign currency, while they close the open currency position at a profitable rate for them in the future.

Today, the size of the capital of these two banks allows them to freely operate at the limit of the open currency position, especially since these banks actually represent their own currency exchanges, and it is possible that they use the Bloomberg system to fix the desired exchange rate.

Large banks did not lose anything due to currency devaluation, on the contrary, they made record profits, both in terms of profit from conversion operations and net interest income, that is, they practically covered the losses arising from currency revaluation.

The instability and unpredictability of the exchange rate, first of all, have a negative effect on Georgian business, because as a result of the aforementioned positioning of the leading Georgian banks, business operating costs increase, which reduces their competitiveness, which again affects consumers negatively by increasing prices.

Therefore, it becomes one of the additional factors of negative impact on inflation.

It is true, from the point of view of de-dollarization, the National Bank has taken important steps in recent years, reduced dollarization and which means limiting lending in foreign currency to uninsured borrowers, requesting information from credit bureaus about all loans in terms of individual currencies, and requiring banks to routinely assess currency risks. But dollarized deposits remain a problem, which in turn leads to the dollarization of loans.

High levels of foreign currency-denominated deposits cause banks to lend to local borrowers in foreign currencies to maintain balanced balance sheet positions while shifting the exchange rate burden from banks to depositors. On the other hand, important factors causing the dollarization of deposits are the inflation rate and volatility, as well as currency devaluation in low-income countries. And the asymmetric exchange rate policy encourages depositors to keep their deposits mostly in foreign currency in order to maintain their purchasing power.

In addition, in countries with dollarized and highly import-dependent economies, interest rates and their differences are high, resulting from risks arising from currency devaluation. Consequently, price elasticity to monetary and credit shocks is often higher in countries with dollarized economies, because inflation is more responsive to monetary and credit shocks due to weak policy transmission mechanisms.

In the conditions of an oligopolistic market, where the assets of two banks are up to 75% of the total banking assets, the SEB is obliged to intervene more actively in the market for the sake of macroeconomic stabilization and limit the profits of the banks, both in the direction of increasing the refinancing rate, interest margin and interventions in the market.

In terms of de-dollarization and increasing the attractiveness of the local currency, it is necessary, especially in the short term, to focus on measures that will make the local currency more attractive and reduce the asymmetry of the exchange rate policy and, therefore, the probability of currency speculation.

From the point of view of de-dollarization of deposits and credits, it will be important to develop the liquid capital market in local currency in the medium term, along with the development of the stock market in the long term, which will help to reduce the level of dollarization of credits along with the de-dollarization of deposits.

## References

1. Belewu, M. A., Belewu, K. Y., & Adesina, A. A. (2018). Non-interest income and bank performance in Nigeria. *Banks and Bank Systems*, 13(3), 122-129.
2. Charaia, V., & Papava, V. (2022). On the Inflation and its Modifications in the Era of Global Pandemic: The Case of Some ADB Countries. *Journal of Asian Finance, Economics and Business*, 9(8). [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4207659](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4207659)
3. Gamsakhurdia T., & Kokiauri L. (2021). NEW FINANCIAL TECHNOLOGIES FACING SYSTEMIC ECONOMIC SHOCK. *European science review*, (11-12), 64-66.
4. Chen, S., Chen, X., & Lin, M. (2018). The effect of non-interest income on bank risk in China. *Journal of Financial Stability*, 36, 54-65.
5. Gul, S., Tariq, Y. B., Ali, S., & Sajjad, S. (2020). Non-interest income and bank risk-taking behavior: Evidence from Pakistan. *Journal of Financial Regulation and Compliance*, 28(1), 82-99.
6. Hasko, H., Mahringer, S., & Wix, C. (2021). The impact of non-interest income on the cost efficiency of European banks. *Journal of Banking & Finance*, 124, 106111.
7. Javakhadze, L., & Imnaishvili, T. (2021). Non-Interest Income in Georgian Commercial Banks: Current Status and Future Challenges. *Journal of Economic Sciences*, 2, 84-94.
8. Jorbenadze, A., & Bregvadze, T. (2018). Non-Interest Income Sources of Georgian Commercial Banks. *Journal of Economics and Business*, 1, 89-105.
9. Kapanadze, G., & Kekelidze, D. (2021). Non-Interest Income and its Determinants in Georgian Commercial Banks. *International Journal of Economics, Commerce and Management*, 9(4), 10-27.
10. Lashkhi, M. (2022). The Impact of FinTech Companies on Financial Institutions, Case of Georgia. Gemeris Publishing. <https://libro-terra.com/shop/business-finance/the-impact-of-fintech-companies-on-financial-institutions-789/>
11. Lashkhi, M., Charaia, V., Boyarchuk, A., & Ebralidze, L. (2022). The Impact of Fintech on Financial Institutions: The Case of Georgia. *TalTech Journal of European Studies*, 12(2), 20-42.
12. NBG. (2022). Organic Law of Georgia on the National Bank of Georgia. <https://nbg.gov.ge/fm/%E1%83%98%E1%83%9C%E1%83%93%E1%83%98%E1%83%95%E1%83%98>

E1%83%93%E1%83%A3%E1%83%90%E1%83%9A%E1%83%A3%E1%83%A0\_%E1%83%A1%E1%83%90%E1%83%9B%E1%83%90%E1%83%A0%E1%83%97%E1%83%9A%E1%83%94%E1%83%91%E1%83%A0%E1%83%98%E1%83%95%E1%83%98\_%E1%83%90%E1%83%A5%E1%83%A2%E1%83%94%E1%83%91%E1%83%98/%E1%83%9C%E1%83%9D%E1%83%A0%E1%83%9B%E1%83%90%E1%83%A2%E1%83%98%E1%83%A3%E1%83%9A%E1%83%98\_%E1%83%90%E1%83%A5%E1%83%A2%E1%83%94%E1%83%91%E1%83%98/%E1%83%A1%E1%83%90%E1%83%91%E1%83%90%E1%83%9C%E1%83%99%E1%83%9D/organic-law-of-georgia081122.pdf

13. NBG. (2023a). Monetary and financial statistics, refinancing loans. <https://nbg.gov.ge/en/statistics/statistics-data>

14. NBG. (2023b). Exchange rate, official daily exchange rates (2001-2021), ExRD. <https://nbg.gov.ge/fm/%E1%83%A1%E1%83%A2%E1%83%90%E1%83%A2%E1%83%98%E1%83%A1%E1%83%A2%E1%83%98%E1%83%99%E1%83>

%90/exchange\_rates/eng/exratesyearseng.xlsx?v=orrn0

15. NBG. (2023c). Monetary and Financial Statistics, M3.4 Financial Indicators of Commercial Banks. <https://nbg.gov.ge/en/statistics/statistics-data>

16. NBG. (2023d). Annual financial statements. <https://nbg.gov.ge/en/supervision/banking-supervision?pageKey=pilar3Quarter>

17. Osuji, C. C., Akanbi, T. A., Ibeneme, A. N., & Oguoma, C. M. (2021). COVID-19 pandemic, interest and non-interest income of emerging economies' banks: Evidence from 65 banks. *Journal of Economics, Management and Trade*, 27(7), 36-48.

18. Papava, V., & Charaia, V. (2020). The economic crisis and some challenges for the Georgian economy. *GFSIS, Expert Opinion*, (136). <https://gfsis.org.ge/files/library/opinion-papers/136-expert-opinion-eng.pdf>

19. Uzuner, G., Arslan, M., & Kabadayi, E. T. (2021). The impact of non-interest income on profitability in Turkish banking sector: An application of random effects generalized least squares. *Journal of Business Economics and Management*, 22(3), 531-548.

## THE IMPACT OF SOME ELEMENTS OF PUBLIC GOVERNANCE ON THE LEVEL OF FISCAL PRESSURE BY STATES TYPE

**Raluca Andreea Ghețu,**

*University of Economic Studies, Bucharest, Romania*

**Petre Brezeanu**

*University of Economic Studies, Bucharest, Romania*

[DOI: 10.5281/zenodo.7941606](https://doi.org/10.5281/zenodo.7941606)

### Abstract

The structure of the fiscal system and how it prioritizes its budgetary policies and ensures the efficiency of the collection of financial resources determine in a significant proportion the degree of development of a state. The quantification of the fiscal pressure at the level of the emerging states of the European Union highlights a wide range of tax rates. It presents the degree of fiscal affordability of taxpayers compared to the average level of the European Union. The relationship between taxation and the institutional quality of the system is a topic of significant interest to researchers. The authors of this article disseminate the concept of public governance and explain the evolution of quality indicators of public governance; indicators developed and quantified by the World Bank since 1996. In the article, the authors present an econometric analysis of the concept of fiscal pressure as a dependent variable is carried out, which establishes the influence on the specific indicators of public government and not only in the period 2002-2020, for the 14 emerging states of the European Union.

**Keywords:** fiscal pressure, unemployment rate, global governance indicators, public governance,

### 1. Introduction

According to the literature, the conceptual and scientific approaches to taxation are explained as economic measures applied by adopting various budgetary policies, aiming at raising financial resources for better governance and thus limiting the adverse effects caused by a high level of taxation. The high level of taxation in emerging countries has been a topic of economic interest to economists. The phenomenon of fiscal pressure is managed as an integral part of the fiscal system and is characterized as a tool for collecting revenues through taxes and fees. For taxpayers, this phenomenon is classified as financial payment obligations.

Neumark (1937) and Pehlivan (2014) also argue that taxpayers see taxes and fees as an income for the state and an expense for them. The author Constantin Tulai is that this concept is closely related to taxation and is often used in specialized studies to characterize the level of taxation of a state (Tulai, 2003).

However, a state's taxation level cannot be assessed only according to the absolute volume of taxes, even if its evolution over time is followed. The volume of taxes and fees may change over time, provided that the state cannot change its claims on taxpayers. The fiscal policy adopted by each state is an essential tool for regulating financial and economic imbalances caused by a high level of fiscal deficit and subsequently a high level of fiscal burden, which produces adverse effects on the citizen's standard of living.

The influence of the level of fiscal pressure on public governance and the government's response to the adverse effects of fiscal pressure has been. It is a hotly debated economic topic in various studies, including the 1983 study by Wolman and All. Wolman and all (1983), Adrian Groșanu and all (2015), B. Hasan et al. (2014) and Srivastava (2009) argue that good governance by decision-makers, both nationally and internationally, has It is based on several priority principles,

such as accountability and decision-making transparency in the development of the fiscal and economic policies of the rule of law. These elements play an essential role in the economic growth of the state.

In the article presents a multiple regression with panel data, where its results will be interpreted. In the econometric analysis, the authors took as a dependent variable the level of fiscal pressure, and as independent variables, three indicators from the six specific indicators of public government (Voice and Responsibility; Government Effectiveness; Political Stability and Absence of Violence; Quality of the Regulatory Framework; Rule of Law and Control Corruption) developed following the methodology described in the study "Aggregating Governance Indicators" (Kaufmann, Kraay and Zoido-Lobaton, 1999), and two critical indicators of economic stability represented by the unemployment rate and the growth rate of gross domestic product. All these indicators will be used in the econometric analysis for the 14 emerging countries in the European Union (Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Croatia, Hungary, Lithuania, Latvia, Malta, Poland, Romania, Slovakia, Slovenia) for the period 2002-2020. Ignoring these indicators in the various econometric analyzes of specialists in the economic field and later adopting different budgetary policies creates adverse effects on the economy and has as side effects the decrease in fiscal revenues and the increase in unemployment.

The results of this article are intended to complement the information found in the literature by presenting the significant relationship between fiscal pressure and quality indicators of public governance and providing helpful information to decision-makers to improve and streamline the economic and political environment.

### 2. Speciality literature.

In the literature, the optimal positive level of fiscal pressure is seen by researchers as a priority condition in the good social and economic development of public

governance in order to increase investment and social welfare.

Estimating the fiscal pressure level most frequently used in research studies is the ratio between tax revenues and gross domestic product (Liu et al 2013; Celikay, 2020; Vasileva, 2020; Paientko et al 2020 ).

Ungureanu M.A. (2013) argues that from the government's perspective, the level of fiscal pressure shows us what part of taxpayers' revenues will turn into tax revenue for public authorities and reports that the decrease in the fiscal pressure coefficient influences the level of the budget deficit. In connection with the present study, we identify the modern literature researchers. They empirically claim that reducing the fiscal pressure directly influences the financial stability of the state and has the potential to stimulate the economy (Alstadsaeter et al 2017; Tamai et al 2019; Celikay, 2020). Skarzauskas (2021) analyzed in a recent study the impact of fiscal pressure on the financial stability of the state in 28 states of the European Union in the period 2005-2019. It is empirical that fiscal pressure can affect financial stability by directly impacting economic growth. These researchers used the unemployment rate, gross domestic product growth, deficit and bond yields as indicators to assess economic stability. The authors show that the most decisive positive impact is identified in states with high fiscal burden and low financial stability and low fiscal burden and high financial stability. The weakest influence was identified in states with low fiscal pressure and low fiscal stability. Financial stability is still low.

Regarding the significant influences on public governance and long-term economic development, Vasiliauskaite et al (2009) state that there is still no unanimous opinion in the literature on how the tax burden affects these two concepts. Empirical evidence on this subject is divided, having different characteristics for different states, periods and explanatory variables. Existing studies do not have a clear picture of the impact of the tax burden, as it lacks a methodology for assessing all factors influencing the economy. A key component of public governance is financial and economic stability. Economists argue that national and international comparisons of fiscal pressure are possible, but its exact impact on stability remains problematic due to multiple factors of economic stability (Salaudeen et al, 2018; Celikay, 2020).

Based on existing studies, two channels of the impact of the fiscal burden on the financial stability of the state have been identified, once through the fiscal structure (Yanikkaya et al, 2018; Durusu-Ciftci et al, 2018; Valenduc, 2019; Bunn et al 2020) and the minimum level of taxation (Karagianni et al, 2012; Mao, 2017; Milasi et al 2018; Bösenberg et al 2018). Recent studies show that declining revenues by lowering the tax base negatively influences the overall image of the government (Hoene et al, 2008) and its quality. Contrary to other empirical studies, Dye et al (2008) expect governments to rely more on progressive taxation than on reducing spending to balance budgets, with the risk of increasing unemployment among citizens. The authors claim that, in addition to increasing tax rates and reducing spending, another possible response option is to

step up economic development efforts to regain the tax base that was lost by reducing the tax burden.

Jensen et al (1976) believe that local government must be in the people's best interests. So administrations need to perform well. Jones et al (2010) reaffirmed that government performance is multidimensional, so no single indicator can be used to show comprehensive government performance. For specialists, public governance focuses on how public fiscal policies are implemented and how public services are provided to citizens (Osborne, 2010).

The concept of public governance was defined by Farazmand (2004) as "a participatory process of governing the social, economic and political affairs of a state, country or local community, through structures and values that reflect society."

Worldwide Governance Indicators have been identified within the concept of public governance. These were first presented in a study launched in 1996, which aimed to initiate as many indicators as possible, which helped measure the various elements of public governance for as many states as possible and one of the most important. Often used by them for the United Nations Development Program (UNDP). The program's initiators defined governance as "the exercise of political, economic and administrative authority to manage the internal affairs of a nation. Governance targets complex mechanisms, processes, relationships and institutions through which both citizens and taxpayers exercise their rights and obligations and mediate differences (UNDP, 1997). This definition is characterized by multiple principles such as ensuring transparency, participation, accountability, the rule of law, efficiency, equity and strategic vision (Cheema, 2005).

Quality indicators of public governance can analyze the power of public administrations to develop sound fiscal policies. Bertelsmann (2017) points out that the indicators highlight the existence of significant differences within several states in terms of the executive capacity of each.

Finally, we appreciate that more and more scientific and empirical studies support the importance of the phenomenon of fiscal pressure (Eaton et al 2004; Chen et al 2017), and in this article, we analyze the evolution of economic indicators of economic stability and identify the relationship between fiscal pressure and public governance empirically, with the help of quality indicators of good governance developed by Daniel Kaufmann.

### **3. Case Study - Analysis of Government Influences on Fiscal Pressure in Emerging EU States**

#### **3.1. Research methodology**

Panel regression is characterized as a modelling date that adapts the panel data, also called cross-sectional or longitudinal data.

The statistical representation of the regression of the panel econometric equation is as follows:  $y = \alpha_1 + \alpha_2 x_{2it} + \alpha_3 x_{3it} + \alpha_4 x_{4it} + \dots + \alpha_n x_{nit} + \varepsilon$

In this article, we decided to use the multiple regression model with panel data as a methodology, considering the level of fiscal pressure as a dependent variable. As independent variables, we chose three indicators of public governance quality respectively:

regulatory quality, political stability, absence of violence/terrorism, and control of corruption. In addition to the three indicators supported by the WGI model, we also introduced the variables unemployment and GDP growth. The analysis was performed at the level of emerging states in the European Union. The countries included in the analysis are Romania, Greece, Bulgaria, Lithuania, Estonia, Croatia, Cyprus, Hungary, Latvia,

Malta, Slovenia, Slovakia, Poland, and the Czech Republic. The analyzed period is from 2002 to 2020. The database was taken from the World Bank and AMECO websites.

### 3.2. Research results.

In the first stage of the research, we present the highlighting of the descriptive statistics calculated for the existing data series. We included the maximum, minimum, average, and median calculations.

Table 1.

Descriptive statistics of data sets

	Tax burden	Unemployment	Regulatory quality	Political stability	Gdp Growth	Corruption
Average	33.02	9.24	0.02	0.00	2.97	0.00
Median	32.90	7.79	0.08	0.00	3.52	-0.04
Maximum	42.70	27.47	0.80	0.92	11.98	1.19
Minimum	25.40	2.010	-0.93	-0.90	-14.83	-0.86

Source: own processing in Excel

The fiscal pressure was 33.2%, its maximum value standing at 42.7%. The highest level of the unemployment rate (%) was 0.80%, while the minimum value was 0.02%. The median indicates that half of the values are less than 0.08% of GDP, and half exceed this level.

The average level of Regulatory quality (%) was 0.02%, the minimum value being -0.93%.

The lowest GDP growth rate in emerging countries was 14.83, reaching 11.98. The average value of the GDP growth rate was around 2.97.

Regarding the control of corruption and political stability and the absence of violence/terrorism, it is highlighted that their average value is 0.00, and the maximum is 1.19, respectively 0.92 points.

The present analysis continues by highlighting the correlation between the independent variables in table no.

Table 2.

Correlation between independent variables.

	Unemployment	Regulatory quality	Political stability	Gdp growt	Corruption
Unemployment	1.0000	-0.3216	-0.3500	-0.0056	-0.3122
Regulatory quality	-0.3216	1.0000	0.4907	0.0315	0.7334
Political stability	-0.3500	0.4907	1.0000	0.1562	0.5263
Gdp growt	-0.0056	0.0315	0.1562	1.0000	0.0501
Corruption	-0.3122	0.7334	0.5263	0.0501	1.0000

Source: own processing in Eviews 7.1

There is an inverse relationship between unemployment and indicative regulatory quality, political stability and the absence of violence/terrorism and control of corruption. At the same time, there is a direct, medium intensity relationship between the level of regulatory quality and the indicators of political stability and absence of violence/terrorism, unemployment, and GDP growth.

We also find a direct relationship of medium intensity between control of corruption and political stability and the absence of violence/terrorism, unemployment, and GDP growth. Independent variables regulatory quality and control of corruption are directly related but are not server related.

In table no. 2, we notice no strong intensity relations between the independent variables. Therefore all the above variables will be included in the multiple regression model with panel data.

Within the multiple regression model that will be realized, we took the level of general fiscal pressure as a dependent variable. As independent variables, we chose regulatory quality, political stability and absence of violence/terrorism, control of corruption, GDP growth and unemployment.

Next, we present and discuss the results of the multiple regression model with panel data.

Dependent Variable: TAX\_BURDEN

Method: Panel Least Squares

Total panel (balanced) observations: 238

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT	0.150728	0.047561	3.169144	0.0017
REGULATORY_QUALITY	-7.991829	0.941131	-8.491727	0.0000
POLITICAL_STABILITY	2.649718	0.697551	3.798600	0.0002
GDP_GROWTH	-0.181226	0.049828	-3.637052	0.0003
CORRUPTION	5.707064	0.721602	7.908885	0.0000
C	32.15991	0.519829	61.86636	0.0000
R-squared	0.333311			
Adjusted R-squared	0.318942			
F-statistic	23.19763			
Prob(F-statistic)	0.000000			

*Fig. 1 - results of the multiple regression model with panel data.*

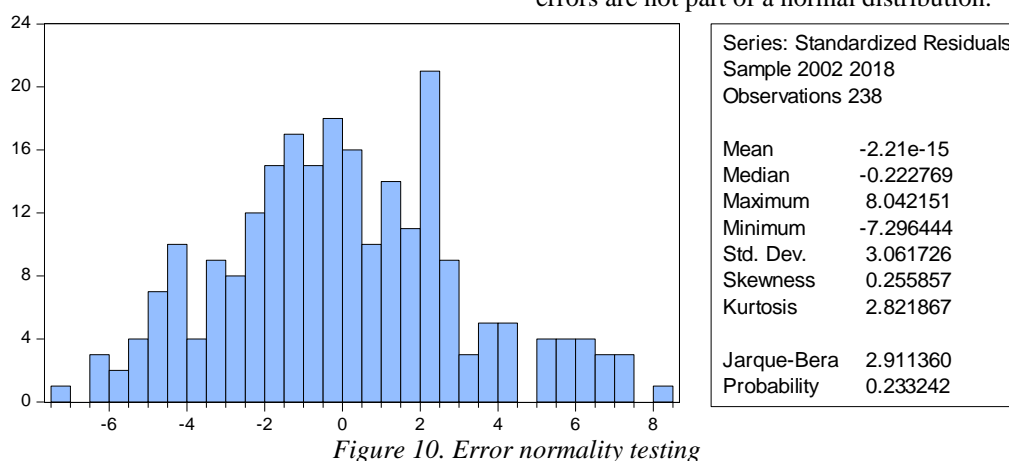
Source: own processing in Eviews 7.1

Following the generation of the multiple models, we observe that the independent variables regulatory quality, control of corruption, GDP growth, political stability and absence of violence/terrorism and unemployment are significant and have a substantial impact on the evolution of fiscal pressure in emerging EU countries. The associated probability is below the significance threshold of 1%. The value of the determination report shows that the regression model explains 33.33% of the variance in the level of fiscal pressure. If we consider the probability value of the Fisher test holds, we can say that the regression model performed is a correctly specified one, at a confidence level of about 99%.

When unemployment increases (%) by one percentage point, the level of fiscal pressure will increase by 0.150 percentage points if the other factors remain constant. When the regulatory quality increases by one

percentage point, the level of fiscal pressure will decrease by 7,991 percentage points if the other factors remain constant. As political stability and the absence of violence/terrorism increase by one percentage point, the level of fiscal pressure will increase by 2,649 percentage points if the other factors remain unchanged. When the control of corruption increases by one percentage point, the level of fiscal pressure will increase by 5,707 percentage points if the other factors remain constant. When the growth rate of gross domestic product (%) increases by one point, fiscal pressure will decrease by 0.181 percentage points if the other factors remain constant.

So, we will continue to test whether or not the disturbing factors belong to a normal distribution using the Jarque-Bera test. According to the Jarque-Bera test, the errors belong to a normal distribution under the null hypothesis, and an alternative hypothesis suggests that the errors are not part of a normal distribution.

*Figure 10. Error normality testing*

Source: own processing in Eviews 7.1

By testing the normality of the errors, we notice that the values estimated by skewness and kurtosis are

very close to standard values, respectively 0 and 3. These values help us conclude that the null hypothesis

of the Jarque-Bera test is accepted, so we can say that the errors in the model belong to a normal distribution.

## 12. Conclusions.

Global Governance Indicators can provide comparable data on the quality of public governance for a considerable number of states and an extended period. WGI indicators maintain interest in the concept of public governance and are an incentive for some states to improve the quality of governance. In the case study, we used the multiple regression model with panel data, for the period 2002-2020, with an annual frequency of data that were used. The general level of fiscal pressure represented the dependent variable. The independent variables were used regulatory quality, political stability and absence of violence/terrorism, control of corruption, GDP growth and unemployment. The results obtained indicate that all five independent variables have a substantial impact on the evolution of fiscal pressure. There is a direct relationship between fiscal pressure and the five variables. When the variables of political stability and absence of violence/terrorism, control of corruption and unemployment increase by one unit, the level of fiscal pressure increases, and with the increase by one unit of the variables regulatory quality and GDP growth, the level of fiscal pressure decreases.

However, we tend to note that WGIs are indicators that have different problems, as they are based on surveys and can be used to assess government policies. They should be used with caution as the content validity of these indicators is questionable.

## References

1. Alstadsaeter A, Johnnesen N and Zucman G, 'What do tax havens cost in terms of lost tax revenue?' in Fjeldstad O, Jacobsen S, Ringstad P and Ngowi H (eds) *Lifting the Veil of Secrecy Perspectives on International Taxation and Capital Flight from Africa*, Chr. Michelsen Institute, Bergen, 2017, 55.
2. Ali Farazmand, *Sound Governance: Policy and Administrative Innovations*, editat de Rosalyn Carter, 2004.
3. Bertelsmann. 2017. *Strategic Capacity Report*. Gütersloh: Bertelsmann.
4. Bunn, D., & Asen, E. (2020). *International Tax Competitiveness Index 2020*. Tax Foundation.
5. Bösenberg, S. P., Egger, & Zoller-Rydzek, B. (2018). Capital Taxation, Investment, Growth, and Welfare, *International Tax and Public Finance*, 25, 352-376. <https://doi.org/10.1007/s10797-017-9454-3>
6. Celikay, F. (2020), "Dimensions of tax burden: a review on OECD countries", *Journal of Economics, Finance and Administrative Science*, Vol. 25 No. 49, pp. 27-43. <https://doi.org/10.1108/JEFAS-12-2018-0138>
7. Chen, G. M. (2021). Costs and liabilities of U.S. public pension systems in a low-return environment. *Journal of Pension Economics and Finance*, 20(2), pages 169-186, DOI: 10.1017/s147474721900043x.
8. Cheema, G.S., *Building Democratic Institutions: Governance Reform in Developing Countries*, Kumarian Press Inc., 2005.
9. Dye, R., and Reschovsky, A. (2008) Property Tax Responses to State Aid Cuts in the Recent Fiscal Crisis. *Public Budgeting & Finance*, 28(2), 87-111, Summer 2008.
10. Durusu-Ciftci, D., Gokmenoglu, K. K., & Yetkiner, H. (2018). The Heterogeneous Impact of Taxation on Economic Development: New Insights from a Panel Cointegration Approach. *Economic Systems*, 42, 503-513. <https://doi.org/10.1016/j.ecosys.2018.01.001>
11. Eaton, T. V. (2004). The effect of financial constraints and political pressure on the management of public pension plans. *Journal of Accounting and Public Policy*, 161-189, The effect of financial constraints and political pressure on the management of public pension plans - ScienceDirect.
12. Geffroy J. B., *Grands problèmes fiscaux contemporains*, Presses Universitaires de France, 1993; Gest G., Tixier G. *Droit fiscal international*, PUF, Paris, 1993
13. Groșanu, A., Boța-Avram, C., Răchisan, P., Vesselinov, R., & Tiron-Tudor, A. (2015). The influence of country level governance on business environment and entrepreneurship: A global perspective. *Amfiteatru Economic*, 17(38), 60-75.
14. Haralambie G., *Taxation, Theory and applications*, Science Publishing Codecs, 1998;
15. Hoene, C., and M. A. Pagano. 2008. *Cities and States Fiscal Structure*. Washington, DC: National League of Cities. [Google Scholar]
16. Inessa Vasileva\*, Natalia Morozova, Artem Evseev- *Institutional Components of Economic Security and Their Transformation- Advances in Economics, Business and Management Research*, volume 139, International Conference on Economics, Management and Technologies 2020 (ICEMT 2020)
17. J. de Haan, J.-E. Sturm Political and institutional determinants of fiscal policy in the European Community *Publ. Choice*, 80 (1994), pp. 157-172
18. J. Von Hagen, R.R. Strauch Fiscal consolidations: quality, economic conditions, and success *Publ. Choice*, 109 (3-4) (2001), pp. 327-346
19. J Picatoste, S Ruesga-Benito, F González-Laxe - *Economic sustainability and possibilities of action for the states, in the case of monetary integration: some notes for reflection- Progress in Industrial Ecology, an International Journal*, 2016,
20. Jones, R. and M. Pendlebury. 2010. *Public Sector Accounting*. Sixth Edition. Pearson Education (Prentice Hall).
21. J.O. Mierau, R. Jong-A-Pin, J. de Haan Do political variables affect fiscal policy adjustment decisions? *New empirical evidence Publ. Choice*, 133 (2007), pp. 297-319
22. Kaufmann, D., Kraay, A., & Mastruzzi, M. (2005). *Governance matters IV: governance indicators for 1996-2004*. World Bank Policy Research Working Paper Series, 3630.

23. Karagianni, S., Pempetzoglou, M., & Saraidaris, A. (2012). Average Tax Rates and Economic Growth: A Nonlinear Causality Investigation for the USA. *Frontiers in Finance and Economics*, 12, 51-59.
24. Keohane, R.O. și Nye, J.S., „Governance in a Globalizing World”, 2000, în Keohane, R.O. (ed.) *Power and Governance in a Partially Globalized World*, Routledge, Londra, 2002, pp. 193-218.
25. Kaufmann, D., Kraay, A. și Zoido-Lobaton, P., „Governance Matters”, 1999, Policy Research Working Papers, 2196.
26. Kaufmann, D., Kraay, A. și Mastruzzi, M., „The Worldwide Governance Indicators Project: Answering the Critics”, 2007, World Bank Policy Research Working Paper, 4149.
27. Kikuchi, Y., Tamai, T. Tax competition, unemployment, and intergovernmental transfers. *Int Tax Public Finance* 26, 899–918 (2019). <https://doi.org/10.1007/s10797-019-09533-0>
28. L Liu, R Altshuler - MEASURING THE BURDEN OF THE CORPORATE INCOME TAX UNDER IMPERFECT COMPETITION- *National Tax Journal*, 2013 - [journals.uchicago.edu](http://journals.uchicago.edu)
29. Langbein, L. și Knack, S., „The Worldwide Governance Indicators: Six, One, or None?”, 2010, *Journal of Development Studies*, vol. 46, nr. 2, pp. 350-370.
30. Mao, C. (2017). Growth, Income Inequality, and Capital Income Taxes. *Economics Bulletin*, 36, 1463-1478.
31. Md. Shamimul, HasanRashidah, AbdulRahmanSyed, ZabidHossain- Monitoring Family Performance: Family Ownership and Corporate Governance Structure in Bangladesh- *Procedia - Social and Behavioral Sciences*, Volume 145, 25 August 2014, Pages 103-109, <https://doi.org/10.1016/j.sbspro.2014.06.016>.
32. Milasi, S., & Waldmann, R. J. (2018). Top Marginal Taxation and Economic Growth. *Applied Economics*, 50, 2156-2170. <https://doi.org/10.1080/00036846.2017.1392001>
33. Michael C.JensenWilliam H.Meckling- Theory of the firm: Managerial behavior, agency costs and ownership structure- *Journal of Financial Economics*, Volume 3, Issue 4, October 1976, Pages 305-360, [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X).
34. Osborne, S.P. 2010. The New Public Governance: A Suitable Case for Treatment? in Osborne, S.P. (Ed). *The New Public Governance? Emerging Perspectives on the Theory and Practice of Public Governance*. London, UK: Routledge.
35. Pehlivan, Osman (2014). *Kamu Maliyesi, Celepler Matbaacılık, Trabzon*
36. Neumark, Fritz (1937). Vergi Yüğü ve İktisadi Hayat, İstanbul Üniversitesi Hukuk Fakültesi Mecmuası, (Çev: Sabri F. Ülgener), 247 – 261
37. Paientko, T., & Oparin, V. (2020). Reducing the Tax Burden in Ukraine: Changing Priorities. *Central European Management Journal*, 28, 98-126. <https://doi.org/10.7206/cemj.2658-0845.28>
38. Simon Commander- Inflation and the Transition to a Market Economy: An Overview- *he World Bank Economic Review*, Volume 6, Issue 1, January 1992, Pages 3–12, <https://doi.org/10.1093/wber/6.1.3> Published: 01 January 1992
39. Srivastava, Meetika, Good Governance - Concept, Meaning and Features: A Detailed Study (December 26, 2009). Available at SSRN: <https://ssrn.com/abstract=1528449> or <http://dx.doi.org/10.2139/ssrn.1528449>
40. Skarzauskas, S. (2021) Evaluating Impact of Tax Burden on State Financial Stability: Empirical Research of EU Countries. *Theoretical Economics Letters*, 11, 1122-1139. doi: 10.4236/tel.2021.116071.
41. Salaudeen, Y. and Atoyebe, T. (2018) Tax Burden Implication of Tax Reform. *Open Journal of Business and Management*, 6, 761-777. doi: 10.4236/ojbm.2018.63058.
42. Sorin Dan ȘANDOR, Simona Claudia CREȚA- Indicatorii globali ai guvernanței – considerente metodologice- *Revista Transilvană de Științe Administrative*, 2(35)/2014, pp. 114-129.
43. Rahman, A. (2000). Challenges of Governance in Bangladesh. *Bangladesh: Government and Politics*, 2, 437.
44. Thomas, M.A., „What Do the Worldwide Governance Indicators Measure?”, 2010, *European Journal of Development Research*, nr. 22, pp. 31-54.
45. Tulai C.I. (2003), *Finantele publice si fiscalitatea*, Ed. Casa carti de stiință, Cluj Napoca.
46. Ungureanu, M.A. (coord.), (2013), *Politici și Practici Financiare*, Editura Universitară, București.
47. UNDP (1997) *Governance for sustainable human development – a UNDP policy document*. United Countries Development Programme, New York
48. Valenduc, C. (2019). Corporate Income Tax in the EU, the Common Consolidated Corporate Tax Base (CCCTB) and Beyond: Is It the Right Way to Go? *ETUI Research Paper—Working Paper 2018.06*. <https://doi.org/10.2139/ssrn.3316120>
49. Weber, Till O.; Fookien, Jonas and Herrmann, Benedikt (2014). *Behavioural Economics and Taxation*. Luxembourg: European Commission. (Working Paper n.º 41).4
50. Wolman and all (1983), Understanding Local Government Responses to Fiscal Pressure, *Journal of Public Policy* , Volume 3 , Issue 3 , August 1983 , pp. 245 – 263, DOI: <https://doi.org/10.1017/S0143814X00005936>
51. Yanikkaya, H., & Turan, T. (2018). Tax Structure and Economic Growth: Do Differences in Income Level and Government Effectiveness Matter? *The Singapore Economic Review*, 65, 217-237. <https://doi.org/10.1142/S021>



# JURISPRUDENCE

## FEATURES AND CHARACTERISTICS OF INFORMATION CRIMES IN AZERBAIJAN CRIMINAL LAW

**Musayev Erkin**

*Full-time PhD student*

*in Criminal Law and criminology; Criminal-enforcement law*

*at the Criminal Law and Criminology Department.*

*Baku State University, Faculty of Law*

[DOI: 10.5281/zenodo.7941904](https://doi.org/10.5281/zenodo.7941904)

### Abstract

As in any field, there are disadvantages to the development of technology. In the last decades of the twentieth century, as a result of the progressive development of technology, significant changes have been observed in the state and dynamics of crime worldwide. Thus, new crimes have emerged and expanded in the digital and virtual spheres, creating legal threats to people's lives.

These violations, defined as crimes, are in theory "computer crimes", "computer-related crimes", "electronic crimes", "digital crimes", "high-tech crimes", "information crimes", "cybercrime" and so on. is called.

For this reason, in the article, the criminal composition of information crimes was investigated in more detail and the object and objective aspects of acts considered information crime according to the Criminal Code of the Republic of Azerbaijan as a socially dangerous act were studied.

**Keywords:** cybercrime, cyber security, computer system, information, information security, data base

The crime is defined as a socially hazardous conduct when it comprises of a collection of objective and subjective characteristics established in the law. The following four factors make up the crime's objective and subjective characteristics: 1) the crime's purpose; 2) the crime's objective aspect; 3) the crime's subject; and 4) the crime's subjective aspect.

When it comes to the crime's goal, it's worth noting that criminal law divides scientific crime into three categories: 1) the crime's broad objective; 2) the crime's particular purpose; 3) the crime's immediate object;

The attribute that immediately characterizes the thing is always within the scope of the crime among the objects specified above. As a result, in order to solve the problem, the object must be specified explicitly.

The appearance of a socially harmful aim that occurred at a certain time and place, under specific circumstances, and that impacted existing public relations is an objective indicator of a crime[3].

The objective part of a crime, according to another definition, is the outward nature of a socially harmful act or inaction that hurts or threatens to harm the target of the crime defined by law, as well as the conditions in which the harm was done[5]. In addition to socially harmful acts and their corresponding socially dangerous results, the objective part of the crime also includes the causal link between the socially harmful behavior, the socially dangerous effects, the technique of committing the crime, the tools and equipment used, and the location, time, and conditions in which it happened.

In light of the foregoing, the objective characteristics of the crime can be classified as follows: 1) an intentional act or omission; 2) a potentially harmful societal effect; 3) the causal link between action (inaction) and consequence; 4) the manner of committing the verb; 5) the location and time of the conduct; 6) the

conditions of the act; 7) the tools and methods used in the commission of the law[5].

A criminal conduct must include a socially hazardous act or omission. Other elements are optional, meaning they are not required to be included in every offense.

The crime's target is public relations, which is protected by law.

The general objective of "Cyber Crimes" is public relations and data protection using computer technologies. The nature of each of the offences listed in Chapter 30 of the Criminal Code distinguishes its intent in addition to its general purpose.

The objective aspects of cybercrime can be clarified using the criteria listed above.

Article 271 of the Criminal Code defines the offense of unauthorized access to a computer system. Before identifying the plot's aim and objective, it's important to remember that the computer is an electronic calculator that stores data and performs mathematical, logical, and other calculations[1]. As a result, the thing in issue is data for the purpose of creating computer data.

The offense in question concerns public relations issues that develop during the safeguarding of computer systems and data. The inviolability and integrity of legally protected information, as well as the property and other rights of the information's legal owners, are direct targets of individual, societal, and governmental security. In this scenario, a person who joins the computer system without authorization is infringing on the computer system and the information to which he has no access. This data is the damage object in this case.

The information and data immediately on the computer are the target of the crime. It's also worth noting that, unlike the criminal, the subject is a component of the caste object.

The breach of security measures in a computer system or any portion of it, the seizure of computer information stored there, or any other personal goal is the objective side of the crime of unauthorized access to a computer system.

In the context of breaches in this area, clarifying the objective nature of the crime in detail aids in determining the breadth of the crime by unlawfully accessing a computer system.

The nature of this illegal crime indicates that it is a socially hazardous act, as may be deduced from its character. Illegal access to information also involves gaining access to information through the unauthorized use of acceptable technological equipment[4].

In this scenario, it's important to remember that the computer system and data must be in excellent functioning order for the conduct to be regarded criminal. It is not a question of whether or not the computer system and its data are accessible and useable as a whole, but rather whether or not the computer system has been hacked[4].

Another situation to be determined is whether computer data is protected in accordance with the Republic of Azerbaijan's relevant legal regulations as a result of illegal and unauthorized access to this information, and whether the state's, the owner's, the author's, or other legal and natural persons' rights are violated.

The unlawfully accessed computer system and data must infringe the rights of the owner of the computer system or any natural or legal person for an act to fall under the scope of Article 271 of the Criminal Code.

Article 271 of the Criminal Code defines the act of accessing a computer system or any part of it for the purpose of obtaining computer data, regardless of whether the information is of personal, public, or government importance, and whether it is partially or completely compromised as a result of the access.

Without the right to illegally enter a computer system or any portion of it, the crime is committed. This includes anybody who does not have the legal authority to do so, such as someone who is not a valid user, whose right is restricted by law, or who lacks the necessary license.

As previously stated, the Criminal Code's Note to Article 271 defines "computer system" quite explicitly. The idea of "any portion of the computer system," on the other hand, is not defined in the code. To me, every portion of a computer system that contains information significant to its owner or any human or legal body is a part of a computer system. Illegal access to a section of a computer system by a person who does not have the authority to do so is punishable under Article 271 of the Penal Code.

It is a violation of security measures in a computer system or any portion of it, including the interception of computer information stored therein, or any other personal aim, according to article 271. These features represent the action's subjective traits, which will be examined more below.

The following are the key elements of the crime of unauthorized access to a computer system: 1) the individual has the right to access; 2) the security measures are violated.

The unauthorized seizure of computer data is another felony under this section of the Criminal Code. Article 272 of the Criminal Code specifies the elements of this offense.

Following the Republic of Azerbaijan's acceptance of the European Convention on Cybercrime, this article was added to the Criminal Code.

The crime described in this article has a distinct and extra goal. It governs public relations as a private item, ensuring that diverse data flowing in the computer system, as well as the bearers of this data, are protected from electromagnetic radiation. Additional objectives, property relationships, people's constitutional rights and freedoms, and relationships governing the regular operation of governmental organizations, among others.

Computer data and the electromagnetic radiation of computer systems that transmit this data are the topic of the alleged crime.

Non-public computer data communicated from, to, or via a computer system, as well as the intentional capture of electromagnetic radiation by computer systems conveying such computer data by a person who does not have the right to it, using technological methods.

Information that only certain persons are not barred from accessing by law, such as a personal family secret, a business or financial secret, and so on, is referred to as non-public computer information.

Connecting directly to a computer system does not always capture computer data. Data can be acquired through communication links, in the computer system's room, in the building, and from a safe distance. Electromagnetic radiation is constantly present while electronic gadgets are in use.

The stances at the conclusion of the crime are fascinating. According to some scientists, the crime will be over once the information in the computer system has been seized. Another viewpoint considers purposeful access to the system with the intent of getting information to be the conclusion of the crime.

Article 273 of the Criminal Code deals with unauthorized access to a computer system or computer information. There are two components to this article of the Criminal Code: 1) Intentional serious interference with the operation of a computer system by an unauthorized person by entering, transmitting, damaging, deleting, damaging, altering, or blocking computer data; 2) Intentional serious interference with the operation of a computer system by an unauthorized person by entering, transmitting, damaging, deleting, damaging, altering, or blocking computer data, where substantial damage is caused.

This crime is being committed for public relations purposes in order to protect computer data.

As previously said, this offense may be separated into two categories. The objective part of the offense, according to paragraph 1 of article 273, is the intentional destruction, deletion, corruption, modification,

or blockage of computer data by an unauthorized person.

The crucial characteristic of a criminal crime, as Norman's disposition demonstrates, is that the conduct enumerated above do severe injury. "Significant harm" is defined in this section as damage in excess of one thousand manats produced by a socially risky conduct, or other substantial damage to the state's, society's, or individuals' legally protected rights[2].

That is, the infringement is only punishable under Article 273 of the Criminal Code if there is considerable harm.

The crime described in Article 273.1 is one of material character.

The goal part of the offense, according to the second paragraph of article 273, is for an unauthorized person to intentionally substantially interfere with a computer system by inputting, sending, damaging, deleting, corrupting, modifying, or blocking computer information.

Blockage a computer system by input, transmission, damage, deletion, destruction, alteration, or blocking of computer data is a breach of the computer system's regular operation that prohibits or considerably limits the owner's or user's usage of the computer system. The ability to communicate with computer systems.

273-1 is a section of the Criminal Code. Approves the distribution of instruments for committing cybercrime. This crime is divided into three parts: 1) As stated in Articles 271-273 of this Law, the major goal of its preparation or adaption is: manufacturing, import, acquisition, storage, sale, distribution, or acquiring other circumstances for the purpose of committing such offenses (in the case of serious harm); 2) Purchased for storage or use (in case of serious damage) computer passwords, access codes, or other similar information permitting unauthorized access to the computer system or any of its elements for the purpose of committing the offenses described in Articles 271-273 of this Law; 3) Computer passwords, access codes, or other similar data that permits illegal access to the computer system or any portion of it is to establish conditions conducive to the sale, diffusion, or other acquisition of the offenses listed in Articles 271-273 of this Law with the intent to commit a crime;

The target of the crime is public relations, which guarantees that the computer system runs well. Computer programs and devices are known as premdet.

The offence has objective characteristics, according to Article 273-1.1:

a) The manufacture, importation, use, storage, sale, or distribution of devices or computer programs for the purpose of committing the crimes listed in Articles 271-273 of this Law, or other conditions for committing such crimes; b) a socially dangerous consequence, expressed in significant harm, as a result of the listed acts; c) a causal link between the listed acts and the material damage.

The activities described are undertaken with the intent of committing a crime in accordance with Articles 271-273 of the Penal Code, as can be seen from the structure of the article.

General security measures and software protection measures are examples of specific security measures.

It involves obtaining users' information using programs that access a computer system or any element of it, imitate its regular operation, and collect personal interest information from the offending user in a covert manner[5].

The owner can design computer information security software on his own or at his request. In computer software, for example, security tools are frequently utilized. Activities in the field of information security tool design and manufacture are carried out under the terms of an unique agreement[6].

Import refers to introducing the crime's specified substances into the Republic of Azerbaijan.

Acquisition refers to the receiving of devices or computer programs as presents or settlement tools, trading for other products and articles, embezzlement, or any other ownership in violation of the applicable legislation's requirements. Regardless of the mobile application approach, the Republic of Azerbaijan is comprehensible.

Any action aimed at keeping gadgets or computer programs available to you is referred to as maintenance.

Acts aimed at providing devices or computer programs in return for conducting cybercrime are referred to as selling. From the minute it reaches the other person, it is deemed finished.

Distribution through barter with a product other than a sale and other ways is referred to as propagation.

The invention of a range of devices and devices for accessing a computer system, collecting, erasing, destroying, changing, damaging, intercepting data, and adapting ready-made devices for this purpose is known as cybercrime device manufacturing. Actions aiming at ongoing improvement of devices or computer programs are referred to as device or computer program manufacturing.

Distribution through barter with a product other than a sale and other ways is referred to as propagation.

The invention of a range of devices and devices for accessing a computer system, collecting, erasing, destroying, changing, damaging, intercepting data, and adapting ready-made devices for this purpose is known as cybercrime device manufacturing. Actions aiming at ongoing improvement of devices or computer programs are referred to as device or computer program manufacturing.

The criminal's objectively producing computer passwords, access codes, or similar information for the purpose of committing cybercrime, storing, obtaining for use, significant damage resulting from these actions, and the causal relationship between the actions and the damage are all covered by Article 273-1.2.

A computer password (fr. Password-word) is a combination of conventional words or symbols used to confirm identity and authority.

One of the most prevalent forms of assaults against information systems using password or "user-password name" authentication is password hacking. The attack is based on a criminal capturing the password of a user who has access to the system. The attacker likes this approach since it takes over all of the

powers of the user whose account is exposed after successfully supplying the password, while also not raising suspicion among system administrators with the existing account. An attack can take two forms from a technical standpoint[6]:

1) Attempts at direct authentication in the system on many occasions

2) Another method is to analyze the "hashed" form of passwords collected through traffic capture.

Computer access codes are the text of a computer program written in any programming language or in a human-readable sign language, as well as any login information for the transmitter in general.

273-1.3, 271-273 of this Law specify the objective part of the offence. The goal of committing the Articles of Association violations is to establish circumstances for the sale, distribution, or other acquisition of those articles.

The first two forms of crime do significant damage. Significant harm is defined as damage in excess of one thousand manats or to the state's, society's, and individual's legally protected interests.

Falsification of computer information is the final article under the ambit of article 273-2 of the Criminal Code on Cybercrime.

The public threat of crime is exemplified by the fact that putting bogus computer data into a computer system causes the true content of the computer data to be lost, resulting in a disruption of government agencies' and individual companies' regular operations.

The target of the crime is public relations, which governs the computer system's regular operation. Computer information is the target of the crime.

Falsification of computer information is the final article under the ambit of article 273-2 of the Criminal Code on Cybercrime.

The public threat of crime is exemplified by the fact that putting bogus computer data into a computer system causes the true content of the computer data to be lost, resulting in a disruption of government agencies' and individual companies' regular operations.

The target of the crime is public relations, which governs the computer system's regular operation. Computer information is the target of the crime.

One of the most serious issues in the sphere of cybercrime is the Republic of Azerbaijan's penal legislation in this area, which is still in its infancy. When we all know, as technology advances, new technological

equipment, such as computers with more complex capabilities and other forms of electronic computers, enters the market. As a result of this evolution, new types of cybercrime have emerged, in which individuals violate the rights of actual and legal persons in various ways and break the law in order to further their own goals. In this regard, new criminal acts must be reflected in the Penal Code. On the territory of Azerbaijan, there are also many socially dangerous acts that are not yet included in the cybercrime section, but are penalized under other criminal aspects or do not result in criminal responsibility at all.

The inclusion of crimes committed on the Internet, particularly those aimed at causing damage to other computer systems, in the Criminal Code of the Republic of Azerbaijan would make it easier to combat crime, administer more appropriate and correct sanctions, and carry out rehabilitative work.

Another problem is the lack of sufficient human resources to solve crimes in the field of cyber crimes. Cybercrime is very difficult and requires knowledge in this field. In addition to the spirit of the perpetrator, it is important to know the methods and techniques used in committing this crime.

In my opinion, in addition to raising people who have knowledge in informatics, computers, especially the internet, which is a new type of cybercrime, fraud, vandalism and other areas, judicial officers, inspectors, prosecutors, judges, etc. should be trained on whether cyber crimes have occurred or make decisions that are reasonable enough to justly punish the crimes committed.

## References

1. "Artificial Intelligence and the Law; Cybercrime and Criminal Liability (Dennis J. Baker, Paul H. Robinson) 2021
2. "Criminal Code of the Republic of Azerbaijan", Baku 2021
3. "Criminal Law (General Section)", (textbook, Samandarov F.Y.) Legal literature publishing house, Baku, 2018
4. "Cybercrime and the law: Challenges, issues and outcomes" (Susan W. Brenner), Northeastern University Press, November 2012
5. "Cybercrime: law and practice", (Matthew Richardson), March 2014
6. "Principles of cybercrime" (second edition), (Jonathan Clough), October 2

# MATHEMATICAL SCIENCES

## EQUIVARIANT FIBER RESOLUTIONS OF CONTINUOUS MAPS

**Maia Dzadzamia**

Associate Professor, Department of Mathematics

Batumi Shota Rustaveli State University

Batumi, Georgia

DOI: [10.5281/zenodo.7941909](https://doi.org/10.5281/zenodo.7941909)

### Abstract

The shape theory of continuous maps is a new branch of classical shape theory and is an extension of the homotopy theory of absolute neighborhood retracts for the category of maps of metrizable spaces. In this paper we investigate equivariant fiber resolution of a map in the equivariant homotopy category of  $G$ -maps.

**Keywords and Phrases:**  $G$ -map, equivariant fiber resolution of a  $G$ -map, equivariant fiber expansion of the  $G$ -map.

**Math. Sub. Class.:** 54C15, 54C20, 54C56.

**Equivariant Fiber Resolutions of Continuous Maps.** Let  $f = \{f_\mu, (p_\mu, p'_\mu), \mu \in M\}$  is an inverse system of the category  $\mathbf{pro} - \mathbf{Mor}_{\mathbf{Top}_G}$  and let  $(f)$  be a rudimentary system whose term is only a  $G$ -map  $f: X \rightarrow X'$  of a category  $\mathbf{Top}_G$ .

**Definition 1.** An equivariant fiber resolution of a  $G$ -map  $f$  is a morphism  $(p, p') = \{(p_\mu, p'_\mu), \mu \in M\} : (f) \rightarrow f$  of the category  $\mathbf{pro} - \mathbf{Mor}_{\mathbf{Top}_G}$  which for any  $G - \mathbf{ANR}(\mathbf{Mor}_M)$ -map  $t: P \rightarrow P'$  and a pair  $(\alpha, \alpha')$  of coverings  $\alpha \in \mathbf{Cov}(P)$  and  $\alpha' \in \mathbf{Cov}(P')$  satisfies the following two conditions:

EFR1) for every morphism  $(\varphi, \varphi'): f \rightarrow t$  there exist  $\mu \in M$  and a morphism  $(\varphi_\mu, \varphi'_\mu): f_\mu \rightarrow t$  such that  $(\varphi_\mu, \varphi'_\mu) \cdot (p_\mu, p'_\mu)$  and  $(\varphi, \varphi')$  are  $(\alpha, \alpha')$ -near;

EFR2) there exist a pair  $(\beta, \beta')$  of coverings  $\beta \in \mathbf{Cov}(P)$  and  $\beta' \in \mathbf{Cov}(P')$  with the following property, if  $\mu \in M$  and  $(\varphi_\mu, \varphi'_\mu), (\psi_\mu, \psi'_\mu): f_\mu \rightarrow t$  are morphisms such that the morphisms  $(\varphi_\mu, \varphi'_\mu) \cdot (p_\mu, p'_\mu)$  and  $(\psi_\mu, \psi'_\mu) \cdot (p_\mu, p'_\mu)$  are  $(\beta, \beta')$ -near, then there exists a  $\mu' \geq \mu$  such that  $(\varphi_{\mu'}, \varphi'_{\mu'}) \cdot (p_{\mu'}, p'_{\mu'})$  and  $(\psi_{\mu'}, \psi'_{\mu'}) \cdot (p_{\mu'}, p'_{\mu'})$  are  $(\alpha, \alpha')$ -near.

If in an equivariant fiber resolution  $(p, p'): (f) \rightarrow f$  all  $f_\mu$  are  $G - \mathbf{ANR}(\mathbf{Mor}_M)$ -maps, then  $(p, p')$  is an  $\mathbf{ANR}_G(\mathbf{Mor}_M)$ -fiber resolution.

**Theorem 2.** Every  $G$ -map  $f: X \rightarrow X'$  of topological  $G$ -spaces admits an  $\mathbf{ANR}_G(\mathbf{Mor}_M)$ -fiber resolution.

**Proof.** Let  $t: P \rightarrow P'$  and  $t_1: P_1 \rightarrow P'_1$  be the  $G$ -maps and let  $(p, p'): f \rightarrow t$

and  $(p_1, p'_1): f \rightarrow t_1$  be the morphisms. We say that  $(p, p')$  and  $(p_1, p'_1)$  are  $G$ -equivalent if there exists an isomorphism  $(\varphi, \varphi'): t \rightarrow t'$  such that  $(\varphi, \varphi') \cdot (p, p') = (p_1, p'_1)$ .

Let  $\mathbb{I}$  consist of all equivalence classes of the morphism  $(p, p'): f \rightarrow t$ , where  $t$  is a  $G$ -map with weight  $\omega(t) \leq \max\{w(f), \aleph_0\} = \tau$ .  $\mathbb{I}$  is a set because every such map  $t$  we can embed in the projection  $\pi: I^\tau \rightarrow I^\tau$ , where  $I^\tau$  is a Tychonoff cube of weight  $\tau$ . For every  $\gamma \in \mathbb{I}$  consider a morphism  $(p_\gamma, p'_\gamma): f \rightarrow t_\gamma$ , where  $t_\gamma$  is a  $\mathbf{ANR}_G(\mathbf{Mor}_M)$ -map such that  $w(t_\gamma) \leq \gamma$ .

Let  $\Delta$  be a set of finite subsets

$$\delta = \{\gamma_1, \gamma_2, \dots, \gamma_n\} \leq \delta' = \{\gamma_1, \gamma_2, \dots, \gamma_n, \gamma_{n+1}, \dots, \gamma_m\}.$$

We define the morphism  $(p_{\delta\delta'}, p'_{\delta\delta'}): t_{\delta'} = t_{\gamma_1} \times t_{\gamma_2} \times \dots \times t_{\gamma_n} \times t_{\gamma_{n+1}} \times \dots \times t_{\gamma_m} \rightarrow t_\delta = t_{\gamma_1} \times t_{\gamma_2} \times \dots \times t_{\gamma_n}$  as the pair of  $G$ -projections. It is clear, that for every  $\delta \leq \delta' \leq \delta''$

$$(p_{\delta\delta'}, p'_{\delta\delta'}) \cdot (p_{\delta'\delta''}, p'_{\delta'\delta''}) = (p_{\delta\delta''}, p'_{\delta\delta''})$$

and for any  $\delta \in \Delta$ ,  $t_\delta$  is a  $\mathbf{ANR}_G(\mathbf{Mor}_M)$ -map. Obviously,  $\mathbf{t} = \{t_\delta, (p_{\delta\delta'}, p'_{\delta\delta'}), \Delta\}$  is a  $G - \mathbf{ANR}(\mathbf{Mor}_M)$ -inverse system.

Now we define the morphism  $(p_\delta, p'_{\delta'}) : f \rightarrow t_\delta$ . It is a pair  $(p_{\gamma_1} \times p_{\gamma_2} \times \dots \times p_{\gamma_n}, p'_{\gamma_1} \times p'_{\gamma_2} \times \dots \times p'_{\gamma_n})$ . The family  $(p, p') = \{(p_\delta, p'_{\delta'}), \delta \in \Delta\}$  is a morphism of  $\mathbf{pro} - \mathbf{Mor}_{G-\mathbf{Top}}$ .

It is readily seen that  $(p, p')$  has a property EFR1)). Therefore we can replace the inverse system  $\mathbf{t}$  by a larger inverse system. Let  $\Lambda = \{\lambda = (\delta, h)\}$ , where  $\delta \in \Delta$  and  $h$  is a  $G$ -neighborhood of the  $G$ -map  $t_{\delta|p_\delta(X)}: p_\delta(X) \rightarrow p_\delta(X')$  in  $t_\delta$ . Let,  $f_\lambda = h$ . Obviously,  $f_\lambda \in \mathbf{ANR}_G(\mathbf{Mor}_M)$ . We order  $\Lambda$  by putting  $\lambda = (\delta, h) \leq \lambda' = (\delta', h')$  if and only if  $\delta \leq \delta'$  and  $(p_{\delta\delta'}, p'_{\delta\delta'})(h')$  is a submap of  $h$ . Now we define a morphism  $(p_{\lambda\lambda'}, p'_{\lambda\lambda'}): f_{\lambda'} \rightarrow f_\lambda$  as a restriction of the morphism  $(p_{\delta\delta'}, p'_{\delta\delta'})$  on  $h'$ . Let  $p_\lambda = p_\delta: f \rightarrow h$  for every  $\lambda = (\delta, h) \in \Lambda$ . It is clear we have

a  $G - ANR(Mor_M)$  –inverse system  $\mathbf{f} = \{f_\lambda, (p_{\lambda\lambda'}, p'_{\lambda\lambda'}), \Lambda\}$ . Obviously, the morphism  $\{(p_\lambda, p'_\lambda), \lambda \in \Lambda\}: (f) \rightarrow \mathbf{f}$  of the category  $\mathbf{pro} - \mathbf{Mor}_{Top_G}$  has property EFR1).

Now we check that  $\{(p_\lambda, p'_\lambda), \lambda \in \Lambda\}: (f) \rightarrow \mathbf{f}$  satisfies condition EFR2). Let  $\lambda = (\delta, h)$  be an index of  $\Lambda$ , where  $h: C \rightarrow Q$  is a  $G$ -map. Let  $(\varphi, \varphi'), (\psi, \psi'): h \rightarrow t$  be morphisms such that  $(\varphi, \varphi') \cdot (p_\delta, p'_\delta)$  and  $(\psi, \psi') \cdot (p_\delta, p'_\delta)$  are  $(\alpha, \alpha')$ -near. For every point  $y \in p_\delta(X)$  there exists a set  $V \in \alpha$  such that  $\varphi(y), \psi(y) \in V$ . Moreover, there exists a neighborhood  $O_y$  of  $y$  such that  $\varphi(O_y), \psi(O_y) \subset V$ . Let  $O = \bigcup_{y \in p_\delta(X)} O_y$ . The set  $O$  is open in  $X_\delta$  and  $p_\delta(X) \subset O \subset C$ . Equivariant restrictions  $\varphi|O$  and  $\psi|O$  are the are  $\alpha$  –near

$G$ -maps. Similarly, we conclude that there is an open set  $O'$  of  $X'_\delta$  such that  $p'_\delta(X') \subset O' \subset Q$  and  $\varphi'|O'$  and  $\psi'|O'$  are the are  $\alpha'$  –near  $G$ - maps.

Let  $t_\delta^{-1}(O') \cap O = O''$ . It is clear that  $t_\delta(O'') \subset O'$ . Consequently,  $\lambda' = (\delta, t_\delta|O'') \in \Lambda$  and  $\lambda \leq \lambda'$ . Hence,  $(\varphi, \varphi') \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'})$  and  $(\psi, \psi') \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'})$  are  $(\alpha, \alpha')$ -near.

**Lemma 3.** Let  $p: E \rightarrow B$  be a topological  $G$ -space and let  $r': P' \rightarrow Q'$  and  $r: P \rightarrow Q$  be  $G - ANR(Mor_M)$  –maps. Let  $(f, f_1): p \rightarrow r'$  and  $(h_0, h_0'), (h_1, h_1'): r' \rightarrow r$  be morphisms such that  $(h_0, h_0') \cdot (f, f_1)$  and  $(h_1, h_1') \cdot (f, f_1)$  are  $G$ -homotopic. Then there exists a  $G - ANR(Mor_M)$  –map  $r'': P'' \rightarrow Q''$  and morphisms  $(f', f'_1): p \rightarrow r''$  and  $(h, h'): r'' \rightarrow r'$  such that  $(f, f_1) = (h, h') \cdot (f', f'_1) \cdot (h_0, h_0') \cdot (h, h') \simeq_G (h_1, h_1') \cdot (h, h')$ .

The proof is similar of general case ([5]lemma 3.4.)

**Definition 4.** Let  $f: X \rightarrow X'$  be a  $G$ -map of topological  $G$ -spaces,  $[\mathbf{f}] = \{f_\lambda, [(p_{\lambda\lambda'}, p'_{\lambda\lambda'})], \Lambda\}$  be an inverse system in  $\mathbf{H}(\mathbf{Mor}_{Top_G})$  and  $[(\mathbf{p}, \mathbf{p}')]: f \rightarrow [\mathbf{f}]$  be a morphism of  $\mathbf{pro} - \mathbf{H}(\mathbf{pro} - \mathbf{Mor}_{Top_G})$ . We call  $[(\mathbf{p}, \mathbf{p}')]$  an equivariant fiber expansion of the  $G$ -map  $f$ , provided it has the following properties:

FE1) for every  $ANR_G(Mor_M)$  map  $t: P \rightarrow P'$  and a morphism  $(\varphi, \varphi'): f \rightarrow t$  there is an index  $\lambda \in \Lambda$  and a morphism  $(\varphi_\lambda, \varphi'_\lambda): f_\lambda \rightarrow t$  such that  $(\varphi, \varphi') \simeq_G (\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$ ;

FE2)  $(\varphi_\lambda, \varphi'_\lambda), (\psi_\lambda, \psi'_\lambda): f_\lambda \rightarrow t$  are morphisms into a  $ANR_G(Mor_M)$  –map  $t: P \rightarrow P'$  and  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda) \simeq_G (\psi_\lambda, \psi'_\lambda) \cdot (p_\lambda, p'_\lambda)$ , then there exists an index  $\lambda' \geq \lambda$  such that  $(\varphi, \varphi') \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'}) \simeq_G (\psi, \psi') \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'})$ .

If all  $f_\lambda \in G - ANR(Mor_M)$ , then  $[(\mathbf{p}, \mathbf{p}')]: f \rightarrow [\mathbf{f}]$  is called  $ANR_G(Mor_M)$  -fiber expansion.

**Theorem 5.** If  $(\mathbf{p}, \mathbf{p}'): f \rightarrow \mathbf{f}$  is a equivariant fiber resolution of a  $G$ -map  $: X \rightarrow X'$ , then  $[(\mathbf{p}, \mathbf{p}')]: f \rightarrow [\mathbf{f}]$  is an equivariant fiber expansion.

**Proof.** Let  $t: P \rightarrow P'$  be an  $ANR_G(Mor_M)$  –map and let  $(\varphi, \varphi'): f \rightarrow t$  be a morphism. Consider a pair  $(\alpha, \alpha')$ - of a  $\alpha \in Cov(P)$  and  $\alpha' \in Cov(P')$  such that  $(\alpha, \alpha')$ -near morphisms into  $t$  are  $G$ -homotopic. By the condition EFR1), there exist  $\lambda \in \Lambda$  and a morphism  $(\varphi_\lambda, \varphi'_\lambda): f_\lambda \rightarrow t$  such that  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  and  $(\varphi, \varphi')$  are  $(\alpha, \alpha')$ -near. Consequently,  $(\varphi, \varphi') \simeq_G (\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$ . It means  $[(\mathbf{p}, \mathbf{p}')]$  has property FE1)

Let  $t: P \rightarrow P'$  be an  $ANR_G(Mor_M)$  –map and let  $\lambda \in \Lambda$  and  $(\varphi_\lambda, \varphi'_\lambda), (\psi_\lambda, \psi'_\lambda): f_\lambda \rightarrow t$  be the morphisms such that

$$(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda) \simeq_G (\psi_\lambda, \psi'_\lambda) \cdot (p_\lambda, p'_\lambda).$$

Let  $(\alpha, \alpha')$  be a pair of  $\alpha \in Cov(P)$  and  $\alpha' \in Cov(P')$  such that any  $(\alpha, \alpha')$ -near morphisms into  $t$  are  $G$  - homotopic. Choose a pair  $(\beta, \beta')$  of coverings  $\beta \in Cov(P)$  and  $\beta' \in Cov(P')$  according to EFR2). Let  $t$  be the map  $t \times t$ . Denote by  $(v, v'): f \rightarrow t'$  a morphism defined by

$$\begin{aligned} v(x) &= (\varphi_\lambda p_\lambda(x), \psi_\lambda p_\lambda(x), x \in X, \\ v'(x') &= (\varphi'_\lambda p'_\lambda(x), \psi'_\lambda p'_\lambda(x'), x' \in X' \end{aligned}$$

Let  $(\eta, \eta')$  and  $(\xi, \xi')$  be the morphisms defined by

$$\begin{aligned} \eta(y, y') &= y, \xi(y, y') = y', (y, y') \in P \times P, \\ \eta'(y_1, y'_1) &= y_1, \xi'(y_1, y'_1) = y'_1, (y_1, y'_1) \in P' \times P'. \end{aligned}$$

It is clear that  $(\eta, \eta') \cdot (v, v') \simeq_G (\xi, \xi') \cdot (v, v')$ . The  $G$  -map  $t'$  is an  $ANR_G(Mor_M)$  –map. By Lemma 3, there are an  $G - ANR(Mor_M)$  –map  $t'': P'' \rightarrow P_1''$  and morphisms  $(\sigma, \sigma'): f \rightarrow t'', (s_2, s'_2): t'' \rightarrow t'$  such that

$$(s_2, s'_2) \cdot (\sigma, \sigma') = (v, v'), (\eta, \eta') \cdot (s_2, s'_2) \simeq_G (\xi, \xi') \cdot (s_2, s'_2).$$

Let  $(\beta_1, \beta'_1)$  be a pair of equivariant coverings such that

$$\begin{aligned} \beta'_1 &> (\eta' \cdot s'_2)^{-1}(\beta') \wedge (\xi' \cdot s'_2)^{-1}(\beta'), \\ \beta_1 &> (\eta \cdot s_2)^{-1}(\beta) \wedge (\xi \cdot s_2)^{-1}(\beta) \wedge (t'')^{-1}(\beta'_1). \end{aligned}$$

By EFR1), there exist  $\lambda'' \in \Lambda$  and  $(o, o_1): f_{\lambda''} \rightarrow t''$  such that  $\lambda'' \geq \lambda$  and  $(\sigma, \sigma')$  and  $(o, o_1) \cdot (p_{\lambda''}, p'_{\lambda''})$  are the  $(\beta_1, \beta'_1)$  -near morphisms. Moreover,

$$(\eta, \eta') \cdot (s_2, s'_2) \cdot (\sigma, \sigma') = (\eta, \eta') \cdot (v, v') = (\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$$

implies that  $(\eta, \eta') \cdot (s_2, s'_2) \cdot (o, o_1) \cdot (p_{\lambda''}, p'_{\lambda''})$  and  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_{\lambda\lambda''}, p'_{\lambda\lambda''}) \cdot (p_{\lambda''}, p'_{\lambda''})$  are  $(\beta_1, \beta'_1)$  - near morphisms.. Consequently, there is a  $\lambda''' \geq \lambda''$  such that

$$(\eta, \eta') \cdot (s_2, s'_2) \cdot (o, o_1) \cdot (p_{\lambda''\lambda'''}, p'_{\lambda''\lambda'''}) \text{ and } (\varphi_\lambda, \varphi'_\lambda) \cdot (p_{\lambda\lambda''''}, p'_{\lambda\lambda''''}) \text{ are the } (\alpha, \alpha')\text{-near mor-}$$

phisms and they are  $G$ -homotopic.

Consequently there is a  $\lambda''' \geq \lambda''$  such that

$$(\eta, \eta') \cdot (s_2, s'_2) \cdot (o, o_1) \cdot (p_{\lambda''\lambda''''}, p'_{\lambda''\lambda''''}) \simeq_G (\psi_\lambda, \psi'_\lambda) \cdot (p_{\lambda\lambda''''}, p'_{\lambda\lambda''''}).$$

Let  $\lambda' \geq \lambda''', \lambda''''$ . It is clear that

$$\begin{aligned} (\varphi_\lambda, \varphi'_\lambda) \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'}) &\simeq_G (\eta, \eta') \cdot (s_2, s'_2) \cdot (o, o_1) \cdot (p_{\lambda''\lambda'}, p'_{\lambda''\lambda'}) \simeq_G (\xi, \xi') \cdot (s_2, s'_2) \cdot (o, o_1) \cdot \\ (p_{\lambda''\lambda'}, p'_{\lambda''\lambda'}) &\simeq_G (\psi_\lambda, \psi'_\lambda) \cdot (p_{\lambda\lambda'}, p'_{\lambda\lambda'}). \end{aligned}$$

**Theorem 6.** Let  $\pi : M \rightarrow M'$  be an  $ANR_G(Mor_M)$  –map and let  $f : X \rightarrow X'$  be a closed submap of  $\pi$ . Let  $\mathbf{f} = \{f_\lambda, (p_{\lambda\lambda'}, p'_{\lambda\lambda'}), \Lambda\}$  be the inverse system which consists of all neighborhoods  $f_\lambda : U_\lambda \rightarrow U'_\lambda$  of  $f$  in  $\pi$  and embedding morphisms  $(p_{\lambda\lambda'}, p'_{\lambda\lambda'}) : f_{\lambda'} \rightarrow f_\lambda$  for every  $\lambda \leq \lambda'$ . Then the family  $\{(p_\lambda, p'_\lambda), \lambda \in \Lambda\}$  consisting of equivariant embeddings  $(p_\lambda, p'_\lambda) : f \rightarrow f_\lambda$  is the  $G - ANR(Mor_M)$  –fiber resolution.

**Proof.** Let  $t : P \rightarrow P'$  be an  $ANR_G(Mor_M)$  –map,  $(\varphi, \varphi') : f \rightarrow t$  be a morphism and  $(\alpha, \alpha')$  be a pair of  $\alpha \in Cov(P)$  and  $\alpha' \in Cov(P')$ . The map  $t$  is an  $ANR_G(Mor_M)$  –map because there exist a neighborhood  $h : C \rightarrow C'$  of a map  $f$  in  $\pi$  and an equivariant extension  $(\tilde{\varphi}, \tilde{\varphi}') : h \rightarrow t$  of a morphism  $(\varphi, \varphi')$ . Let  $\lambda$  be the index such that  $f_\lambda = h, U_\lambda = C$  and  $U'_\lambda = C'$ . Note that  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda) = (\varphi, \varphi')$  where  $\varphi_\lambda = \tilde{\varphi}, \varphi'_\lambda = \tilde{\varphi}', p_\lambda = i : X \rightarrow C, p'_\lambda = i' : X' \rightarrow C'$ . Consequently,  $(\varphi, \varphi')$  and  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  are the  $(\alpha, \alpha')$  –near morphisms.

Let  $(\varphi_\lambda, \varphi'_\lambda), (\psi_\lambda, \psi'_\lambda) : f_\lambda \rightarrow t$  be the morphisms such that  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  and  $(\psi_\lambda, \psi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  are the  $(\alpha, \alpha')$  –near morphisms. For every point  $y \in p_\lambda(X)$  there exists a equivariant  $V \in \alpha$  of  $\varphi_\lambda(y)$  such that  $\varphi_\lambda(y) \in V$ . By the continuity of  $\varphi_\lambda$  and  $\psi_\lambda$  we conclude that there is an equivariant neighborhood  $O_y$  of  $y$  in  $U_\lambda$  such that  $\varphi_\lambda(O_y), \psi_\lambda(O_y) \subset V$ . Let  $\tilde{O} = \bigcup_{y \in p_\lambda(X)} O_y$ . It is clear that  $\tilde{O}$  is open in  $U_\lambda$ , and  $p_\lambda(X) \subset \tilde{O} \subset U_\lambda$ . The maps  $\varphi_\lambda|_{\tilde{O}}$  and  $\psi_\lambda|_{\tilde{O}}$  are  $\alpha$  –near.

Similarly, we conclude that there is an open set  $O'$  of  $U'$  such that  $p'_\lambda(X') \subset O' \subset U'_\lambda$ , and the maps  $\varphi'_\lambda|_{O'}$  and  $\psi'_\lambda|_{O'}$  are the  $\alpha'$  –near maps.

Let  $f_\lambda^{-1}(O') \cap \tilde{O} = O$ . The equivariant restriction  $f_\lambda|_O : O \rightarrow O'$  is an  $G - ANR(Mor_M)$  –map. It is a neighborhood of  $f$  in  $\pi$  and a equivariant submap of  $f_\lambda$ . Let  $\lambda'$  be an index in  $\Lambda$  such that  $f_{\lambda'} = f_\lambda|_O, U_{\lambda'} = O$  and  $U'_{\lambda'} = O'$ . Note that  $f_{\lambda'} \in \mathbf{f}, \lambda' \geq \lambda$  and  $(\varphi_\lambda, \varphi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  and  $(\psi_\lambda, \psi'_\lambda) \cdot (p_\lambda, p'_\lambda)$  are the  $(\alpha, \alpha')$  –near morphisms.

Any  $G$  –map  $f : X \rightarrow X'$  of metric  $G$  –spaces can be considered as a closed submap of an  $G - ANE(Mor_M)$  –map  $\pi : M \rightarrow M'$ . Consequently,

$$(\mathbf{p}, \mathbf{p}') = \{(p_\lambda, p'_\lambda), \lambda \in \Lambda\} : f \rightarrow \mathbf{f} = \{f_\lambda, (p_{\lambda\lambda'}, p'_{\lambda\lambda'}), \Lambda\},$$

where  $f_\lambda$  is an equivariant neighborhood of  $f$  in  $\pi$ ,  $(p_{\lambda\lambda'}, p'_{\lambda\lambda'}) : f_{\lambda'} \rightarrow f_\lambda$  is an equivariant embedding of  $f_{\lambda'}$  in  $f_\lambda$  and  $(p_\lambda, p'_\lambda) : f \rightarrow f_\lambda$  is an equivariant closed embedding of  $f$  in  $f_\lambda$ , is an  $ANR_G(Mor_M)$  –fiber resolution and therefore  $[(\mathbf{p}, \mathbf{p}')] : f \rightarrow [\mathbf{f}]$  is an equivariant fiber expansion.

Now we have following main

**Theorem 7.** The category  $H(ANR_G(Mor_M))$  is a dense subcategory of the category  $H(\mathbf{Mor}_{TopG})$ .

## References

1. S. A. Antonian and S. Mardešić, Equivariant shape. Fund. Math., 127 (1987), 213–224.
2. A. Dold, The fixed index of fibr-preserving maps. Invent. Math., 25(1974), 281–298.
3. V. Baladze, On shape theory for fibrations, Bull. Georgian Acad. Sci., 129(1988), 269–272.
4. V. Baladze, Fiber shape theory and resolutions, Zb. Rad. Filoz. Fak. Nisu, Ser. Mat., 5(1991), 97–107.
5. V. Baladze, Fiber shape theory, Proc. A. Razmadze Math. Inst., 132(2003), 1–70.
6. V. Baladze; M. Dzadzamia . On retracts of compact transformation groups. Bull. Georgian Acad. Sci. 166, No2, 217–221 (2002).
7. M. Dzadzamia. Equivariant Fiber Retracts and Extensors of  $\mathbf{G}$  –maps. WSPÓŁPRACA EUROPEJSKA - clmconsulting.pl. 6 (37), 9–20. (2018).
8. P. S. Gevorgyan, Generalized shape theory and movability of continuous transformation groups, Dissertation, MSU, 2001.
9. G. S. Ungar, ANR's and NES's in the category of mapping of matric spaces. Fund. Math. 95(1977), 111–127.



# MEDICAL SCIENCES

## ENVIRONMENTAL ANALYSIS IN HEALTH INSTITUTIONS

Selami Yıldırım

*Doctor, Azerbaijan State University of Economics, Department of Business*

[DOI: 10.5281/zenodo.7941921](https://doi.org/10.5281/zenodo.7941921)

### Abstract

Many environmental factors can have a more or less impact on many organizations, including health institutions. Most importantly, these environmental factors are used to evaluate what form health institutions will have in the future. Since environmental factors have a considerable effect on structure and performance of health institutions, they must regularly and consistently conduct environmental analysis and develop evidence-based and implementable strategies grounded on the data obtained from these analyses.

The ability of health institutions to sustain their operations and achieve their definite goals depends on the analysis of internal and external environmental forces forming their positions in the sector. Therefore, the purpose of internal and external analysis is to gain a perspective on the opportunities and threats facing health institutions. Of course, the assessment of the findings gained from such an analysis must be used to develop strategies that will enable health institutions to stay ahead of their competitors.

In this study, we aim to identify major threats and opportunities for health institutions. We employ environmental analysis process to properly uncover these environmental threats and opportunities.

**Keywords:** Environmental Analysis, Environmental Analysis Process

### Introduction

The analysis of factors in the internal and external environment of health institutions within the scope of strategic decision process is crucial for the efficiency and sustainability of their operations, and the achievement of a lasting place in the sector.

For health institutions, environmental analysis is an effective way to create a state of preparedness for not only environmental threats but also opportunities through identifying their strengths and weaknesses. From this perspective, it is vital for health institutions to develop strategies that are compatible with the environmental conditions and can be internalized with the structural characteristics of health institutions in order to sustain their operations in a dynamic and competitive environment.

The environment in which health institutions operate is dynamic and constantly changing. Therefore, health institution managers try to analyze environmental changes and developments regularly and continuously. That is, health institution managers develop shielding strategies to avoid threats from the external environment in order to benefit from opportunities arising from these changes and developments in the environment. One can argue that health institution managers conducting environmental analysis are one step ahead of those managers not conducting similar analysis by obtaining advance signs of potential threats and opportunities. However, the strategies developed through environmental analysis must be evidence-based and implementable to generate intended results.

To be explicit, health institutions are required to constantly monitor the economic, social, epidemiological, technological, and legal environmental conditions they face, gather information about environmental changes, and make strategic decisions based on this in-

formation. The process of compiling and evaluating information about environmental factors is called environmental analysis.

### Purpose of the study

The purpose of environmental analysis is to identify threats and opportunities that may affect health institutions. Therefore, the aim of this study is to examine what environmental analysis implies for health institutions and how it can be used to develop evidence-based and implementable strategies to position them properly against environmental threats and have them to benefit from opportunities. If a health institution is unable to develop evidence-based implementable strategies, sometimes one or a few environmental factors can pose a critical threat to the institution and may have a critical negative impact on its ability to sustain its operation in the market. On the other hand, by developing evidence-based and implementable strategies against these environmental factors, health institutions can position themselves suitably in the future and can even be one step ahead of their competitors by taking better advantage of environmental opportunities.

Another aim of the study is to shed light on how environmental uncertainties facing health institutions can be reduced through employing the environmental analysis process accurately.

### Methodology

In accordance with the purpose of the study, we conduct a detailed and systematic review of the related literature on environmental uncertainties facing health institutions, environmental analysis, and environmental analysis process. We provide a general assessment of the main findings of the literature regarding how effectively managing the environmental analysis process can be used to reduce environmental uncertainties for health institutions.



In the first step of the study, we examine the environmental factors from a general viewpoint, and how these environmental factors are incorporated into the process of environmental analysis. In the second step, we provide recent examples and discuss the environmental analysis process from the perspective of health institutions in detail.

### **Environmental analysis: opportunities and threats**

Environmental analysis is a process of collecting and evaluating information about the environment in which institutions operate. That is, the main aim of the environmental analysis process is to gather information about environmental threats and opportunities. Environmental threats can simply be described as conditions with the potential to negatively affect the functions and performance of the health institution. Environmental opportunities, on the other hand, are a combination of conditions that facilitate the operations of the health institution, enable its growth, and enhance its performance. Factors surrounding health institutions create both threats and opportunities.

The followings are examples of environmental threats for the health institutions:

- Intensified competition, the emergence of new and strong competitors, and the growth of rival health institutions (economic environment),
- The Social Security Institution (SSI) setting lower service prices (legal environment),
- Increases in contribution shares (legal environment),
- Rising foreign exchange rates (economic environment),
- The government imposing additional restrictions on physician employment (legal environment),
- Changes in the expectations and health service utilization behaviors of the public (socio-cultural environment),
- The risk of emerging an economic crisis (economic environment),
- Rising inflation and increases in input costs (economic environment),
- Political instability (political environment),
- Rival health institutions starting to use new and capital-intensive medical technologies (technological environment and economic environment),
- Cooperation among rival health institutions and inadequate antitrust legislations hindering cooperation (competition and legal environment),
- Health personnel shortage (government policies, social environment),
- The possibility for international health institutions entering domestic health sector (international environment, economic environment),
- Decreasing burden of disease, declining incidence, and prevalence of diseases (epidemiological environment), and
- Declining regional and insured population (social environment).

As mentioned above, the external environment presents not only threats but also opportunities. Constructive changes in environmental factors can facilitate the attainment of performance goals such as growth, efficiency, and service quality for health institutions. Some examples of environmental opportunities are:

- Progress towards economic stability (economic environment),
- Increasing in the frequency of the public seeking health services (socio-cultural environment),
- Reduction in the procedures (such as referral requirements) limiting the use of health services by the public (legal environment),
- Development of new cost-effective service delivery models (technological environment),
- Input prices remaining stable or showing a tendency to decline (economic environment),
- Diminishing competition (economic environment),
- Implementation new measures to raise the supply of physicians and health personnel (political environment),
- Expansion in opportunities for collaboration with other health institutions (economic and legal environment),
- Boost in government incentives (political environment, economic environment),
- Enabling public-private partnerships (political environment, legal environment),
- Rise in healthcare literacy (social-cultural environment), and
- SSI implementing measures to bring service prices to reasonable levels (legal environment, economic environment).

Definitions of environmental threats and opportunities may not be the same for every healthcare institution. For example, if SSI lowers the service prices, while it is a threat for private healthcare with agreements with SSI, it may be an opportunity for the institutions without such agreements. Technological advancements in healthcare may be an opportunity for some health institutions because these advancements help them gain a competitive advantage. On the other hand, for health institutions which do not have access to new technologies for various reasons, technological advancement can be a serious threat. Healthcare institutions with sufficient financial and physical capital resources can put a large amount of investment into new technologies, but institutions lacking these resources to carry out this kind of investment may lose their competitive strength.

It is important to point out that health institutions may put different weights on threats and opportunities. Furthermore, the importance that managers at different health institutions assigning to threats and opportunities may vary. For example, an increase in input prices is a threat for all health institutions. However, the importance of this threat may not be the same for a small and a large hospital. Large hospitals may be able to achieve significant price advantages, that is, they may be purchasing their inputs at lower prices through bulk purchases. However, this cost saving arising out of

economies of scale is not possible for small hospitals making small-scale input purchases. Therefore, increases in input prices will have a more negative impact on small hospitals than large ones. In this case, small hospitals may try to work in partnership with other (small) hospitals and opt for bulk purchasing.

#### Environmental analysis process

Environmental analysis enables health institutions to avert negative shocks by providing information about environmental developments. Through the environmental analysis process, managers become aware of environmental factors and the dynamics of change in environmental factors, which also reduces the degree of environmental uncertainty. Managers having sufficient and reliable information about environmental factors and environmental change can make more effective decisions and develop the most appropriate strategies for the health institution. The primary aim of the environmental analysis process is to develop appropriate strategies. However, the environmental analysis process also has specific objectives. The specific objectives of environmental analysis process are (Swayne et al., 2006: 58):

- Identify and classify potential developments and problems in the external environment,

- Identify current developments that may affect the health institution in the future,
- Detect early warning signs of problems that might arise from environmental changes,
- Generate ideas about issues and developments that may impact the health institution,
- Produce information necessary for the health institution's internal environmental analysis, specifying its mission, vision, values, and strategies, and
- Promote the spread of strategic thinking skills throughout the health institution.

The environmental analysis process is not a managerial activity with a start and end date. Because the external environment constantly changes, the environmental analysis process is a perpetual process, that is, it must be reconducted constantly. As presented in Figure 1, the environmental analysis process includes four basic stages. The stages of environmental analysis process are (Duncan et al., 2006: 68-69; Longest, 2004: 41-44; Henry, 2011: 41-42):

1. Scanning
2. Monitoring
3. Forecasting
4. Assessing

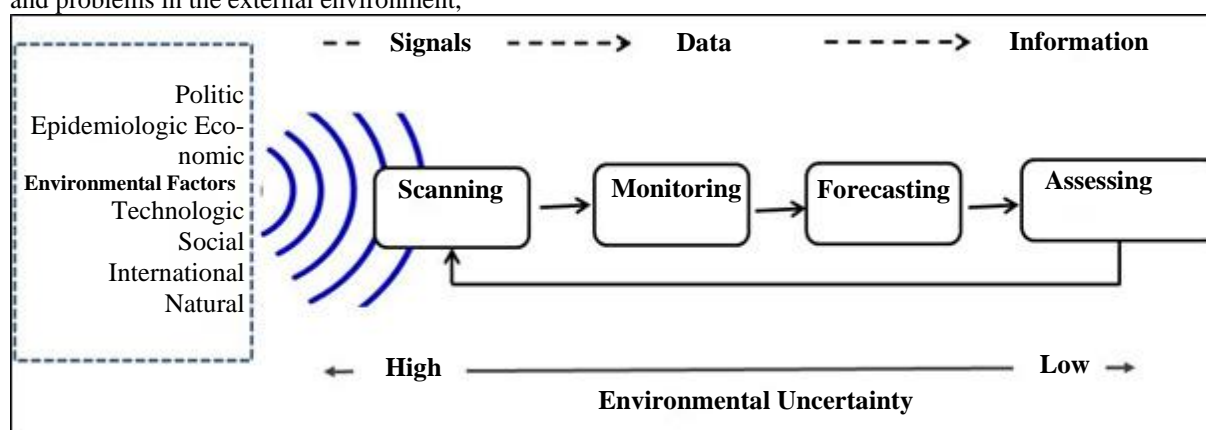


Figure 1. Environmental Analysis Process

#### Scanning Stage

During the scanning stage, the first signals of technological, political, economic, legal, and social developments in the external environment are detected. However, data gathered at this stage is generally imprecise, incomplete, and seemingly unrelated (Hitt et al., 2011: 40). In the health sector where environmental change is rapid, the scanning stage is of critical importance. Hence, health institutions which have the means to observe the signals of emerging developments and changes can have the opportunity to better prepare for the future. Health institution managers should not only monitor environmental factors directly related to health institutions (task environment) but also the general environment. For instance, although laser technology was developed in other industries, it began to be used in the health sector almost instantly. This kind of transition of developments between sectors is called environmental slip (Swayne et al., 2006: 70).

In the environmental scanning stage, subscription-based tools such as media tracking systems and internet-based scanning systems can be used. In Turkey,

companies such as Interpress, Medyatakıp, Ajanspress, and PRNet follow international, national, and sectoral developments and report them to their subscribers. Thus, managers can quickly become aware of current developments in the areas they are interested in.

#### Monitoring Stage

In the monitoring stage, health institution managers focus closely on initial signals of the environmental changes observed during the scanning stage, trying to determine the strength, continuity (trend), and potential effects of the changes on the health institution. For example, a hospital manager can gauge from a government spokesperson's statement, "We will try to reduce health expenditures", that the government will attempt to limit or lower service prices (Scanning stage). Based on this statement by the government, the hospital manager may start to investigate whether the SSI and the Ministry of Treasury and Finance are working on this issue (Monitoring stage). In the monitoring stage, the scattered, incomplete, and inadequate information obtained from the signals received in the scanning stage

is combined to form a meaningful whole. In the monitoring stage, managers organize the data collected from various data sources in their environmental database. Some examples of useful data sources for health institutions are:

- Publications of the Ministry of Health (for example, Health Statistics),
- Publications of the Turkish Statistical Institute (such as Health Statistics, Population Statistics, and Employment Statistics),
- Publications of professional organizations (such as the publications of Turkish Medical Association, and Turkish Pharmacists Association),
- Statistics and publications of Chambers of Commerce (for example, Medical Devices Sector Report),
- Associations' publications (such as the publications of Pharmaceutical Manufacturers Association, Medical Equipment and Device Manufacturers Association, and Turkish Pharmaceutical Industry Association),
- Publications of unions (such as the publications of the Revolutionary Health Workers Union, and Pharmaceutical Industry Employers Union),
- Central Bank statistics (for example, Economic Indicators),
- Academic and scientific publications,
- International statistics (for example, World Health Organization's statistics),
- Publications of the Higher Education Council (for example, Health Human Resource Reports), and
- Reports and publications of other ministries.

While many signals are considered in the monitoring stage, the focus is more on specific environmental factors and environmental developments during the scanning stage. It should be noted that the managers begin to see the threats and opportunities that environmental developments pose for the health institution in the monitoring stage. Managers of health institutions working in a simple and stable environment may have complete information about the potential consequences of environmental developments, while managers of health institutions working in a dynamic environment must give greater importance to the scanning and monitoring stages to reduce uncertainties. Only with effective scanning and monitoring activity can the environmental uncertainty be significantly reduced. However, in a dynamic environment it is not possible to eliminate uncertainty completely (Longest, 2011: 44). Based on the trends identified in the monitoring stage, managers can decide what needs to be done (strategic objectives) and how it should be done (strategies) to prepare the health institution for the future (mission and vision).

#### Forecasting Stage

The scanning and monitoring stages are concerned with identifying developments in the external environment over a specific period. On the other hand, in the forecasting stage, managers form predictions for future developments using the data obtained in the scanning and monitoring stages. That is, in the forecasting stage, managers try to predict how the emerging develop-

ments will progress in the future, what kind of outcomes they will generate, and how these outcomes will affect the health institution. In today's rapidly changing environment most businesses give more importance to strategic management and forecasting. As strategic management is the design of the future from today, there is a big need for forecasts about the future. However, the accuracy of the forecasts is of great importance for successful strategic management activities. Therefore, managers must choose proper forecasting methods.

#### Evaluation Stage

The final stage of the environmental analysis process is the evaluation stage, which focuses more on judgments and interpretations rather than numerical data. In the evaluation stage, information about environmental developments generated in the scanning, monitoring, and forecasting stages is interpreted. That is, the main purpose of the evaluation stage is to go beyond the data and information to produce original ideas. It should be noted that these ideas are based on the judgments of the strategic management team conducting the evaluation (Longest, 2011: 45). Managers must have strategic thinking skills to be able to successfully complete the environmental evaluation. Strategic thinking refers to a future-oriented and development-oriented perspective (Zuckerman, 2006). According to Liedtka (1998; 2001), there are five basic characteristics of strategic thinking:

1. **Focus on Goals:** Shaping the future of the institution by focusing on the long-term goals and objectives of the institution.
2. **Opportunistic Intelligence:** Recognizing opportunities before they arise.
3. **Systemic Perspective:** Being able to see the institution as a whole and analyze the institution's relationships with the environment.
4. **Time-Oriented Thinking:** Making connections between the past, present, and future.
5. **Hypothesis-Oriented Thinking:** Being able to think scientifically, test new ideas, and learn from past experiences.

#### Conclusion

We can argue that the health institutions performing environmental analysis are able form a much faster feedback system than the ones not doing such an analysis. A feedback system enables health institutions to develop implementable and evidence-based strategies to respond to environmental threats and take advantage of environmental opportunities.

Environmental analysis facilitates health institutions to achieve their goals and makes their operations sustainable. On the other hand, it may not be possible to determine all the opportunities and threats arising in the environment around health institutions through environmental analysis. However, the more opportunities and threats detected by way of environmental analysis, the more strategies that are compatible with and applicable to these opportunities and threats can be developed, making environmental uncertainties manageable.

Mounting social needs and expectations, rising pressure from the SSI and private insurance companies,

increasing cost of services provided by health institutions, and the escalating competition in the health sector all contribute to the growing importance of environmental analysis.

Environmental threats facing health institutions can be classified as i) threats arising from economic environment such as the growth of rival health institutions, emergence of new health institutions, and appreciation of foreign exchange rates, ii) threats arising from legal environment such as SSI's policy of low service prices and increasing copays, iii) threats arising from political environment such as political instability, iv) threats arising from international environment such as the potential entry of international health institutions into the country, and v) threats arising from social environment such as the decrease in regional and insured population. On the other hand, we can categorize environmental opportunities for health institutions as i) opportunities resulting from economic environment such as economic stability, ii) opportunities resulting from socio-cultural environment such as a rise in the frequency of the community's access to health services, iii) opportunities generated in the technological environment such as the development of cost-saving medical kit, and iv) opportunities created in political environment-legal environment such as regulations facilitating public-private cooperation.

Environmental analysis for health institutions is not a one-time-only managerial activity, but rather a continuously renewed process as the environment

around healthcare institutions changes constantly. Environmental analysis process in the health sector involves scanning, monitoring, forecasting, and evaluation stages.

### References

1. Hernry, A., (2011). Understanding Strategic Management: New York: Oxford University Press.
2. Hitt, M. A., Ireland, D. R., Hoskisson, R. E., (2011). Strategic Management: Concepts: Competitiveness and Globalization. Ohio: South-Western.
3. Liedtka, J. M., (2001). Strategy Formulation: The Roles of Conversation and Design, İçinde Hitt, M. A., Freeman, R. E., Harrison, J. S., The Blackwell Handbook of Strategic Management, Oxford: Blackwell Publishers, pp.70–93.
4. Liedtka, J. M., (1998). Strategic Thinking: Can it be Taught? Long range Planning. Vol:31, No:1, pp.120-129.
5. Longest, B., (1990). Interorganizational Linkages in The Health Sector. Health Care Management Review, 15(1);17-28.
6. Swayne, L. E., Duncan, J. W., Ginter, P. M., (2006). Strategic Management of Health Care Organizations. Maiden MA: Blackwell Publishing.
7. Zuckerman A. M., (2006)- Advancing The State of The Art in Healthcare Strategic Planning. Frontiers of Health Services Management, Vol:23, No:2, pp.3-15.

## EVALUATION OF THE EFFECTIVENESS OF COMBINED ANESTHESIA IN ONCOLOGICAL ABDOMINAL OPERATIONS

**Bondar O.V.**

*Doctor of Medical Sciences, professor of the department of radiodiagnostics, therapy, radiation medicine and oncology, head of the oncology service of UC ONMedU, oncologist.  
Center of Reconstructive and Restorative Medicine (University Clinic) ONMedU  
Ukraine, Odesa region, Odesa city, Tinista street, 8*

**Bosenko K.V.**

*Candidate of medical sciences, assistant of the department of anesthesiology, intensive care and emergency medicine  
Center of Reconstructive and Restorative Medicine (University Clinic) ONMedU  
Ukraine, Odesa region, Odesa city, Tinista street, 8*

**Son A.S.**

*Doctor of medical sciences, professor, neurosurgeon  
Center of Reconstructive and Restorative Medicine (University Clinic) ONMedU  
Ukraine, Odesa region, Odesa city, Tinista street, 8*

[DOI: 10.5281/zenodo.7941931](https://doi.org/10.5281/zenodo.7941931)

## ОЦІНКА ЕФЕКТИВНОСТІ КОМБІНОВАНОЇ АНЕСТЕЗІЇ ПРИ ОНКОЛОГІЧНИХ АБДОМІНАЛЬНИХ ОПЕРАЦІЯХ

**Бондар О. В.**

*Доктор медичних наук професор кафедри променевої діагностики, терапії, радіаційної медицини та онкології, керівник онкологічної служби УК ОНМедУ, онкохірург.  
Центр реконструктивної та відновної медицини (Університетська клініка) ОНМедУ  
Україна, Одеська область м. Одеса вулиця Тіниста, 8*

**Босенко К.В.**

*Кандидат медичних наук, асистент кафедри анестезіології, інтенсивної терапії і медицини невідкладних станів  
Центр реконструктивної та відновної медицини (Університетська клініка) ОНМедУ  
Україна, Одеська область м. Одеса вулиця Тіниста, 8*

**Сон А.С.**

*Доктор медичних наук, професор, нейрохірург  
Центр реконструктивної та відновної медицини (Університетська клініка) ОНМедУ  
Україна, Одеська область м. Одеса вулиця Тіниста, 8*

### Abstract

A comparative assessment of the effect of two methods of anesthetic support, namely: combined methods, namely, epidural and inhalation anesthesia during extirpation of the uterus with appendages in connection with cancer of the uterine body, on the nature of postoperative analgesia and the feeling of pain.

### Анотація

Порівняльна оцінка впливу двох методів анестезіологічного забезпечення, а саме: комбінованої методики а саме - епідуральної та інгаляційної анестезії при екстирпації матки з додатками у зв'язку з раком тіла матки, на характер післяопераційного знеболення та відчуття болю.

**Keywords:** Postoperative pain, analgesia, oncosurgery, extirpation of the uterus with appendages, cancer of the uterine body, inhalation, epidural anesthesia.

**Ключові слова:** Поопераційний біль, знеболення, онкохірургія, екстирпація матки з додатками, рак тіла матки, інгаляційна, епідуральна анестезія.

Недостатнє контролювання поопераційного болю залишається проблемою дотепер. Результати двох великих досліджень, проведених у США, вказують на те, що 70–83% пацієнтів терпить біль протягом 2 тиж після хірургічної операції. Вгамування поопераційного болю є інтегральною частиною щоденного хірургічного лікування, оскільки не тільки мінімілізує терпіння пацієнта, покращує якість його життя, зменшує перебування пацієнта у шпиталі, а й зменшує фінансові затрати на лікування. Оптимізація лікування у разі поопераційного

болю залежить від кількох чинників: від організації служби лікування гострого болю, навчання пацієнтів, від регулярного підвищення кваліфікації персоналу, застосування мультимодальної анальгезії відповідно до застосованої документації, впровадженій для всіх прооперованих пацієнтів [1].

Не варто забувати про біль, який супроводжує пацієнтів під час хірургічного лікування. З появою нових знеболювальних препаратів, засобів знеболення та технологій доставки анестетиків і анальгетиків

тиків значно зросли можливості медицини у лікуванні болю та патологічних процесів, спричинених хірургічною травмою. Одним із десяти базових прав, пов'язаних із безпекою пацієнта, є право на усунення післяопераційного болю, що затверджено в Гельсінській декларації. Завдяки визнанню у світі важливості та усвідомленню недооцінки проблем, пов'язаних із гострим болем, за останні тридцять років було запропоновано принципово нові підходи та розроблено і адаптовано національні протоколи щодо контролю болю із позиції доказової медицини [2].

Вкрай важлива тема, яка на сьогоднішній день стає все більш актуальною, у сучасній хірургії та анестезіології, це знеболення яке допомагає хворим значно швидше відновлюватись після складних оперативних втручань у хворих з онкологічною патологією. Завдяки новітнім технологіям у роботизованій хірургії, з'являється можливість виконувати операції з мінімальною травматизацією, а це в свою чергу значно прискорює процес післяопераційного одужання.

Погано лікований гострий біль є головним стримуючим фактором раннього одужання пацієнта після операції. Інститут медицини США повідомляє, що частота недолікованого гострого післяопераційного болю сягає 80%. Гострий післяопераційний біль перешкоджає ранньому одужанню пацієнтів і більшує ризик розвитку післяопераційних легеневих ускладнень. Крім того, недолікований гострий післяопераційний біль може також асоціюватися з розвитком синдрому персистуючого (хронічного) післяопераційного болю у 10-50% пацієнтів.[3].

Неефективне лікування післяопераційного болю супроводжується збільшенням катаболізму та потреби у кисні після операції іммобілізацією, уповільненням функціонального відновлення пацієнта, послабленням кишкової перистальтики, зростає рівень респіраторних та серцево-судинних ускладнень, що приводить до збільшення смертності у ранньому та віддаленому (30 добова летальність) післяопераційному періоді онкохірургічних хворих [4].

Таким чином, для якісного, безпечного та максимально швидкого лікування пацієнтів з важким преморбідним фоном необхідна збалансована та узгоджена робота всіх учасників у лікуванні пацієнта співробітників. Сучасні технології хірургічного забезпечення, в основі якої лежить мультимодальна аналгезія, виходить на перший план і в загальній хірургії, і в онкохірургії, оскільки дозволяє не лише зменшити біль без використання опіоїдів, а й прискорити відновлення пацієнта за мінімальної кількості побічних ефектів. Така концепція ведення пацієнтів була розроблена та отримала назву «прискорена реабілітація після хірургічного лікування» (Enhanced Recovery After Surgery – ERAS), або «прискорене відновлення» (Fast-track surgery) [5].

Мета дослідження: порівняльна оцінка впливу двох методів анестезіологічного забезпечення при екстирпації матки з додатками у зв'язку з раком

тіла матки, на характер післяопераційного знеболення та відчуття болю.

До дослідження було включено 87 гінекологічних хворих яким була виконана екстирпація матки з придатками у зв'язку з раком тіла матки. Усі хворі були госпіталізовані у хірургічне відділення Університетської клініки Одеського національного медичного університету.

Середній вік осіб дослідних груп становив  $55,2 \pm 8,6$  років, осіб контрольної групи –  $50,7 \pm 5,6$  років. Доопераційне стадіювання раку тіла матки розподілили таким чином: Cr corporis uteri St IA – 49 жінок (56,32% від загальної кількості осіб); Cr corporis uteri St IB – 25 (28,74%); Cr corporis uteri St IIA – 8 (9,20%); Cr corporis uteri St IIB – 5 осіб (5,75%).

У більшості жінок досліджуваної групи виявлено екстрагенітальну патологію. Серед захворювань у осіб досліджуваної групи найчастіше зустрічалась серцево-судинна патологія: гіпертонічна хвороба I стадія (34,46%), гіпертонічна хвороба II стадія (66,70%), серцева недостатність ІА (25,31%), серцева недостатність ІВ (48,26%) та стенокардія напруги: I ФК (18,39%) і II ФК (45,99%). Рідше зустрічались захворювання інших систем та органів: хронічний бронхіт (13,85%), бронхіальна астма (2,33%), хронічний гастрит (18,34%), хронічний панкреатит (2,33%) та цукровий діабет (16,12%).

Всі хворі жінки були співставлені за віком, супутньою патологією та об'ємом крововтрати, яка у 1 та 2 групі достовірно не відрізнялась.

I (основна) група – 44 хворих на рак тіла матки, які отримали хірургічне лікування в умовах загальної низькопоточної інгалаційної анестезії севофлюраном та продовженої епідуральної аналгезії.

У групі I на операційному столі проводили інфузію (6-10 мл/кг маси тіла) кристалоїдних розчинів. У положенні хворого сидячи у вибраному міжкостному проміжку на рівні Th IX-XI пунктували епідуральний простір, катетер орієнтували у краніальному напрямку на глибину 3-5 см. Після введення тест-دوزи 40 мг лідокаїну за 25–30 хв до розрізу в катетер вводили: 0,5 % розчину бупівакаїну – 5 мл болісно та ще 10 мл інфузувалась зі швидкістю 20 мл/год. Швидкість введення знижувалася до 4-6 мл/годину залежно від показників гемодинаміки та обширності операції. Рівень симпатичного блоку намагалися доводити до Th 7-8. Індукція здійснювалась пропофолом 1% у дозі 2 мг/кг ваги, потім на фоні введення міорелаксантів (тракіум 0,6 мг/кг), виконувалася інтубація трахеї. Ендотрахеально проводили інгалацію севофлюраном 1.0 - 1,5 об% (0,4–0,5 МАК), а також внутрішньовенне введення 0,005% розчину фентанілу в травматичні моменти операції за показаннями. Післяопераційну аналгезію здійснювали безперервним введенням в епідуральний простір розчину бупівакаїну 0,25% зі швидкістю 6-8 мл/годину, яка продовжувалась на протязі 48-72 години.

II (контрольна) група – 43 хворих на рак тіла матки, які отримали хірургічне лікування у супро-

воді інгалаційної анестезії з використанням севофлюрану та опіоїдного анальгетика фентаніла 0,005 %. Індукція здійснювалася пропофолом 1% у дозі 2 мг/кг ваги, потім на фоні введення міорелаксантів (тракіум 0,6 мг/кг), виконувалася інтубація трахеї. Далі проводилася ендотрахеальна інгаляція севофлюрану 1,5–3,0 об% (0,7–0,8 МАК), під час найбільш травматичних етапів операції, з урахуванням вегетативних реакцій та показників гемодинаміки, додатково здійснювалося внутрішньовенне введення 0,005 % розчину фентанілу.

У основі лікування післяопераційного болю в обох групах був застосований мультимодальний підхід знеболення, в основі використання якого були застосовані такі препарати як: морфін 1%, парацетамол (ацетамінофен), кеторолак.

Всім хворим при надходженні до стаціонару проводили загальний аналіз крові, загальний аналіз сечі, визначали рівень глюкози крові, біохімічні дослідження крові, коагулограми, час згортання крові, тривалість кровотечі, кількість тромбоцитів. Із інструментальних методів обстеження хворим проводилися: електрокардіографія, флюорографія

або рентгенографія органів грудної клітини, доплерівське дуплексне ультразвукове сканування вен нижніх кінцівок.

Із інструментальних методів обстеження системи гемостазу використовувалася НПТЕГ (низькочастотна п'єзоелектрична тромбоеластографія) аналізатор реологічних властивостей крові портативний АРП – 01 «Меднорд».

На періопераційному етапі проводилося дослідження периферичної гемодинаміки. Проводився аналіз систолічного (АТсис) мм рт.ст, діастолічного (АТдіаст) мм рт.ст, середнього артеріального тиску (АТср). мм рт.ст. Контроль частоти серцевих скорочень (ЧСС) та оксигенації.

Рівень болю оцінювався за візуальною аналоговою шкалою (ВАШ), для кожного пацієнта з обох груп.

Результати дослідження

Результати що були отримані характеризувалися стабільнішими показниками центральної гемодинаміки в інтраопераційному періоді у пацієнтів 1-ї групи. У 2-ї групи пацієнтів спостерігалось менш стабільна гемодинаміка, та значна потреба у знеболенні наркотичними анальгетиками та поглиблення рівня анестезії (таб. 1).

Таблиця 1

Порівняльна оцінка змін центральної гемодинаміки залежно від виду анестезіологічного посібника

Показник	1 ГРУПА			2 ГРУПА		
	Вихідний показник	Інтраопераційно	Через 3 години після операції	Вихідний показник	Інтраопераційно	Через 3 години після операції
ЧСС ударів/хвилину	86 +/- 5	67 +/- 4	74 +/- 2	85 +/- 3	82 +/- 5	88 +/- 4
АД сист мм.рт.ст	138 +/- 4	112 +/- 3	125 +/- 3	133 +/- 4	124 +/- 5	142 +/- 4
АД діаст мм.рт.ст	88 +/- 3	65 +/- 3	63 +/- 2	88 +/- 3	58 +/- 3	98 +/- 3
АД сер мм.рт.ст	100 +/- 5	83 +/- 4	86 +/- 4	102 +/- 3	79 +/- 2	114 +/- 4

Середня крововтрата в 1-й групі склала 190 – 330 мл (250 +/- 20 мл), у 2-й групі – 210– 380 мл (270 +/- 30 мл), застосовували метод зважування серветок. При однаковій тривалості операцій тривалість відновлення свідомості в досліджуваних групах становила 7,9 +/- 1,7 та 23,2 +/- 4,2 хв відповідно, тобто в 3,5 рази коротше за використання інгалаційної анестезії севофлюраном у порівнянні з епідуральною анестезією. Поряд зі зниженням потреби у фентанілі (0,8 +/- 0,3 мкг/кг/год у 1 групі та 3,8 +/- 0,5 мкг/кг/год у 2 групі), спостерігалось зниження потреби у міорелаксантах у першій групі (витрата атракуріуму становила 0,5 +/- 0,1 мг/кг у 1 групі та 0,6 +/- 0,1 мг/кг у 2 групі), а також

було знижена потреба у МАК севофлюрану (1 група 0,4–0,5 +/- 0,1 МАК, 2 група 0,7–0,9 +/- 0,1 МАК).

У першу добу після операції 47 хворим першої групи не потрібно було введення наркотичних анальгетиків. Через 3 години оцінювалась інтенсивність болю у хворих. Де жодна із хворих не визначала нестерпний біль (ВАШ 9-10 балів), а також 6 хворих відзначали скарги на біль середньої інтенсивності (6-8 балів за ВАШ), при збільшенні швидкості інфузії бупівакаїну больовий синдром зменшувався. У 2-й групі 6 хворих після операції через 3 години визнали інтенсивність болю як нестерпну (9-10 балів за ВАШ), та яким призначався морфін 1% в/м, після якого інтенсивність болю зменшувалась.



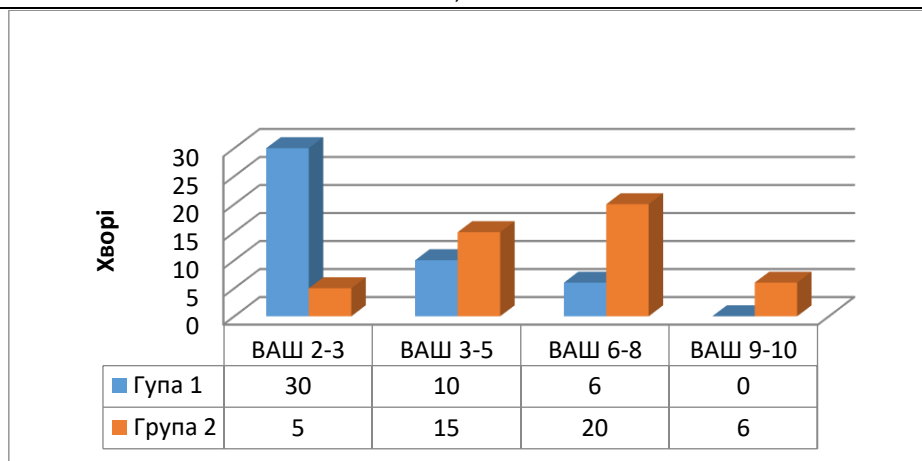


Рис.1 Оцінка н\о болі у хворих через 3 години після операції.

Через 24 години після операції, була відмічена тенденція до зменшення післяопераційного болю у кожній із груп, але пацієнти першої групи відмічали більш комфортне самопочуття, та усі 100% були переведені до хірургічного відділення для подальшого лікування.

У 2-й групі 1 хвора після операції у першу добу визначала інтенсивність болю як нестерпну (ВАС 9-10), 15 хворих констатували біль середньої інтенсивності (ВАС 6-8), 20 хворих – слабкий (ВАС 3-5), та 10 хворих визначали незначну біль (ВАС 1-3) (рис. 2).

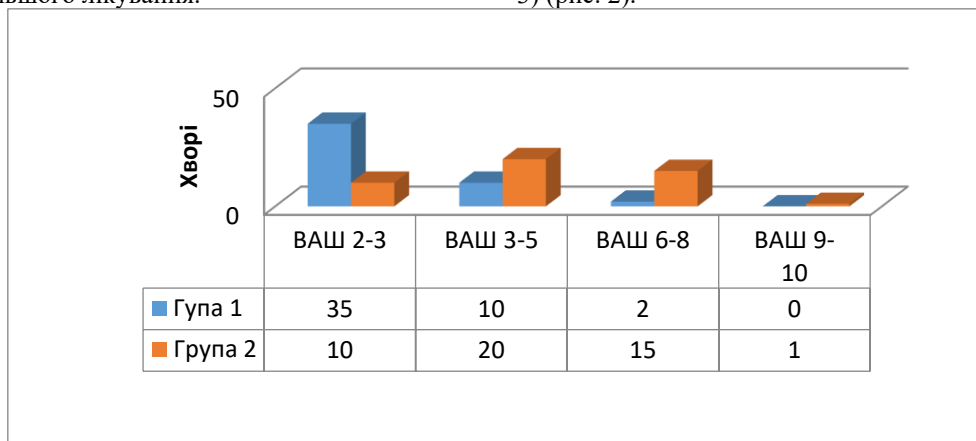


Рис.2 Оцінка н\о болі у хворих через 24 години після операції.

### Висновок

Порівняльна оцінка різних методів анестезіологічного забезпечення операцій з приводу рака тіла матки дозволяє рекомендувати як метод вибору подовжену епідуральну анестезію у поєднанні з інгаляційною низькопоточною анестезією севофлюраном з підтримкою МАК 0,4-0,5, з продовженням у післяопераційному періоді безперервного епідурального введення бупівакаїну 0,25% на протязі наступних 24 годин зі швидкістю 4-6 мл\годину.

Даний метод забезпечує адекватний анестезіологічний захист та комфортні умови для пацієнта під час лікування, за рахунок зменшення больових відчуттів після операції, знижує потребу у наркотичних анальгетиках та прискорює процес одужання (1 група 3 - 4 +/- 1 доба, проти 4 - 5 +/- 1 доба у 2 групі).

### References

1. Falk W, Magnuson A, Eintrei C, Henningsson R, Myrelid P, Matthiessen P, Gupta A. Comparison between epidural and intravenous analgesia effects on disease-free survival after colorectal cancer surgery: a

randomised multicentre controlled trial. Br J Anaesth. 2021 Jul;127(1):65-74. doi: 10.1016/j.bja.2021.04.002. Epub 2021 May 7. PMID: 33966891; PMCID: PMC8258969.

2. Van den Beuken-van Everdingen M. H. J., van Kuijk S. M. J., Janssen D. J. A., Joosten E. A. J. Treatment of Pain in Cancer: Towards Personalised Medicine. Cancers (Basel). 2018

3. Gustafsson U.O., Scott M.J., Hubner M. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018. World Journal Surg. 2019. Vol. 43, No. 3. P. 659–695

4. Gorkyi E.A., Lesnoy I.I. Comparison of perioperative anesthesia methods in the surgical treatment of rectal cancer. Pain, anesthesia and intensive care: Proceedings of the congress of anesthesiologists of Ukraine (Kyiv, September 13–15, 2018). 2018. No. 3(84). C. 64. [Published in Ukrainian]

5. Thiery-Vuillemin A., Bazan F., et al. Prevalence and management of pain in patients with metastatic cancer in Franche-Comté. Bull Cancer. 2016 Oct;103 (10):849–860.



## CLINICO – MORFOLOGICAL FEATURES OF BURN INJURIES CAUSED BY HIGH TEMPERATURES

**Smolnițchi Daria**

*Student, Faculty of General Medicine,*

*Nicolae Testemitanu*

*State University of Medicine and Pharmacy*

*Republic of Moldova, Chisinau*

[DOI: 10.5281/zenodo.7941952](https://doi.org/10.5281/zenodo.7941952)

### **Abstract**

Burns are injuries to the skin or other organic tissues that are caused by the local action of high temperatures. The cause of burns can be: flame/explosion, hot liquids or gases, superheated or incandescent solids, electric current, chemicals agents and sunlight. There are 4 degrees of burns, depending on the intensity of the burn and its morphological aspects. The "palm area", conventionally equal to 1% of the body surface and the "rule of 9", are used to estimate the burned body surface. There are different scores to determine the severity and prognosis of burns, so: Baux, ABSI.

In the forensic diagnosis it is necessary to determine when the burn occurred - during life or after death (antemortem or postmortem burns).

**Keywords:** burns, injuries, burn shock, rule of nines.

### **Introduction:**

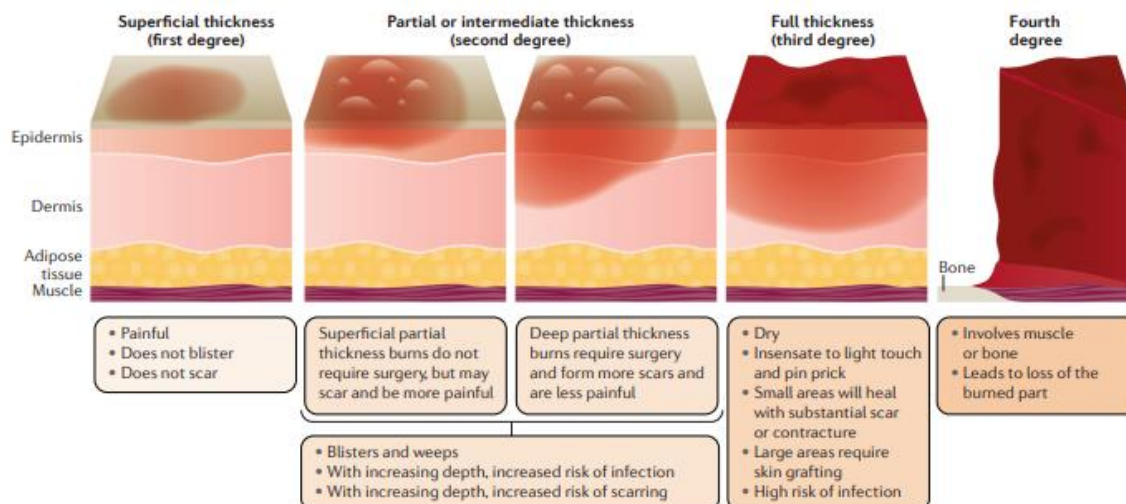
The problem of burn injuries has been around for decades. Determining the nature and severity of injuries and damage to health, including burn injuries, is a necessary part of forensic examination. In forensic examination, full investigation of burns requires determination of their cause. They are frequently represented by thermal, electrical, chemical and radiation injuries. [13]

According to WHO data, an estimated 180 000 deaths each year are caused by burns - the vast majority occur in low- and middle-income countries. Burns usually occur at home due to people's own negligence in the home or workplace and are accidental. [17]

### **Definition, etiology and epidemiology:**

**Burns** are injuries to the skin or other organic tissues that are caused by the local action of high temperatures. The etiology of burns can be presented by: flame/explosion, hot liquids, superheated or incandescent solids, electric current, chemicals agents and radiation. Burn injuries can lead to profound long-term damage, even if the wounds have healed, affecting not only physical health but also mental health and quality of life. [3,6,18]

**Risk factors** in burns include: gender, age, socio-economic factors, etc. In most countries, men are injured almost twice as often as women. The exception to this trend was seen in Ghana and India, where three times as many women are injured and die from burns as men. Women are usually affected in kitchens. Thermal burns often occur from local exposure to substances with high temperatures, such as: spilling containers of hot liquids (water, oil), from exploding stoves or preparing dishes over an open fire, which can ignite clothing. Open flames used for heating and lighting are also a risk factor. Men are more prone to burns at work due to flames in fires, chemical and electrical burns. [10,13] Children are particularly vulnerable to burns. Although a major risk is inadequate adult supervision. Other risk factors involved in the development and frequency of burns include: carelessness while performing household chores, such as preparing dishes and caring for young children; overcrowding, poverty and lack of adequate safety measures; alcohol abuse and smoking.[10]

**Burns classification:***Pic. 1. Burn depth. [10]***Mechanisms by which burns cause death:**

- Burn shock
- Infection
- Pneumonia
- Septicemia
- Toxic shock syndrome
- Pulmonary embolism
- Gastric ulceration
- Acute renal failure
- Scar-related malignancy. [7]

Severe burns will develop **combustion sickness**, which often becomes the cause of death. The severity of the disease, its development and prognosis will influence the area of deep burns. Also an important role belongs to the age and location of the lesion. [14]

Four periods are highlighted in the development of combustion disease:

- ✓ Shock period
- ✓ Period of toxemia
- ✓ Period of septicotoxemia
- ✓ Period of reconvalescence

“**Burn shock** describes the rapidly developing hypovolemic circulatory failure seen in the first 72 hours after burn injury. Skin burning is followed by

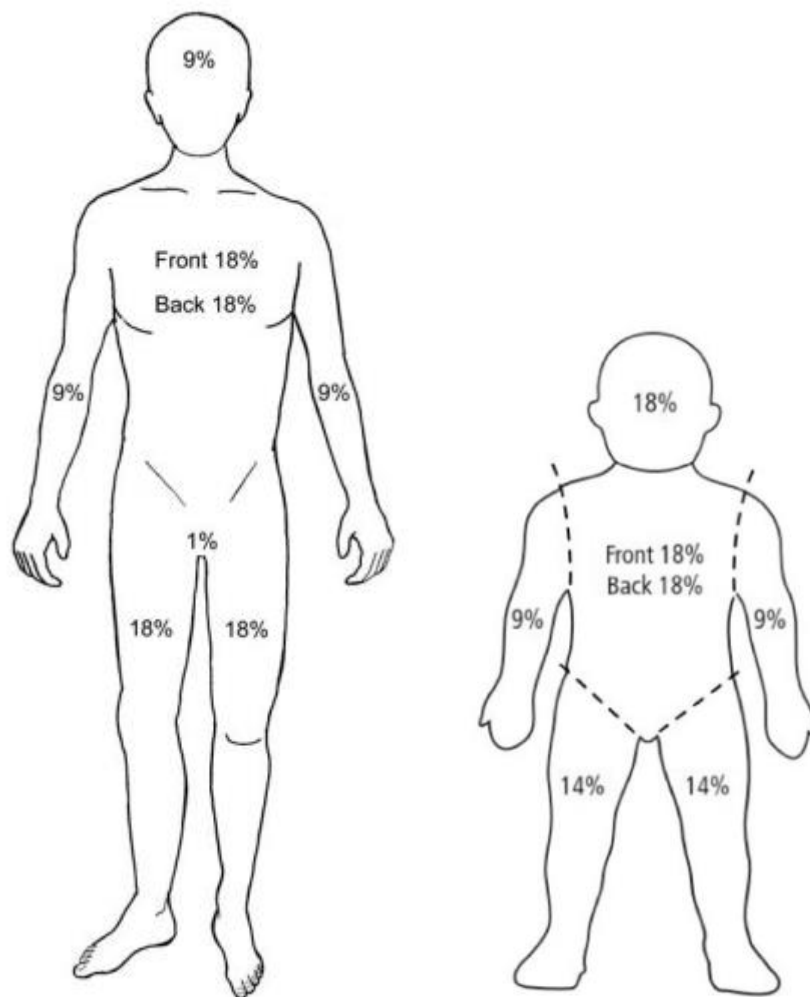
hypovolemia, low cardiac output, hypoproteinemia, hyponatremia, and a rising hematocrit. Burn shock is the result of hypovolemia and the effects of cytokines and other inflammatory mediators”. [7] In the first hours the patient may be excited, due to pain syndrome and psycho-emotional stress, later he becomes apathetic and lethargic. Oliguria develops at the onset of combustion sickness, but in severe states anuria. [1,2,11,14]

The second period is the period of **toxemia**, which will develop in the 2, 3 days and continue for 10 to 14 days after the trauma. Clinical manifestations: fever 38 - 39°C; CNS disorders, characterised by: headache, lethargy, sleep disorder, delirium, hallucinations, lack of appetite; anemia, oliguria, polyuria, hyperproteinemia. After the period of 15, 16 days, clinically the symptoms of toxemia decrease. [2,11,14]

The period of **septicemia** is characterised by the development of infection. After the scab detaches, various infections join and septic-purulent complications occur. The period of septicotoxemia may end with complete recovery of the skin. But in cases of severe burns, the period of septicotoxemia is accompanied by loss of body weight, dryness and pallor of the skin, severe muscle atrophy, scars. [2,14]

**The recovery period**, is the fourth period of the combustion disease, for which it is characteristic: normalization of the functions of organs and systems affected during the previous periods. It ends with reconvalescence or death. [14]

### Estimating the surface area of the body burned:



*Pic. 2. Rule of nines. [5,7]*

According to "rule of nines", the head represents 9% of the body surface, each upper limb 9% of the body surface, each lower limb 18% of the body surface, the anterior trunk 18%, the posterior trunk 18%, the perineum (genital area) 1% of the body surface. To assess the degree of burns and to obtain the percentage of body surface burnt, the values are added together. [12]

In the case of children, the "rule of 9" is that the head represents 18% of the body surface and both legs together represent 28% of the body surface. [12]

#### **Antemortem versus Postmortem burns:**

- Antemortem: Presence of soot in the airways, alveoli and sphenoid sinuses (Pic. 3)
- Presence of carboxyhemoglobin in blood
- Presence of a red rim to a burn
- Significant presence of dystrophic and necrotic changes of nerve elements
- Presence of thrombi in the vessels of the affected areas
- The evaluation of phlyctene detects the presence of high numbers of leukocytes and fibrin in the exudate. [8,16]



*Pic. 3. Soot in airway. [15]*

Postmortem:

- The Pugilistic Position - hands raised in front of the face (Pic. 4)
- Skin splitting
- Fractures
- Heat Hematoma. [7]



*Pic. 4. Pugilistic attitude. [15]*

The **Baux score** were developed for determination of the prognosis of burns according to burned body surface area and age. Is represented by the formula:

$$A+S=P \quad (1)$$

where A represents age, S -burned body surface area and P - probability of death.

The prognosis is:

- favourable if the score is < 60
- relatively favourable, if the score is < 80
- reserved, if the score is > 75
- extremely severe, if the score is > 100. [4,9]

**Conclusion:** Every year, millions of people suffer from burns and hundreds of thousands die from them. Burn injuries present challenging problems to the forensic physician and pathologist. Medico-legal problems of burns include: positive diagnosis of burns, assessment of the burned area, determination of the time of burn (intravital or postmortem) and assessment of the cause of death.

## References

1. Avazov, A.; Sattorov, A.; Zhumanov, H.; Zhubborov, K.; Sadullaeva, M., PATHOGENESIS, CLINICS, PRINCIPLES OF TREATMENT IN BURNS. In: Vesnik nauki i obrazovaniya. 2021, 3 - 2 (106), pp. 99 - 102. Available from: <https://cyberleninka.ru/article/n/patogenez-klinika-printsipy-lecheniya-ozhogovogo-shoka>
2. Babiuc V., THE SCIENTIFIC ASPECT OF BURNS. In Public Health, Economics and Management in Medicine. 2015, Nr. 6(63), pp. 38-41. ISSN: 2587-3873.
3. Baciuc Gheorghe. Course on Forensic Medicine. Chisinau. 2013, 302 p.
4. BLOANCĂ V., BRATU T., CRĂINICEANU Z., GRUJIC D., GYEBNAR V., HOINOIU T., NODIȚI G., PRILIPCEANU G., PLASTIC SURGERY, RECONSTRUCTIVE MICROSURGERY AND BURNS. Victor Babes Publishing House Timisoara, 2020, 229 p.

5. Broadis Emily, Chokotho Tilinde, Paediatric burn and scald management in a low resource setting: A reference guide and review. In: African Journal of Emergency Medicine. 2017, pp. 27 – 31. Available from: DOI:10.1016/j.afjem.2017.06.004
6. Cheianu Silvia. Course notes in the discipline of LEGAL MEDICINE. Chisinau. 2014, 64 p.
7. Cooper, P.N. Burn Injury. In: Essentials of Autopsy Practice, 2006, pp. 215 – 232. ISBN: 978-1-8233-967-8. Available from: [https://doi.org/10.1007/1-84628-026-5\\_9](https://doi.org/10.1007/1-84628-026-5_9)
8. Denisenko A.G. HEALTH IMPAIRMENT AND DEATH FROM EXTREME TEMPERATURES. Methodical recommendations. Vitebsk, 2018, 34 p.
9. Iuga V., Negoței E., Burns, 2016. 89 p. Available from: <https://www.slideshare.net/ElenaNegotei1/arsurile-66522800>
10. Jeschke, M.G., van Baar, M.E., Choudhry, M.A. et al. Burn injury. In: Nat Rev Dis Primers 6, 11 (2020). Available from: <https://doi.org/10.1038/s41572-020-0145-5>
11. Litvitsky P., Extreme conditions: shock. In: Voprosy sovremennoi pediatrii, 2010, vol. 9, n.4, pp. 85 - 93. Available from: <https://cyberleninka.ru/article/n/ekstremalnye-sostoyaniya-shok>
12. Manakov V.Y. Burns. Classification and treatment of burns. In: Modern scientific research and innovations. 2020, № 11. Available from: <https://web.snauka.ru/issues/2020/11/93833>
13. Manjieva E.B. Analysis of the application of the criteria for assessing the severity of health damage in burn injuries according to the data of RK "RBSME" for the period 2012-2016. In: FORENSIC MEDICINE. 2019, Vol. 5 No. 1s, pp. 40-41. Available from: <https://cyberleninka.ru/article/n/analiz-primeneniya-kriteriev-otsenki-tyazhesti-vreda-zdorovyu-pri-ozhogovyh-travmah-po-dannym-bu-rk-rbsme-za-period-2012-2016-gg>
14. Miyassarova I.F., Styazhkina S.N., Burn Disease. In: "Collection of Scientific Proceedings on the materials of the XXI International Scientific and Practical Conference "Scientific research: key problems of the III millennium", 2018, pp. 62-65. ISBN 978-5-6040524-0-2.
15. Peranantham S., Manigandan G., Shanmugam K. Forensic approach to a case of death due to burn injury: a case report. In: International Journal of Research in Medical Sciences. 2014, 2(3), pp. 1214 – 1216. Available from: DOI: 10.5455/2320-6012.ijrms20140866
16. Pigolkin Y.I. Forensic medicine and forensic medical examination. "GEOETAR-Med. 2014, 721 p.
17. Shailendra Patel, Jitendra Singh Tomar, Ankit Pandey Jain, Poornima Patel. Profile of Death Due to Thermal Burns: A Retrospective Study. In: Medico Legal Update. 2020, Vol 20 (4), pp. 519-524. Available from: <https://doi.org/10.37506/mlu.v20i4.1870>
18. Yakupu, A., Zhang, J., Dong, W. et al. The epidemiological characteristic and trends of burns globally. In: BMC Public Health 22, 1596 (2022). Available from: <https://doi.org/10.1186/s12889-022-13887-2>

# PEDAGOGICAL SCIENCES

## DEVELOPMENT OF SELF-SERVICE SKILLS OF OLDER PRESCHOOL CHILDREN THROUGH PLAY ACTIVITIES

Kalybay Arailym Talgat kyyzy

2<sup>nd</sup> year master's student

K. Zhubanov Aktobe Regional University

Republica Kazakhstan, city Aktobe, st. Baisheva 25

DOI: [10.5281/zenodo.7941988](https://doi.org/10.5281/zenodo.7941988)

## МЕКТЕП ЖАСЫНА ДЕЙІНГІ ЕРЕСЕК БАЛАЛАРДЫҢ ӨЗІНЕ-ӨЗІ ҚЫЗМЕТ КӨРСЕТУ ДАҒДЫЛАРЫН ОЙЫН ӘРЕКЕТІ АРҚЫЛЫ ДАМУ

Қалыбай Арайлым Талғат қызы

2 курс магистранты

Қ. Жұбанов атындағы Ақтөбе өңірлік университеті

Қазақстан Республикасы, Ақтөбе қ., Баишева көш.25

### Abstract

The article discusses the main ways of developing self-service skills of older preschool children through play activities.

### Аннотация

Мақалада ойын әрекеті арқылы ересек мектеп жасына дейінгі балалардың өзіне-өзі қызмет көрсету дағдыларын дамытудың негізгі жолдары қарастырылады.

**Keywords:** preschoolers, development, skills, game, self-service.

**Түйінді сөздер:** мектеп жасына дейінгі балалар, даму, дағдылар, ойын, өзіне-өзі қызмет көрсету.

Мәлімделген тақырыпты зерттеудің өзектілігі:

Өзіне-өзі қызмет көрсету - бұл мектеп жасына дейінгі балаларды тәрбиелеудің бірінші кезеңі. Ойын әрекеті арқылы өзіне өзі қызмет көрсету дағдыларын дамытудың баланың әлеуметтік дамуы үшін үлкен маңызы бар. Өздерін қалай ұстау керектігін білетін балалар ұжымда өздерін жақсы сезінеді, оның құрдастарымен байланысуға және араласуға көбірек уақыты бар.

Өзіне - өзі қызмет көрсету – «Қызмет көрсету дағдысы тұрмыстық қажеттіліктерді өз күшімен қанағаттандыру». Өзіне-өзі қызмет көрсету - бұл "жеке тұлғаның өзара әрекеттесу процесі, оның айналасындағы әлем, оның ішіндегі шындық туралы идеяларды жинақтау, өмірлік тәжірибені байыту, тәуелсіз өмір сүру үшін қажетті дағдыларды, дағдыларды игеру».

Үлкен мектепке дейінгі жас – баланы мектепке қабылдағанға дейінгі соңғы кезең.

Бұл психиканың дамуы тұрғысынан, даму ерекшеліктері тұрғысынан өте маңызды, сондықтан осы кезеңге психология саласында көптеген ғылыми әдебиеттер арналған.

Баланың психикасында мектепке барар алдында жаңа формациялар пайда болады. Оларға психикалық процестердің еріктілігі жатады – есте сақтау, зейін, қабылдау және басқалары туындайды, соның әсерінен мінез-құлқын басқару қабілеті туындайды. Балада өзгерістер пайда болады, өзі туралы идеялары, өзін-өзі бағалауы өзгереді.

Үлкен мектепке дейінгі жас деп 5-6 жас аралығындағы кезең түсініледі. Осы сәтте балалардың физикалық және психикалық мүмкіндіктері орта топтағы балалардың ұқсас көрсеткіштерінен әлдеқайда ерекшеленеді. Балалардың дамуы егде жастағы мектеп жасына дейінгі балалар тез қарқынмен жүреді; олар тез игереді, негізгі қозғалыстар және одан да көп физикалық тұрғыдан мықты дамиды. Психикалық даму физикалық дамумен қатар жүреді. Олар параллель жүреді, сондықтан егер біз лайықты бала өсіргіміз келсе, оны жан-жақты дамытуымыз керек. Адамгершілік тәрбиеге, сондай-ақ әлеуметтік дағдыларды дамытуға үлкен көңіл бөлу керек.

Баланың дамуының осы кезеңінде оның сөйлеуі қабілеті дамиды. Бірінші сыныпқа түскен кезде балалар өз тілінің дыбыстарының барлығын дұрыс айтып білуі керек, сөздерді анық және анық айту және құрдастарымен де, ересектермен де қалыпты қарым-қатынас жасау үшін қажетті сөздік қорына ие болуы керек. Балалар сөйлеуде көптеген грамматикалық формаларды қолдана білуі керек, күрделі сөйлемдер құрайды және сөйлеу мәнерін, интонациясын қажет жерде қолдана білуі керек. Жақсы дамыған ауызша сөйлеу қабілетінің көмегімен баланың әлеуметтік дағдылары дамиды. Үлкен мектеп жасына дейінгі балалардың дамуы тек өздерінің жеке басын бағалауды ғана емес, қоршаған ортадағы басқа адамдардың да тұлғалық қасиеттерін бағалауды дамып бастайды.

Мектепке дейінгі жастағы тұлғаның даму кезеңі жаңа білім жинаумен, жаңа қасиеттердің



дамуымен, жаңа қажеттіліктердің пайда болуымен сипатталады. Көп қырлы тұлға деп аталатын адам дәл осы жаста қалыптасады. Айналасындағылар баланы әртүрлі көзқарастардан бағалай алады: интеллектуалды, моральдық, эмоционалды, ерікті және тиімді-практикалық. Психологтар мен мұғалімдер бұл ересек мектеп жасына дейінгі жаста моральдық нормаларға бағынатын ситуациялық мінез-құлықтан іс-әрекетке түпкілікті көшу болатынын атап өтеді. Көптеген балаларға бұл процесс қиын және эмоционалды түрде берілгенімен, сайып келгенде, моральдық нормалар баланың мінез-құлқына шешуші әсер ете бастайды.

Баланың ересектермен, ең алдымен ата – аналармен қарым-қатынас стилі де өзгереді. Егер бастауыш және орта мектепке дейінгі жаста қарым-қатынас когнитивті болса, онда өмірдің алтыншы жылында ол жеке формаға ауысады. Бала адамдардың бір-бірімен қарым-қатынасына қызығушылық танытады. Осы білімді алғаннан кейін бала өзінің іс-әрекетін барабар бағалай бастайды. Ол өзінің мінез-құлқының ересектерге ұнайтынын немесе ұнамайтынын сенімді түрде болжай алады және өзінің іс-әрекеті мен жеке басының сапасын өз бетінше бағалай алады. Тұлғааралық қатынастарды дамытудың бұл процесі өзін-өзі бағалау сияқты маңызды дағдыларды қалыптастырумен қисынды түрде аяқталады. Бала өзі үйренген адамгершілік нормаларын өзінің мінез-құлқымен, іс-әрекетімен, дағдыларымен салыстырады. Оның өзін-өзі бағалауы әдетте өте жоғары болғанымен, оны минус деп санауға болмайды. Керісінше, керісінше-жоғары өзін-өзі бағалау баланың сәтсіздіктерден қорқуын басады және жаңа іс-әрекеттердің дамуын ынталандырады. Мектепке түсу кезінде дайындық сабақтарына үлкен қызығушылық танытуы - бұл дәл осындай өзін-өзі бағалауының нәтижесі.

Өз іс-әрекеттерінде есеп беру және не жақсы және не жаман туралы түсінік алу арқылы бала айналасындағы бөгде адамдарға мұқият қарай бастайды. Оның іс-әрекеттерінде туыстары мен жақындарына деген шынайы қамқорлық пайда бола бастайды. Мазасыздық пен қайғыдан ата-анасын қорғау мақсатында ересек мектеп жасына дейінгі балалар ата-аналарын қорғау үшін өздерінің эмоциялары мен сезімдерін басқаруды үйренеді. Әрине, бұл оның мүлдем эмоциясыз болатынын білдірмейді, бірақ көз жасы мен қорқыныш көріністері айтарлықтай азаяды. Бала айқайлап, жылаудың орнына басқа сезімдердің «тілін» игереді. Ол көріністер, мимика, қимылдар, позалар, интонациядағы өзгерістер және т. б. арқылы тәжірибелер мен эмоцияларды білдіруді үйренеді.

Үлкен мектеп жасына дейінгі балалардың дамуы оны еңбек қызметіне тартпай-ақ мүмкін емес. Мұғалімдер сабақтарды бала түсіне бастайтындай етіп жасайды: өз қызметімен ол басқа адамдарға пайда әкеледі. Бұл сабаққа ең қолайлы – ойын әрекеті арқылы қолөнер жасау, мүсіндеу, сурет салу және жасау. Әлеуметтік пайдалы еңбектің қарапайым мысалы-өзіне-өзі қызмет көрсету дағдыларын игеру. Өзіңізді киіндіріп, өз

бетіңізше тамақтануды үйрену ата-ананы көмектен босатады және бала мұны түсінуі керек.

Мұның бәрі орта мектепке дейінгі жаста, ал 5-6 жасында балалар күрделі жұмыстарды орындауға үйренеді. Олар гүлдерді суарады, шанды сүртеді, киім мен аяқ киімді тазалайды, ойыншықтарды жәшікке салады және т.б. осы тапсырмаларды орындағаннан кейін балалар орындалған жұмыстың қуанышын сезінеді – олардың қызметі ұжымға бағытталмағандықтан, олар бұрын таныс емес сезім. Егде жастағы мектеп жасына дейінгі балалардың дамуына қатысты тағы бір маңызды мәселе – олардың оқу іс-шараларына қатысуы. Бұл баланың сөздік қорын толтыру немесе жаңа дағдыларды игеру құралы ғана емес. Оқу қызметі-бұл тұлғаны өзгертудің тамаша құралы. Даму сәтті болуы үшін, оқыту қызықты болуы керек.

Баланың қиялының гүлденуі дәл мектеп жасына дейінгі жаста. Баланың қиялы ойында ең күшті көрінеді: бұл қандай қызығушылықпен көрінеді, оған балалар қатысады. Екінші жағынан, осы жастағы қиялдар өздігінен пайда болады. Балаға «күш арқылы» немесе «Тапсырыс бойынша» бірдеңе ойлап табу өте қиын, сондықтан балалардың сүйікті іс-әрекеттері-рөлдік ойындар. Олардың мәні қарапайым: балалар өз мамандықтарын сынап, әлеуметтік және әлеуметтік функцияларды орындай отырып, ересектерді «ойнайды». Бұл ойындарда жаңалық жоқ, өйткені бала бұрын көргендерін қайталайды.

Мектеп жасына дейінгі жастағы негізгі жетекші іс-әрекет болып табылатын рөлдік ойындардан басқа, балалар басқа ойындарды да ойнайды. Балалар ұжымның мүдделерін бірінші орынға қоя бастағандықтан, ойындар сәйкес келеді. Оларда қазірдің өзінде бар ережелер, ал кейбіреулері рөлдерді бөлу. Жақсы мысал-жасырынбақ немесе тығылыспақ, онда бір жүргізуші бар, ал қалғаны ойыншылар. Ойын ережелеріне бағынып, балалар екі рөлді де өздері үшін сынап көреді, ойында кезекпен өзгереді. Егер құрдастарының бірі болса ережелерді бұзады, ол назардан тыс қалмайды. Ойынға деген қызығушылық барлық балалар ережелер бойынша ойнаған жағдайда ғана сақталады. Осы ойындардың барлығының мақсаты (әдеттегі және сюжеттік рөлдік ойындар) баланың бастауыш мектепте сәтті оқуына көмектесетін қасиеттерді дамыту болып табылады.

Үлкен мектепке дейінгі жастағы танымдық сұрақтардың шыңы да бар. Алты жасында балалар ересектер түсінетіндей жақсы сөйлей алады, бірақ олар әлі де көп нәрсені білмейді. Балаларды барлығы қызықтырады және олар жаңа ақпарат алу үшін энергияны аямайды. Қиындық-бұл үшін бір тілек жеткіліксіз, ал балалар әлі де қабылданған ақпаратты терең және дұрыс түсіне алмайды. Білім ағыны тым үлкен, сондықтан баланың басын әр түрлі мәліметтермен толтыру қаупі жоғары, ол оны түсінуге және түсінуге қабілетсіз.

Егде жастағы мектеп жасына дейінгі баланың ақыл-ой қабілеті дами бастайды. Талдау, салыстыру, жалпылау, логикалық ойлау – бұл

дағдылардың барлығы ерте жаста кездеседі, бірақ алты жасында олар баланы бірінші сыныпқа беруге болатын деңгейге жетеді. Балаларды ол байқайтын заттар мен құбылыстар ғана емес, сонымен қатар олардың жалпыланған қасиеттері де қызықтыра бастайды. Балаларда себеп-салдарлық байланыстар туралы ұғымдар пайда болады; олар механизмдердің қалай жұмыс істейтініне және олардың неден тұратынына қызығушылық танытады. Алынған ақпаратқа сүйеніп отырып, бала іс жүзінде тексеруді күтпестен толықтай қисынды қорытынды жасай алады. Бұл дағдыларды одан әрі дамыту үшін баланы мүмкіндігінше көп іс-әрекетке тарту ұсынылады.

Егде жастағы мектепке дейінгі жастағы ұсыныс қабілеті біршама төмендейді. Бұл балаларда қабылданған шындықты мұғалімнің сөздерімен салыстыру механизмінің қалыптасуына байланысты. Балалар бәріне сенуді тоқтатады және өз көзқарастарын қорғай бастайды. Сонымен қатар, егде жастағы мектеп жасына дейінгі балалар жас оқушылармен салыстырғанда көптеген жағдайларды дұрыс бағалайды. Соңғысын қорғауда мектеп олар үшін жаңа бейімделу кезеңі деп айтуға болады, бұл мектеп жасына дейінгі балалардың дамуындағы жетістіктерді төмендетпейді. Баланың жеке басындағы өзгерістер, ең алдымен, оның өзін-өзі бағалауының өзгеруімен және басқалардың оған қалай қарайтынын білумен байланысты.

Ересек мектеп жасына дейінгі балалардың дамуындағы жетекші қызмет түрі рөлдік ойындар мен ережелермен ойындар болып табылады. Олар тек балалардың шеберлігін ғана көрсетпейді, кез-келген пәнмен жұмыс істеу, сонымен қатар бір-бірімен және ересектермен қарым-қатынас көрсетіледі. Өмірдің алтыншы жылындағы дамудың нәтижесі - баланың назарын, есте сақтау қабілетін, қабылдауын және басқаларын қамтитын мінез-құлқы мен психикалық процестерін мақсатты түрде басқару қабілеті дамиды. Үлкен мектепке дейінгі жас – бұл баланың «мен»идеясында түпкілікті өзгеріс болатын кезең.

Өзіне-өзі қызмет көрсету дағдыларын тәрбиелеуде ойын техникасы ерекше рөл атқарады. Оларды қолдана отырып, мұғалім балаларда күнделікті өмірде дамитын дағдыларды бекітеді. Бұл жағдайда сюжеттік-дидактикалық ойындарға ерекше орын беріледі ("қуыршақты төсекке қойыңыз", "қуыршақты серуендеуге киіңіз", "қуыршақты түскі аспен тамақтандырыңыз" және т.б.).

Ойында балалар тұрмыстық процестер барысында қалыптасатын қатынастарды көрсетеді. Бала қуыршаққа тиісті жағдайларда ата-анасы сияқты қарайды. Ойында балалар тұрмыстық әрекеттерді (қолды жуу, тамақтану) еліктейді, осылайша әрекеттерді бекітеді тұрмыстық заттармен (қасықпен, шыныаяқпен және т.б.), сондай-ақ өзіне-өзі қызмет көрсету дағдыларын орындаудың ережелерін көрсетеді: қуыршақ киімдерін мұқият бүктеп, үстелге ыдыс-аяқтарды әдемі етіп қою керек.

Ересек топтарда ойын жеке гигиена дағдыларын қалыптастырудың негізгі әдістерінің бірі болып табылады, көптеген қарапайым еңбек дағдылары, әсіресе өзіне-өзі қызмет көрсету, мәдени қарым-қатынас, заттармен жұмыс істеу, көбінесе заттармен ойындарда үйренеді.

Осылайша, өзіне-өзі қызмет көрсету дағдыларын игеру балалар ойындарының мазмұнын нығайтады және байытады. Балалар оларды әртүрлі ойын жағдайларына ауыстыра бастайды, содан кейін тақырыптық әрекеттер ойынға айналады".

## References

1. Electronic resource:  
<https://govorysha.ru/razvitie-detej-starshegodoshkolnogo-vozrasta/>
2. Korney I. A. Pedagogical methods in the formation of self-service skills of early preschool children [electronic resource] access re-education [Published in Russian] :  
<https://nsportal.ru/detskiysad/raznoe/2020/12/29/pedagogicheskie-priemyformirovaniya-navykov-samoobsluzhivaniya-u>



# PHILOLOGICAL SCIENCES

## PHONETICS AS AN IMPORTANT ASPECT OF LEARNING THE RUSSIAN LANGUAGE

**Valentina Tarasova**

*Senior Lecturer of the Department of Russian Language and Literature*

*Thammasat University*

*Klong Luang, Pathumthani 12121*

[DOI: 10.5281/zenodo.7942016](https://doi.org/10.5281/zenodo.7942016)

## ФОНЕТИКА КАК ВАЖНЫЙ АСПЕКТ ИЗУЧЕНИЯ РУССКОГО ЯЗЫКА

**Валентина Тарасова**

*Старший преподаватель кафедры русского языка и литературы*

*Университет Таммасат*

*Клонг Луанг, Патум Тхани 12121*

### Abstract

To form the skills of speaking, listening, writing and reading, one must not only be able to pronounce the corresponding sounds, but also know how they are combined in words, and then how these words are combined in a sentence.

### Аннотация

Для формирования навыков устной речи, аудирования, письма и чтения надо не только уметь произносить соответствующие звуки, но и знать, как они соединяются в словах, а затем и как эти слова соединяются в предложении.

**Keywords:** phonetics, sounds, oral speech, speaking, language, pronunciation, Russian language.

**Ключевые слова:** фонетика, звуки, устная речь, говорение, язык, произношение, русский язык.

### Вступление

В настоящее время, фонетика играет наиболее важную роль в изучении русского языка, в том числе, при изучении данного языка иностранными лицами. Зачастую, без хорошей фонетики не удастся создать условия для развития коммуникации.

В современном мире английский язык стал языком международной коммуникации. Изучение иностранного языка имеет глубокий личностный смысл и персонально значимые мотивации совершенствования навыков и умений общения, являясь одним из доминирующих факторов конкурентоспособности личности в профессиональном пространстве.

Признание отечественных дипломов за рубежом и отечественная биржа труда требуют высокой компетентности в развитии вторичной языковой личности, способной участвовать в международной коммуникации [3].

При изучении иностранного языка расширяется языковая картина мира и личностный кругозор, что дает полное ощущение причастности к мировому сообществу. Развиваются мыслительные процессы и коммуникативные способности. Значительная часть информации (Интернет, компьютерные программы, документация, деловые переговоры и т. д.) кодируется английским языком, а как говорится «кто владеет информацией — тот владеет миром».

### Значение исследования.

Исследование заключается в том, что фонетика должна быть многократно использована при

изучении русского языка иностранцами, нежели, чем грамматика.

Цель исследования — изучить особенности использования фонетики как важного аспекта изучения русского языка.

### Методология

В работе используется метод анализа, синтеза, сравнения, обобщения.

### Находки и результаты.

Проблеме обучения фонетике посвящено множество работ таких ученых как Антипова А. М., Дубовский Ю. А., Антонова Д. Н., Брызгунова Е. А., Светозарова Н. Д., Любимова Н. А. и др. Однако проблема обучения фонетике в неязыковом вузе еще недостаточно разработана. Студенты, становясь участниками иноязычного общения, сталкиваются с рядом проблем фонетического и фонационного характера, такие как несоблюдение произносительных норм, логико-смысловых пауз, ударений и т.д.

Таким образом, минимальная изученность формирования просодических характеристик иноязычной речи у иностранных студентов неязыковых вузов обуславливает актуальность исследования.

Фонетика требует особого внимания на начальном этапе обучения, предполагая овладение практическими навыками и умениями, а также теоретическими аспектами, для использования в различных видах коммуникативной деятельности.

Фонетические навыки — это навыки произношения иностранных звуков и их сочетаний, а также выделение этих звуков в потоке речи, постановки

ударений и интонационного оформления синтаксических единиц

[1, с. 14].

При овладении иностранным языком, отмечает Любимова, действие фонетической интерференции приводит к «переосмыслению» фонологической значимости признаков единиц как сегментного, так и супraseгментного уровней в звуковой системе неродного языка [2, с.16]. «В этом смысле сопоставительный или сравнительный анализ звуковых систем, находящихся в контакте, позволяет с большей или меньшей степенью точности предсказать возможные нарушения вторичной звуковой системы».

Фонетика русского языка для иностранцев: работу над постановкой любого звука русского языка надо начинать с постановки фонематического слуха, т.е. сначала нужно добиться, чтобы иностранец различал звуки на слух. Это важно, потому что для иностранцев многие русские звуки звучат одинаково. Например, если Ваш ученик говорит «де-Душка» вместо «деВушка», а когда Вы его поправляете, он отвечает, что так и сказал, то это значит, что Ваш ученик не различает на слух звуки [Д] и [В], они для него звучат одинаково.

#### Рекомендации

Для того чтобы иностранцы научились различать звуки на слух, мы рекомендуем делать следующие упражнения: Упражнение «Игра с карточками»: 1. Возьмите два листа бумаги, напишите на них звуки, которые

Вы будете отрабатывать. Например, на одном листе пишем Д, а на другом – В.

Отдадим эти карточки иностранцу. Преподаватель произносит звуки [Д] и [В] в случайном порядке, а иностранец должен поднять соответствующую карточку. Разумеется, преподаватель должен говорить иностранцу, если он делает ошибку. 2. Затем преподаватель произносит слоги, например: ва – да, ду – ву, ава – ада и т.д., а иностранец должен поднять карточку «Д» или карточку «В».

Упражнение «Фонетический диктант»: Преподаватель диктует ученику звуки, слоги, слова, а иностранец записывает то, что слышит. Важно также обратить внимание, что в упражнении «Игра с карточками» и «Фонетический диктант» при отработке согласных звуков не нужно диктовать слова, которые заканчиваются на звонкие парные согласные буквы (Б, В, Г, Д, Ж, З), т.к. при произношении на конце слова звонкие парные согласные оглушаются.

Например, если преподаватель будет диктовать иностранцу «лук», «луг», то иностранец запишет «лук», «лук», потому что «луг» произносится как «лу[К]», при этом иностранец не сделает ошибку, т.к. это фонетический, а не орфографический диктант. Когда иностранец начал различать русские звуки на слух, то преподаватель уже может поменяться с иностранцем местами, т.е. преподаватель показывает карточку, а иностранец произносит то, что написано.

На этом этапе возникает другая проблема: иностранец слышит и понимает, как должен звучать русский звук, но не может его корректно произнести.

Наибольшие сложности у иностранцев возникают при произношении следующих звуков: [Ы], [Й], [Р], [Ж], [Ц], [Ш], [Щ]. Ниже мы рассмотрим правила постановки этих звуков и дадим рекомендации, как объяснить русскую фонетику иностранцам, как проводить фонетические упражнения для иностранцев.

Основным, наиболее эффективным и надежным способом постановки звуков является метод использования ощутимых моментов артикуляции.

Артикуляцию, создающую определенный звуковой эффект, можно разложить на ряд составляющих ее движений, и большинство таких движений ощутить, проконтролировать при помощи:

1) Зрения (положение губ, степень раствора ротовой полости, положение кончика языка и до некоторой степени всего тела языка);

2) Осязания (имеет ли место смычка или щель в образовании звука, место смычки, площадь касания);

3) Мускульного ощущения (напряжение или расслабление определённого органа речи);

4) Моторного чувства (движения передней части языка вперёд или назад, поднят кончик языка или опущен).

#### Обсуждение и заключение

Подводя итог, можно сказать, что учителям при работе на уроках русского языка необходимо обращать внимание на речь. Буква обозначает звук, звук обозначается буквой. Интерес к изучению фонетики создается путем использования игровых заданий, поисковых задач. Эти приемы активизируют учащихся и способствуют формированию различать звук и букву. Эти выводы имели важное значение для теории и практики урока, так они способствовали активизации мышления учащихся на протяжении изложения и закрепления новых знаний на уроке, давали основу для организации самостоятельной работы учеников на уроке.

Таким образом, фонетика русского языка для иностранцев: работу над постановкой любого звука русского языка надо начинать с постановки фонематического слуха, т.е. сначала нужно добиться, чтобы иностранец различал звуки на слух. Это важно, потому что для иностранцев многие русские звуки звучат одинаково. Ограничения в написании работы. Прежде всего, существуют ограничения по указанию правильности произношений.

#### References

1. Boronnikova N. V. "WORKSHOP ON THE METHODS OF TEACHING RUSSIAN AS A FOREIGN LANGUAGE" Perm, 2019 P.19-20
2. Lyubimova N.A. etc. St. Petersburg: from St. Petersburg State University, 1993
3. R.R. Shakirova The use of NLP (Neuro-Linguistic Programming) as an effective method of improving literacy in Russian language lessons "Economics and Society No. 4 (83) 2021 p. 91.
4. ELECTRONIC RESOURCES:  
<http://www.psu.ru/files/docs/science/books/uchebnie-posobiya/boronnikova-praktikum-po-metodike-prepodavaniya-russkogo-yazyka-kak-inostrannogo.pdf>

# THE "THE WORLD ACCORDING TO GARP" BY J. IRVING AS BILDUNGSROMAN OF THE 1970-S IN AMERICAN LITERATURE

**Makhmudova Nargiza Alimovna,**

*PhD, Assoc. Prof.*

**Asadova Gulnoza Yodgor qizi**

*MA student,*

*Uzbekistan State University of World Language*

[DOI: 10.5281/zenodo.7942028](https://doi.org/10.5281/zenodo.7942028)

## Abstract

This article analyzes the prerequisites for the development and formation of personality in the novel "The World Through the Eyes of Garp" by the famous writer of the 20th century J. Irving. The question of the influence of Ch. Dickens' novels in the creation of the main image of the novel is also considered. The World According to Garp is a Bildungsroman, which is a chronological account of a life. It is complex and episodic, with subplots such as the dissolution of traditional gender roles, infidelity, assaults on women, and death. Other themes include the challenges of becoming an artist, the difficulties of becoming an artist, and death.

**Keywords:** Bildungsroman, novel, personality, formation, development, theme, plot

"Novel of development" is what the German word "bildungsroman" implies. A bildungsroman is a book that tracks the growth of a young person. A novel of education, in its simplest form, is a story that chronicles the progressive psychological and physical growth of a male or female character from infancy to adulthood, or the point at which the character finds his position in society. Circumstances, obstacles, and environment all have a significant impact on how the main literary character develops. The novel's distinguishing characteristic is the hero's successful completion of his positive life agenda. Coming-of-age stories frequently include orphans as the primary protagonists, who struggle with various difficulties throughout their lives. Against this backdrop, supporting characters influence the hero's development in an illuminating, detrimental, or constructive way [3, p. 37-38]. Jane Eyre (1847) by Charlotte Bronte, Great Expectations (1861) by Charles Dickens, The Adventures of Huckleberry Finn (1884) by Mark Twain, The Catcher in the Rye (1951) by J.D. Salinger, To Kill a Mockingbird (1960), and other works by these authors are considered classic types of Bildungsroman.

Midway through the 1970s, a consolidation phase started. Following the end of the Vietnam War, the US swiftly recognized the People's Republic of China and commemorated its bicentennial. Soon afterward came the 1980s, sometimes known as the "Me Decade," in which individuals prioritized little social concerns over more significant ones.

Old literary traditions continued, although there was less support for pure innovation. Novels by up-and-coming writers like John Gardner, John Irving (The World According to Garp, 1978), Paul Theroux (The Mosquito Coast, 1982), William Kennedy (Ironweed, 1983), and Alice Walker (The Color Purple, 1982) were exquisitely written in terms of style and portrayed heartfelt human tragedies. Again, realistic topics, situations, and characters raised questions. Realism was abandoned by experimental authors in the 1960s, but it began to slowly reemerge. A novel-within-a-novel structure or black American vernacular, as in John Gardner's October Light (1976) or Alice Walker's

The Color Purple, were commonly blended with it. Minority literature grew in popularity. Dramatizations that were more cinematic and vibrant replaced realistic drama. However, the "Me Decade" was also reflected in the audacious new writers Jay McInerney, Bret Easton Ellis, and Tama Janowitz (Bright Lights, Big City, 1984). 1986's Slaves of New York.[5]

John Winslow Irving (1942) is a famous American-Canadian novelist, short story writer, and screenwriter.[4] Irving gained praise from both critics and the general public after The World According to Garp became a worldwide hit in 1978. The Hotel New Hampshire (1981), The Cider House Rules (1985), A Prayer for Owen Meany (1989), and A Widow for One Year (1998) are just a few of Irving's books that have enjoyed successful sales. He received the Academy Award for Best Adapted Screenplay at the 72nd Academy Awards (1999) for his screenplay for The Cider House Rules. The World According to Garp, John Irving's fourth book, is about a man born out of wedlock to a feminist activist who goes on to become a writer. After its 1978 release, the book enjoyed years of best-seller status. For the 1979 National Book Award, it was a finalist.

Garp's adolescence and his growth as a person and artist are at the core of the narrative. In a bildungsroman, the main character learns about the highs and lows of life via his interactions with the many people he meets and the connections he forms. Garp learns about women via his relationships with his mother, Cushie Percy, Helen Holm, Charlotte, the Austrian woman who fell, Alice Fletcher, Mrs. Ralph, and Ellen James. He has learned precious lessons about love, accountability, discipline, suffering, and hope from his duties as a husband and parent. While Ellen Jamesian and Pooh Percy despise him, John Wolf and Roberta Muldoon are friendly to him. Despite being only 33 years old, Garp has a busy life.

A Bildungsroman, sometimes known as a fictitious biography or coming-of-age story of a single protagonist (who typically develops into an artist), is essentially what The World According to Garp is. One of them is the book David Copperfield by Charles Dickens. Even Jane Eyre would fit the bill because the novel

details her dreadful upbringing and years spent in school prior to meeting Mr. Rochester. The World According to Garp demonstrates this. The main character of the story is T.S. Garp, the artistically talented son of an asexual feminist nurse who had him with a dying, lobotomized technical sergeant while she was caring for him. The book follows Garp as he studies at the esteemed Steering School (where his mother works as a nurse), competes in wrestling, visits Austria, and discovers and his desire to be a writer.

The creation of Garp marks the start of the book. *Lunacy and Sorrow: The Life and Art of T.S. Garp*, written by a biographer, serves as the primary narrative voice. Jenny served as a nurse at a Boston hospital during World War II. Jenny uses the body of a wounded soldier with mental impairment to conceive. She had a soldier, Technical Sergeant Garp, and he passes away immediately after she acts selfishly. After the soldier, Jenny gave her kid the name T.S. Garp. Her son ultimately enrolls and decides he wants to work at The Steering School, where Jenny later finds a position.

Garp falls in love with Helen Holm, whose father is the school's wrestling coach. She warns him that until he develops into a true writer, she won't marry him. Following graduation, Garp relocates to Vienna, Austria, with the idea that in order to become a writer, he must have life experience. As she works on her memoirs, *A Sexual Suspect*, Jenny is with him. Helen has consented to marry Garp, and he has completed a novella titled *The Pension Grillparzer*. Garp travels to America with his mother to look for book publishers. With the help of editor John Wolf, Jenny's book becomes a best-seller, and she gains notoriety in the feminism community. One cult that idolizes her is called the Ellen James Society after an eleven-year-old girl who was raped and had her tongue cut off by the rapist. Jenny, who is now financially secure thanks to the popularity of her book, gives up nursing and moves in with her parents in Dog's Head Harbor, New Hampshire, where she operates a shelter for battered women. Robert Muldoon, a former professional football player who is now transgender and goes by the name Roberta, also has admiration for Jenny.

Garp has his book published as well, but he does not experience the same level of success as his mother. Garp stays at home to take care of their two young kids, Walt and Duncan, while Helen accepts a position as a professor of English literature. *Procrastination and The World According to Bensenhaver* are two novels that Garp has completed. The Ellen James Society and other feminists criticize the latter because it features vividly violent assault scenes. As a result of Garp's many extramarital romances during their marriage, Helen decides to have a relationship with one of her doctoral students, Michael Milton. One night, as Michael and Helen are having sex in Helen's car, Garp arrives in his car with his boys and strikes the car driveway. In the accident, the younger child perishes and his brother

loses an eye. Jenny becomes Garp and Helen's third child when they are able to mend their differences.

A few months later, a guy who blames Jenny Fields' book for the dissolution of his marriage violently murders her. Only women and children, according to her supporters, will be allowed to attend her funeral, so with Roberta's help, Garp assumes the identity of a woman to participate in the ceremonies. Garp's actual identity is exposed at the funeral, after which he leaves for the airport. At the airport, he bumps across Ellen James, who has grown up and become a lady. She tells Garp that she hates the group that bears her name and that she agrees wholeheartedly with the way he describes assault in his book. Ellen travels with Garp and is welcomed into the family.

Roberta insists that Garp establish The Fields Foundation, a charitable organization, in honor of his mother. When he gets back, he is named the wrestling coach at The Steering School. One day while practicing his wrestling, Pooh Percy, a member of the Ellen James Society, kills Garp. When they were younger, Pooh and Garp were friends, and Pooh now believes that Garp killed her sister. According to the epilogue, Garp's final book, *My Father's Illusions*, will be released as a result of his son's efforts.

The World According to Garp is a Bildungsroman, thus as a chronological account of a life, it tends to be lengthy on character development and short on plot, although this is more or less expected. Typically, the storyline is complicated and episodic, with everything leading up to the character's success or failure. The dissolution of traditional gender roles in families, infidelity, assaults on women, and death are just a few of the many subplots in *The World According to Garp*. Other themes include the challenges of becoming an artist (and the ambivalence many artists feel about whether creating art is even a worthwhile endeavor), the difficulties of becoming an artist, and death.

## References

1. Campbell, J.P. John Irving: a critical companion. UK, Greenwood Press, 1998. - 202 p.
2. Irving J. The world according to Garp (40th anniversary). Dutton an imprint of Penguin Random House LLC. 2018. - 526 p
3. Makhmudova N.A. Typology of the genre of the novel of education in the work of C. Dickens: author's abstract ... dis. Doctor of Philosophy in Phil. Sciences (PhD) - Tashkent.: 2020. - 61 p. URL: <https://www.twirpx.com/file/3965732>
4. Smith, Dinitia. "While Excavating Past, John Irving Finds his Family". The New York Times. 2014. <https://www.nytimes.com/2005/06/28/books/while-excavating-past-john-irving-finds-his-family.html>
5. <http://www.let.rug.nl/usa/outlines/literature-1991/american-prose-since-1945-realism-and-experimentation/the-1970s-and-1980s-new-directions.php>

## SOCIAL SCIENCES

### ANTHROPONYMS WITH GEOGRAPHICAL NAMES OF THE MASTCHOH DISTRICT OF THE SUGHD REGION

**Nasruddinov Sirojiddin Mohadsharifovich**

*Candidate of Philological Sciences, Associate Professor, Head of the Department of Foreign Languages of the Presidium of the National Academy of Sciences of Tajikistan.*

[DOI: 10.5281/zenodo.7942064](https://doi.org/10.5281/zenodo.7942064)

### АНТРОПОНИМЫ С ГЕОГРАФИЧЕСКИМИ НАЗВАНИЯМИ МАТЧИНСКОГО РАЙОНА СОГДИЙСКОЙ ОБЛАСТИ

**Насруддинов Сирожиддин Мохадшарифович**

*к.ф.н., доцент заведующий кафедры иностранных языков Президиума Национальной академии наук Таджикистана.*

#### Abstract

This article is devoted to the history of the naming of people and anthroponyms associated with the geographical names of the Mastchoh district of the Sughd region. Historical data indicate that "the Tajiks of the Upper Zeravshan basin and the rivers associated with it are descendants of local Sogdians, just as the Tajiks of Samarkand and Middle Zeravshan are descendants of the Sogdians who once lived in these regions."

The article deals with the influence of the political and social situation in the naming of people, and geographical places, for example: the change in political and social situations strongly influenced the naming of people, the names of streets, enterprises, collective and state farms, factories and dehqan farms. Out of 3000 dehqan farms, more than 2500 of them are named after their owners. When Central Asia was occupied by the Mongols under the leadership of Chengiz Khan, the words "bek", Safarbek, Islombek, etc. were added to the names of people, but after Central Asia entered the Russian Empire, the suffix "-ov", was added to the surnames, Ibodov, Rasulov, etc. Since 1957, people were given a surname, name and patronymic, Kholikov Anvar Qodirovich, etc.

#### Аннотация

Данная статья посвящена истории наречения людей и антропонимы связанные с географическими названиями Матчинского района Согдийской области. Исторические данные свидетельствуют о том, что «таджики бассейна Верхнего Зеравшана и связанных с ним рек – потомки местных согдийцев в такой же мере, как таджики Самарканда и Среднего Зеравшана являются потомками согдийцев, живших когда-то в этих районах».

В статье речь идёт о влиянии политических и социальных ситуации в наречение людей, и географических мест, например: изменение политических и социальных ситуаций сильно повлияло на наречение людей, название улиц, предприятий, колхозов и совхозов, заводов и дехканских хозяйств. Из 3000 дехканских хозяйств, более 2500 из них названы именами владельцев. Когда Среднюю Азию оккупировали монголы под руководством Чингизхана, к именам людей добавили слова «бек», Сафарбек, Ислонбек и т.п., но после того, когда Средняя Азия вошла в Российскую империю, к фамилиям добавляли суффикса «-ов», Ибодов, Расулов и т.п. Начиная с 1957 году, людям давали фамилию, имя и отчество, такие как: Холиков Анвар Кодирович и т.п.

**Keywords:** naming, anthroponyms, geographical names, descendants, influence, dehqan farms, enterprises, social situation, Sogdians, independence, social sphere.

**Ключевые слова:** наречение, антропонимы, географические названия, потомки, влияние, дехканские хозяйства, предприятия, социальная ситуация, согдийцы, независимость, социальная сфера.

Первые упоминания о Матче содержатся в трудах арабо-язычных географов X в. Согласно сведениям Ибн-Хаукаля, Матча входила в состав горной области Буттам и являлась одним из её рустаков, не имевших городов.

Имеется описание этой области и в «Худуд ал-алам», где она упоминается под названием Буттаман. [9]

В период, предшествовавший арабскому завоеванию, горные рустаки Матча и Бургар (Фальгар) описываются как входящие в состав Усрушаны.

Тем не менее, они были тесно связаны не только с городами и селениями Усрушаны, но и с центром Согда - Самаркандом. Связи носили не только торговый, но и культурный характер. [5]

Героическое сопротивление оказывало население горных рустаков арабским завоевателям. Буттам был завоеван при наместнике Хорасана ибн Мухаллабе (701 – 704) его сыном Мухалладом, но через некоторое время население Буттама, подняв восстание, прогнало оставленный арабами гарнизон и вернуло себе независимость. При Кутейбе ибн

Муслиме в эти районы вновь были посланы арабские войска, на этот раз во главе с Джахма ибн Захром и Буттам вновь был покорен. Однако и впоследствии, вплоть до IX в. горным рустакам почти всегда удавалось ослабить свою зависимость от власти арабов. [1]

По мнению А.Ю. Якубовского, ислам был внедрён в верховьях Зеравшана гораздо позже, чем в равнинной Усрушане, - только в X в.

Ещё недавно существовало ошибочное мнение, что в бассейне Верхнего Зеравшана и связанных с ним рек очень много пришлого населения из долин Мавераннахра. Вероятно, это мнение основывается на показаниях местных жителей. Так, о Матче старики рассказывали, что их предки якобы были высланы сюда из Самарканда при Александре Македонском, эти места специально служили местом ссылки. [6]

Данные истории свидетельствуют о том, что «таджики бассейна Верхнего Зеравшана и связанных с ним рек – потомки местных согдийцев в такой же мере, как таджики Самарканда и Среднего Зеравшана являются потомками согдийцев, живших когда-то в этих районах». [10]

К сожалению, мы пока не располагаем подробными сведениями об истории Матчи вплоть до XIX в. Известно лишь, что при Тимуридах горные районы Усрушаны, в том числе и Матча, входили в Шавждарский тюмень. [1-]

С XVI в. до второй половины XIX в. области Верхнего Зеравшана входили в состав Бухарского ханства, разделяясь на бекства: Матчинское, Фальгарское, Ягнобское и Фанское. Территория этих бекств, отрезанных от остального среднеазиатского мира высокими горами, во многом отличалась от равнинных районов Бухарского ханства. Беки распоряжались в своих владениях совершенно самостоятельно и вели междоусобные грабительские войны, которые обычно заканчивались полным покорением и разграблением одного бекства другим. [7]

В середине XIX в. в Матче правил бек Ботур-Ходжа, отличившийся своеобразием и жестокостью.

Постоянной резиденцией беков был кишлак Пальдорак, расположенный в верховьях Матчи.

В начале 60-х годов XIX в. началось наступление царских войск на Среднюю Азию. В 1866 г. были заняты Ходжент и Ура-тюбе, а в 1868 г. Самарканд. Летом 1870 г. русскими войсками была предпринята так называемая Искандер-Кульская экспедиция, в результате которой к среднеазиатским владениям России была присоединена вся территория верховья Зеравшана. С этого времени территория бывшего Матчинского бекства стала входить, в качестве отдельной волости, в Самаркандский уезд.

Матчинская волость подразделялась на ряд «обществ» (джамоат). Центрами джамоатов обычно были крупные селения, названия которых и присваивались данному «обществу». Таких джамоатов в Матчинской волости были четыре: Обурдонская, Пастигавская, Мадрушкентская и Пальдоракская.

Природные условия Матчи не давали возможности населению обеспечить себя хлебом и другими продуктами, и поэтому местные жители закупали хлеб на ближайших к Матче базарах. Для населения нижематчинских кишлаков такими базарными пунктами служили Ура-тюбе, для населения верхнематчинских кишлаков (Мадрушкентское и Пальдоракское «общества») – базары Гиссарского и Каратегинского бекств. Иногда зерно привозилось из Искандерской волости. Недостаточная обеспеченность продуктами своего земледельческого и скотоводческого хозяйства, суровые условия жизни способствовали широкому развитию отхожих промыслов. Ежегодно от 25 до 75 процентов взрослого мужского населения шло на заработки. Обычно уходили два раза в год: весной, после полевых работ до уборки, и осенью после снятия урожая до начала весны. Наиболее бедные жители оставались на заработках целый год, а иногда и больше года. Уходя на заработки в летний период, матчинцы чаще всего нанимались на полевые работы в пределах окрестных уездов – Ходжентского, Джизакского и Самаркандского. На зимний же период горцы обычно отправлялись в города – Самарканд, Коканд, Ташкент и Бухару. Здесь они поступали на подённые работы в качестве чернорабочих. [8]

Местные пути сообщения представляли собой узкие, пробитые по откосам горных хребтов зигзагообразные тропы, проложенные по горным ущельям вдоль течения рек. Передвигаться по этим тропам было опасно. [2]

В первый период после свершения Октябрьской социалистической революции в Матче установилась Советская власть. Однако впоследствии Матча была занята басмаческими бандами и лишь в апреле 1923 г. освобождена частями Красной Армии. В 1929 г. был организован Матчинский район Ходженского округа с центром в кишлаке Мадрушкат. В 1935 г. кишлак Мадрушкат переименован в кишлак Матча. [5]

Указом Президиума Верховного Совета Таджикской ССР от 27 ноября 1956 года был образован Матчинский район (тадж. *ноҳияи Мастҷоҳ*) — административный район в Согдийской области Республики Таджикистан,

тогда в составе Ленинабадской области Таджикской ССР путём заселения местной равнины жителями из ликвидированного в 1956 году горного Матчинского (ныне Горно-Матчинского) района. Районный центр — посёлок городского типа Бустон, расположенный в 56 км северо-западнее города Худжанда. Расстояние до Душанбе — 360 км. Территория Матчинского района составляет 1000 км². Матчинский район расположен в Ферганской долине. На севере граничит с Ташкентской областью Узбекистана, на востоке и юге — с Гафуровским районом, на западе — со Спитаменским районом Согдийской области.

Матчинский район перенесён на территорию вновь осваиваемого Дальверзинского массива (к северу от Ленинабада). Все приводимые ниже сведения об административном делении и экономике района относятся к периоду до опубликования данного Указа. В Матчинском районе имеется 7 сель-



советов: В состав Матчинского района входят 3 посёлка городского типа (Бустон, Обшорон, Сугдиён) и 4 сельские общины (тадж. *ҷамоат*):

В районе Горной Матчи развиты животноводство и зерновое хозяйство (посевы пшеницы, ячменя и бобовых). В некоторых нижнематчинских сельсоветах (Обурдон, Падрох, Эсиз) население занимается также садоводством.

Районный центр, расположенный в кишлаке Матча (ранее Мадрушкат), связан автомобильным сообщением с Душанбе, Ленинабадом и Самаркандом.

Расстояние от райцентра до Душанбе и Самарканда одинаковы – 280 км, расстояние до Ленинабада 292 км. В летний период, примерно с середины июня до конца октября, по этим дорогам идут автомашины, доставляющие в Матчинский район различные грузы.

В течении зимнего периода действовал лишь одна дорога, ведущая в Самарканд (через Айни – бывший Захматабад) и Пенджикент. Дороги в Душанбе и Ленинабад зимой закрывались, так как в этот период горные перевалы (Анзоб и Шахристан) заносятся снегом.

Внутри района, все центры сельсоветов кроме сельсовета Гузн, также связаны автомобильной дорогой.

Кишлаки, расположенные в стороне от автомобильной дороги, связывались между собой выючными тропами.

Основное население района составляют таджики. В райцентре имеется незначительное число русских, которые хорошо владеют таджикским языком. Узбекского и киргизского населения совсем нет. [9]

Почти нет, и переселенцев из других районов Таджикистана. Во всем районе насчитывается всего две – три семьи переселившихся из Каратегина. Зато не раз происходили значительные переселения из Матчи в другие районы Таджикистана. Имеются данные о наличии переселенцев из Матчи в Каратегин и Ворух. [3]

До Великой Октябрьской революции почти все население Матчи было неграмотным. Лишь отдельные, наиболее зажиточные люди имели возможность получить духовное образование в медресе Самарканда или Бухары.

После изгнания басмаческих банд, особенно после проведения коллективизации, население Матчинского района стало приобщаться к культуре и грамотности.

В районе Горной Матчи в 1925 году были 2 средние школы, несколько неполных средних и начальных школ. В центре каждого сельсовета работали клуб и библиотека, многие дома имели радиоприёмники. Издавалась районная газета «Байраки ленинӣ» («Ленинское знамя»).

После получения независимости в 1996 году был образован (2 февраля 1996 года) район Горной Матчи с населением 22800 человек.

Что касается Матчинского района переселившиеся из района горной Матчи в 1956 году в основном выращивают хлопок и созданные коллективные хозяйства помогают людям встать на ноги. Территория куда переселили население раньше, называлась Мирзочульская степь. Для того, чтобы

люди выращивали хлопок в Матчинском районе было построено пять каналов. В 1970-ых годах матчинцы сдали государству 60 тысяч тонн хлопка.

Хлопководство очень хорошо повлияло на политическую и социальную жизнь населения. Созданные колхозы и совхозы объединили людей, научили их работать вместе и получать хороший урожай, чтоб улучшить жизнь. В кратчайшем сроке Матчинцы сами научились выращивать хлопок и первыми не только выполняли, но и перевыполняли государственный план.

Во времена Советского Союза, все колхозы и совхозы были названы именами героев революционеров и героев Советского Союза. Например: колхоз имени Ленина, колхоз имени Жданова, колхоз имени Куйбышева, колхоз имени Орджоникидзе, колхоз «Комсомол», совхоз «Правда» и совхоз «Техникум».

Сельская местность была названа исходя из численности махали. Например: сельсовет «Оббурдон», сельсовет «Палдорак», сельсовет «Матча», поссовет «Бустон». Оббурдон и Палдорак это название сёл, в которых больше населения, чем в других кишлаках.

Политическая и социальная ситуация Советского Союза повлияла не только на названия колхозов и совхозов, но и на наречения людей. До создания СССР у таджиков было собственное имя и имя отца. Например: Насриддини Махадшариф, Гадо Умар, Амини Азим и т.п., но для того, чтобы определить, чей это сын ещё прибавляли определительные слова. Например: Насриддин писари Усто Махадшариф, Гадо Умари муаллим, Амин Азими муаллим и т.п., также если в одном селе много одинаковых имён, то в обязательном порядке к именам добавлялось прозвище. Например: Сафари Гафс – толстый Сафар, Мирзои сурх – красный Мирзо, Махадшарифи нишолло – Махадшариф кондитер, Сафари пучук – курносый Сафар и т.п. [4]

Во времена Советского Союза сначала была фамилия и имя, и добавился суффикс «-ов». Например: Шарифов Насриддин, Азимов Амин, Умаров Гадо и т.п. Начиная с 1957 году как и русские фамилии таджики тоже назывались тремя именами, то есть фамилия, имя и отчество. Например: Насриддинов Хусниддин Шарифович, Шарифов Камол Саидахмадович и т.п.

Для того, чтобы получить призвание, некоторые люди называли своих детей такими именами как: Мелс – то есть Маркс, Энгельс, Ленин, Сталин или Ким – Комсомольско-Интернациональная Молодёжь. С социальной точки зрения люди называли своих детей: Гадо – попрошайка, Бой – богатый, Сардор – руководитель, Раис – председатель и т.п. [4]

После распада Советского Союза в 1991 году Республика Таджикистан как и другие республики получила свою независимость. Каждый год 9<sup>го</sup> сентября мы отмечаем день независимости нашей Республики. В течение тридцати лет (1991-2021) было сделано очень много в политической и социальной сфере. Первым делом надо было разрабатывать стратегический план развития страны, то есть первым надо было решать проблему электрификации, и вторым проблему коммуникации, которая, очень

сильно повлияла на экономическую ситуацию нашей страны. Третьей проблемой была безопасность продуктов. Четвёртая стратегия, которую мы стремимся выполнить, это развитие индустрии, то есть из аграрно-индустриальной республики мы должны стать индустриально-аграрной страной.

Кроме того независимость республики повлияла не только на экономическую, социальную и политическую ситуацию, но и на нарекание различных отраслей и местностей. Например: улицу имени Ленина – переименовали на улицу имени И. Сомони, колхоз «Комсомол», теперь называется колхоз имени Юсуф Вафо, школа имени Ленина называется - школа имени Заслуженного учителя СССР Умар Гадо, колхоз имени Жданова, переименовали на колхоз имени Фирдавси, колхоз имени Орджонкидзе переименовали на Сомониён, колхоз Зарафшон переименовали на имя Героя Социалистического труда Навруза Раджабова, который являлся легендарным председателем правления колхоза Зарафшон. В районе созданы более 3000 дехканских хозяйств, где 2600 из них названы именами людей. Например дехканское хозяйство «Шарифиён», «Азизиён», «Хусейновхо», «Зафариён» и т.п. [4]

Таким образом, любая политическая, экономическая, культурная и социальная ситуация обязательно влияет на изменение название людей, предприятий и организации. Как и было сказано, до завоевания Средней Азии арабами, у людей было имя и имя отца, но когда захватили Среднюю Азию, к именам добавилось имя пророка Мухаммада.

Когда Среднюю Азию оккупировали монголы под руководством Чингизхана, к именам людей добавили слова «бек». После того, когда Средняя Азия вошла в Российскую империю, у людей были только фамилия и имя с прибавлением суффикса «-ов». Начиная с 1957 году, людям давали фамилию, имя и отчество. После получения независимости 1991 году, в место суффикса «-ов» к фамилиям добавили «-зода» или «-заде», «-ён», «-пур». Например: Шарифзода или Шарифзаде, Олимпур, Шарифиён и т.п., также это повлияло на название дехканских хозяйств, предприятий, местность, название проспектов и улиц.

### References

1. Aminov P.R., The Military-Topographical Sketch of the Mountainous Country of the Upper Zeravshan River, Materials for Statistics of the Turkistan Territory, vol. III SPb.187, pp.8-9. 2.
2. Ibn-Haukal, Bibliotheca Geographorum Arabicorum, vol. II. Lugduni Batavorum, 1953. p. 110. 110.
3. N.A.Kislyakov, Some materials on ethnography of Isfara Tajiks, Izv. General Sciences of the Tajik SSR, №5, 1957, p. 3. SSR, №5, 1954, p. 61
4. Nasruddinov S.M., Naming of people during the period of Islamic religion in Central Asia. Proceedings of the Academy of Sciences of the Republic of Tajikistan. (Department of Social Sciences). №2 (259), 2020г. С. 240.

5. Negmatov N.N., Historical and geographical sketch of Urushan from the most ancient times to X century AD. H.H. Historical and geographical sketch of Urushan from the most ancient times in X SSE. Archaeological Expedition. v.Y. MIA. NO.37, M-L 1953. P.239.

6. Negmatov N.N., Urushana in struggle against Arabian invasion (the end of VII, the first half IX centuries), Izv. N.N.Uruz mashaniye to resist Arabian invasion (the end of VII - first half IX), Dushanbe, 1954, №5, p.105. 105.

7. Nemenova R.L., The preliminary report on work during Garm ethnographic expedition. Dokl. of Academy of Sciences of Taj. SSR, vol. IX, 1953, p.61. 61

8. Smirnova O.I., Voprosy historichnykh topografii i toponymiki Verkhneye Zeravshan [Issues of historical topography and toponymy of the Upper Zeravshan], MIA, #15, M - L, 1950, p. 58. 58.

9. Hudud al-alem, rkp. Tumanskyi. Izd. of the Academy of Sciences of the USSR. Л. 1930, 236.

10. Yakubovsky A.Y., Results of works of expedition in 1946 - 1947. Tr. I. Yakubovskiy, The results of works of expedition in 1946 - 1947, vol. Archaeological Expedition, MIA, #15, M. - L., p.28.

### Список используемой литературы

1. Аминов П.Р., Военно – топографический очерк горной страны верховьев р. Зеравшана, Материалы для статистики Туркестанского края, вып. III СПб.187, стр.8-9.
2. Ибн - Хаукал., Bibliotheca Geographorum Arabicorum, vol. II. Lugduni Batavorum, 1953. стр. 110.
3. Кисляков Н.А., Некоторые материалы по этнографии исфаринских таджиков, Изв. Отдел. Общ. Наук Тадж. ССР, №5, 1954, стр. 61
4. Насруудинов С.М., Именование людей в период исламской религии в Средней Азии. Известия Академии наук Республики Таджикистан. (Отделение общественных наук). №2 (259), 2020г. С. 240.
5. Негматов Н.Н., Историко географический очерк Усрушаны с древнейших времён по X в.н.э. Тр. Тадж. Археологической экспедиции. т. II. МИА. №37, М-Л 1953. Стр.239.
6. Негматов Н.Н., Усрушана в борьбе с арабским нашествием (конец VII, первая половина IX вв.), Изв. Отдел. общ. Наук АН Тадж. ССР, Душанбе, 1954, №5, стр. 105.
7. Неменова Р.Л., Предварительный отчёт о работе во время Гармской этнографической экспедиции. Докл. АН Тадж. ССР, вып. IX, 1953, стр. 61
8. Смирнова О.И., Вопросы исторической топографии и топонимики Верхнего Зеравшана, МИА, №15, М – Л., 1950. стр. 58.
9. Худуд ал-алем., ркп. Туманского. Изд. АН СССР. Л. 1930, 236.
10. Якубовский А.Ю., Итоги работ экспедиции в 1946 – 1947 гг. Тр. Тадж. Археологической экспедиции, МИА, №15, М. – Л., стр. 28.



## TECHNICAL SCIENCES

### RESEARCH OF THE EFFICIENCY OF THE TECHNOLOGY OF EXTRACTION OF JUICE FROM TABLE BEET USING ELECTROPLASMOLYSIS AND OF THE ENZYME PREPARATION "PECTINASE"

Papcenco A.,  
Bologa M.,  
Grecu G.

*Institute of Applied Physics  
Moldovan State University,  
MD -2028, Chisinau Akademicheskaya st.,5  
[DOI: 10.5281/zenodo.7942068](https://doi.org/10.5281/zenodo.7942068)*

### ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ ТЕХНОЛОГИИ ИЗВЛЕЧЕНИЯ СОКА ИЗ СТОЛОВОЙ СВЕКЛЫ С ПРИМЕНЕНИЕМ ЭЛЕКТРОПЛАЗМОЛИЗА И ФЕРМЕНТНОГО ПРЕПАРАТА «ПЕКТИНАЗА»

Папченко А.Я.,  
Болога М.К.,  
Греку Г.Д.

*Институт прикладной физики  
Молдавского государственного университета,  
MD - 2028, Кишинев ул.Академическая 5,*

#### Abstract

The results of experimental studies of the effect of electropasmolysis and enzymatic treatment on the process of extracting juice from table beets are presented. It has been established that the preliminary processing of raw materials by electropasmolysis and the enzymatic preparation "pectinase" can significantly increase the yield of juice from table beets.

#### Аннотация

Представлены результаты экспериментальных исследований влияния электроплазмолиза и ферментативной обработки на процесс извлечения сока из столовой свеклы. Установлено, что предварительная обработка сырья электроплазмолизом и ферментативным препаратом «пектиназа», позволяют существенно увеличить выход сока из столовой свеклы.

**Keywords:** electropasmolysis, bipolar pulses, vegetable raw materials.

**Ключевые слова:** электроплазмолиз, биполярные импульсы, растительные сырье.

Сок свеклы - это источник марганца, меди, цинка и, что особенно важно, йода. За счет этих веществ стимулируется процесс кроветворения и обмен веществ, половая функция, активизируется действие инсулина, улучшается зрение. Поступление в организм йода из свеклы позитивно отражается на функционировании щитовидной железы. Свекольный сок богат антиоксидантами, витаминами и минералами. Он содержит витамины группы В, витамин С, флавоноиды, железо и значительное количество нитратов. Увеличивает в организме уровень оксида азота, который, усиливает сокращения мышц, улучшает работоспособность. В соке столовой свеклы, соотношение кальция и натрия - 1:10. Именно такое соотношение минералов способствует устранению кальция, который накапливается в сосудах.

Свекольный сок также содержит пигменты, которые помогают снизить артериальное давление и укрепить капилляры.

Исследователи из Университета Эксетера в Великобритании считают свекольный сок прекрасным энергетическим напитком [1-2].. Он повышает выносливость на 16 процентов. Это объясняется тем, что сок столовой свеклы богат оксидом азота, полифенолами, ресвератролом и бетаином АА. Все эти вещества помогают клеткам лучше использовать энергию, а оксид азота не только расширяет сосуды человека, но и помогает клеткам производить энергию. Такие вещества и соли, растворенные в соке, помогают человеческому организму снизить потребность в кислороде. В принципе, такие соки ученые считают допингом, который не запрещен, дешев и доступен. В технологии извлечения сока из столовой свеклы отмечается низкий выход сока. Существуют способы увеличения выхода сока из растительного сырья: измельчение, тепловая обработка, электроплазмолиз [4-5].. Нами проведены исследования влияния электроплазмолиза и ферментного препарата «Пектиназа» на выход сока из растительного сырья

В качестве объекта исследования принята столовая свекла сорта «Цилиндра» цилиндрической формы.

Опыты проводились на экспериментальной установке [3], которая позволяет в широком диапазоне.

регулировать амплитуду импульсов и количество ферментного препарата.

Подготовка и проведение экспериментов проводились в три этапа.

На первом этапе проведены исследования зависимости выхода сока из столовой свеклы от величины частиц при измельчении: 1- крупное измельчение 5-6 мм; 2- среднее измельчение 3-4мм; 3- мелкое измельчение 1-2 мм.

Результаты приведены в таблице 1 и графиках на рис.1.

Таблица 1

№ пп	Время прессования, мин	Давление, кг/см <sup>2</sup>	Выход сока, %		
			Кривая 1	Кривая 2	Кривая 3
			Мезга без обработки, крупное измельчение	Мезга без обработки, среднее измельчение	Мезга без обработки, мелкое измельчение
	0	0 (Самотек)	0	0	0
1	0,5	0,15	3,02	14,3	20,76
2	1,0	0,30	8,16	20,06	28,11
3	1,5	0,45	13,03	23,39	30,85
4	2,0	0,60	15,15	26,02	33,99
5	2,5	0,75	17,05	30,9	36,64
6	2,5	0,75	20,12	32,87	37,81

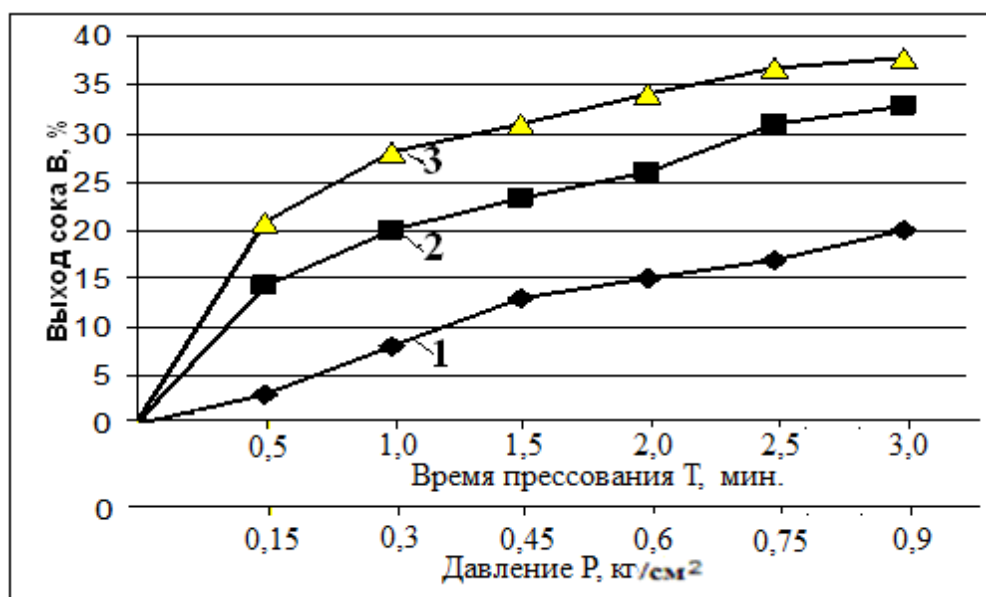


Рис.1 Зависимость выхода сока из столовой свеклы от величины частиц при измельчении: 1- крупное измельчение 5-6 мм; 2- среднее измельчение 3-4мм; 3- мелкое измельчение 1-2 мм

Из таблицы 1 и графиков рис.1 видно, что в результате исследований, установлено увеличение выхода сока из мезги с малыми величинами частицами при измельчении перед процессом прессования. Это объясняется повреждением большего количества клеток при мелком дроблении сырья.

На втором этапе проведены исследования зависимость выхода сока из столовой свеклы при

мелком измельчении: без обработки; после обработки электроплазмолизом и и после обработки ферментным препаратом.

Результаты исследований приведены в таблице 2 и графиках на рис.2.

Таблица 2.

№ пп	Время прессования, мин	Давление, кг/см <sup>2</sup>	Выход сока, %		
			Этап 1	Этап 2	Этап 3
			Мелкое измельчение без обработки Кривая 1	После обработки электроплазмой (ЭП), 50 Вт/кг Кривая 2	После обработки ферментным препаратом (ФП), 0,1 г/кг Кривая 3
1	0	0	0	0	0
2	0,5	0,15	28,11	42,5	42,8
3	1,0	0,30	30,85	56,0	48,8
4	1,5	0,45	33,99	59,7	51,0
5	2,0	0,60	36,64	61,4	52,4
6	2,5	0,75	37,81	62,2	53,5

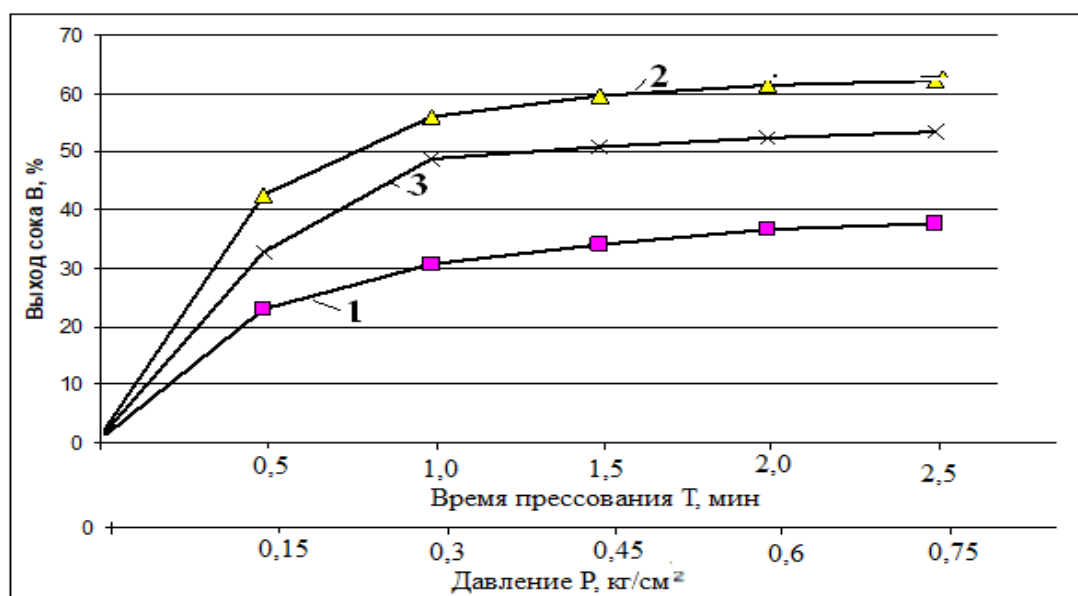


Рис.2 Зависимость выхода сока из измельченной столовой свеклы при мелком измельчении без обработки кривая 1, после обработки электроплазмой кривая 2 и после обработки ферментным препаратом кривая 3.

Из таблицы 2 и графиков рис.2 видно, что в результате исследований, установлено максимальное увеличение выхода сока из мезги столовой свеклы обработанной электроплазмой. Это объясняется повреждением при электроплазме сырья наибольшего количества клеток.

#### Заключение:

В результате исследований установлено, что на процесс извлечения сока из столовой свеклы существенное влияние оказывает степень измельчения и удельная энергия плазмы сырья. Увеличение степени измельчения и величины удельной энергии электроплазмы повышает выход сока. Это объясняется тем, что за счет измельчения и электроплазмы повышается проницаемость ткани столовой свеклы.

#### References

1. Myasoedova J. Beetroot juice - what are the benefits? <https://shuba.life/ru/authors/myasoyedova> 25.11.2022
2. Kardovsky A.A. Improvement of technology and development of products on the basis of beet juice

/ A.A. Kardovsky, M.A. Kozhukhova // Proceedings of the II International Symposium "Food biotechnology: problems and prospects in the XXI century. - Vladivostok, 2004. - С. 143-144.

3. Papchenko A.Y., Bologa M.K., Popova N.A. Research of efficiency of technology of extraction of grape juice with application of electropulsolysis and enzyme preparation Journal of science. Lyon VOL.1 ISSN 3475-3281 № 18 2021 P. 42-45.

4. Toepfl, S., V. Heinz, and D. Knorr, Applications of pulsed electric field technology for the food industry, in Pulsed electric field technology for the food industry, J. Raso and V. Heinz, Editors. 2006, Springer: Berlin. p. 197-221.

5. Popova N.A., Papchenko A.Y., Bologa M.K. Electropulsolysis of grapes using bipolar pulses Electronic processing of materials. 2014, 50(6) 83-91

#### Список использованной литературы

1. Мясоедова Ю. Свекольный сок – в чем польза? <https://shuba.life/ru/authors/myasoyedova> 25.11.2022г.

2. Кардовский А.А. Совершенствование технологии и разработка продуктов на основе свекольного сока / А.А. Кардовский, М.А. Кожухова // Сборник материалов II Международного симпозиума «Пищевые биотехнологии: проблемы и перспективы в XXI веке». – Владивосток, 2004. – С. 143-144.

3. Папченко А.Я. Болога М.К. Попова Н.А. Исследование эффективности технологии извлечения сока из винограда с применением электроплазмолы и ферментного препарата Journal of science. Lyon VOL.1 ISSN 3475-3281 №18 2021 С. 42-45.

4. Toepfl, S., V. Heinz, and D. Knorr, Applications of pulsed electric field technology for the food industry, in Pulsed electric field technology for the food industry, J. Raso and V. Heinz, Editors. 2006, Springer: Berlin. p. 197-221.

5. Попова Н.А., Папченко А.Я., Болога М.К. Электроплазмоллиз винограда с применением биполярных импульсов Электронная обработка материалов. 2014, 50(6) 83-91

**Deutsche internationale Zeitschrift  
für zeitgenössische Wissenschaft**

...  
**№56 2023**

**German International Journal  
of Modern Science**

...  
**№56 2023**

Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft ist eine internationale Fachzeitschrift in deutscher, englischer und russischer Sprache.

Periodizität: 24 Ausgaben pro Jahr

Format - A4

Alle Artikel werden überprüft.

Freier Zugang zur elektronischen Version des Journals

German International Journal of Modern Science is an international, German/English/Russian/Ukrainian language, peer-reviewed journal.

Periodicity: 24 issues per year

Format - A4

All articles are reviewed.

Free access to the electronic version of journal.

- Edmund Holst (Salzburg) AT
- Michaela Meissner (Köln) DE
- Klara Amsel (Liège) BE
- Briana French (Cambridge) GB
- Joleen Parsons (Manchester) GB
- Dragomir Koev (Sofia) BG
- Stanislav Štěpánek (Praha) CZ
- Valeriya Kornilova (Kyiv) UA
- Dmitriy Aksenov (Lviv) UA
- Valentin Bragin (Moscow) RU
- Mirosław Bednarski (Warsaw) PL
- Daniela Villa (Florence) IT
- Mattia Molteni (Rome) IT
- Sylwia Krzemińska (Ljubljana) SI
- Käte Kraus (Vienna) AT
- Eleonora Lehmann (Berlin) DE
- Alexander Dressler (Marseille) FR
- Zdzisław Małecki (Warsaw) PL
- Adrián Borbély (Budapest) HU

- Edmund Holst (Salzburg) AT
- Michaela Meissner (Köln) DE
- Klara Amsel (Liège) BE
- Briana French (Cambridge) GB
- Joleen Parsons (Manchester) GB
- Dragomir Koev (Sofia) BG
- Stanislav Štěpánek (Praha) CZ
- Valeriya Kornilova (Kyiv) UA
- Dmitriy Aksenov (Lviv) UA
- Valentin Bragin (Moscow) RU
- Mirosław Bednarski (Warsaw) PL
- Daniela Villa (Florence) IT
- Mattia Molteni (Rome) IT
- Sylwia Krzemińska (Ljubljana) SI
- Käte Kraus (Vienna) AT
- Eleonora Lehmann (Berlin) DE
- Alexander Dressler (Marseille) FR
- Zdzisław Małecki (Warsaw) PL
- Adrián Borbély (Budapest) HU

## Artmedia24

Anschrift: Industriestraße 8,74589 Satteldorf  
Deutschland.

**E-mail:** info@dizzw.com

**WWW:** www.dizzw.com

**Chefredakteur:** Reinhardt Roth

**Druck:** Einzelfirma Artmedia24, Industriestraße  
8,74589 Satteldorf Deutschland

## Artmedia24

Address: Industriestrasse 8,74589 Satteldorf  
Germany.

**E-mail:** info@dizzw.com

**WWW:** www.dizzw.com

**Editor in chief:** Reinhardt Roth

**Printing:** Artmedia24, Industriestrasse 8,74589 Satteldorf Germany.

Der Redaktionsausschuss der Zeitschrift ist nicht  
verantwortlich für die veröffentlichten Materialien.

Für den Inhalt der Artikel sind die Autoren verantwortlich.  
Die Meinung der Redaktion spiegelt nicht unbedingt  
die Meinung der Autoren wider.

Bei Nachdrucken muss die Zeitschrift zitiert werden.

Das Material wird im eigenen Wortlaut des Autors  
veröffentlicht.

Editorial board of journal is not responsible for the  
materials published there.

Authors are responsible for the content of articles.

Opinion of editorial board may not coincide with the  
opinion of authors.

In case of materials reprinting - link to journal is required.

Materials are publishing in author's edition.

**ISSN (Print) 2701-8369**

**ISSN (Online) 2701-8377**

Edition: № 56/2023 (May) – 56<sup>th</sup>

Passed in press in May 2023

Printed in May, 2023

**Printing:** Artmedia 24, Industriestrasse 8,  
74589 Satteldorf, Germany.

artmedia<sup>24</sup>

© Artmedia24

© Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft / German International Journal  
of Modern Science

