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ДОКЛАДЫ

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EXPERIMENTAL RESEARCH OF THE SIMULATION MODEL FOR DETERMINISTIC SECURE COMMUNICATION PROTOCOL IN QUANTUM CHANNEL WITH NOISE

Abstract. Today there are many methods and approaches used to ensure the privacy of message transmission without encryption. The most advanced technology is quantum cryptography and quantum secure direct communication in particular. It allows information transmission using open channel without previous encryption. From this viewpoint, in this work there was carried out experimental research of the proposed simulation model for deterministic secure direct communication protocol in the quantum channel with noise for qutrit pairs in eavesdropping control mode. Given results can be used for quantum cryptography systems constructing and optimization from viewpoint of asymptotic security as well as its operation rate.

Key words: information security, quantum cryptography, deterministic protocol, quantum key distribution, quantum secure direct communication, qubit, qutrit.

Introduction

The theory of quantum mechanics, which is the basis of quantum cryptography, allows to improve all possible modern methods of ensuring the information transmission security, to solve the problems of encryption keys distribution that exist in classical (non-quantum) cryptography. Quantum secure direct communication protocol provide secrecy (this term in quantum cryptography denotes confidentiality and/or privacy) of the messages transmission without the use of any encryption methods, since this secrecy is guaranteed by the incomprehensibility of the postulates of quantum physics [1-2]. In deterministic quantum protocols [1,3] two-level, and more often multi-level quantum states of quantum systems groups are used to encode the source text of a secret message that are transmitted via a quantum communication channel. The laws of quantum physics guarantee the detection of eavesdropping in the communication channel, which allows legitimate users (e.g. subjects / users A and B) to detect the intruder (user E) during the communication session and to interrupt the communication session.

Related works

Nowadays, there have been carried out many researches of various types of deterministic quantum secure communication protocols, which can be implemented already on the basis of the available and used technical equipment for the information transmission [4]. This version of the protocol uses two Bell states of an entangled pair of qubits and allows one bit of classical information to be transmitted over one protocol cycle [1]. Using four states of a pair of Bell qubits, that is, using quantum superdense coding, it is possible to increase the number of transmitted bits per cycle by two times [2]. In order to build up the

information capacity, instead of the entangled pairs of qubits, there can used their triples, quarks, etc. The protocol with the entangled states of the Greenberger-Horn-Zeilinger (GHZ) triples and quadruples of qubits provides an information capacity equal to *n* bits per cycle, that is, the amount of qubits in the used states of GHZ. Also, in order to increase the information capacity of deterministic protocols, it is possible to use entangled states of multi-level quantum systems - for example, in works [6, 7] a protocol using Bell states of a pair of three-level systems (qutrits) and quantum superdense coding for qutrits. Various types of attacks, in particular a general incoherent attack on various versions of the protocol, including a protocol with pairs of qutrits, were considered in works [5-8]. During an attack, the intruder E can obtain some information before he is detected [8, 11-13]. The method of enhancing secrecy, based on the use of random invertible matrices [13], was investigated in work [14]. The model of the deterministic protocol proposed by the authors in work [15] with the use of an alternative method of enhancing secrecy [16] allows to conclude that there is no fact of eavesdropping.

Theoretical researches carried out in [15] confirm the occurrence of problems of synchronous fixation of the changes occurring in the states of transmitted photons, from collective effects in the channel of natural noise and from the intruder. The creation of a model simulating the operation of the protocol in the eavesdropping control mode will provide practical recommendations on the use of a quantum protocol in a channel with noise. Therefore, the purpose of this article is an experimental research of the simulation model of a deterministic protocol with pairs of qutrits in the eavesdropping control mode in a channel with noise.

Description of the method

As a result of the research of the deterministic protocol in a channel with noise, in the eavesdropping control mode there was revealed the problem of constructing a model allowing investigating a joint attack of the intruder and natural quantum noise in the channel. In the eavesdropping control mode there is considered the case of the impact on the transmitted quitrit of the noise operator.

The model simulates the operation of a deterministic protocol with pairs of quitrits in a depolarized channel at the presence of an intruder E. during the research and modeling of the deterministic protocol operation in the eavesdropping control mode there were obtained statistical data on error levels in the bases *x, z* and their average values [15]. In addition, the model used non-quantum method of enhancing the secrecy of the deterministic protocol, which is described in detail in works [9, 16].

In order to begin the process of message transmission, the user A converts his ternary message a $(a = (a_1, \dots, a_l), i = 1, \dots, l)$ of the length $r\cdot$, then for each block there is generated a random ternary sequence G $(G = (G_1, \dots, G_l),\ i = 1, \dots, l))$ of the size $r \times l$, each block of which is G_i bitwise summed according to the module 3 with the corresponding blocks of the message a_i:

$$b_i = a_i + G_i . \tag{1}$$

Further, with the help of the deterministic protocol, the message $b, (b = (b_1, \dots, b_l), i = 1, \dots, l)$, resulting according to (1), is transmitted to user B on the quantum channel. In case of message interception or its part by the intruder E, he cannot use it, because, without having randomly generated sequences G_i he cannot restore the original message a_i.

After completion of the transmission on the quantum channel, only if the users A and B are confident that the transmission session has not been overheard by the user E, the user B is transmitted sequences G_i along the classical open channel. In order to restore the original message, the user B must use the received random sequences by subtracting them from the corresponding message blocks according to (2):

$$a_i = b_i - G_i. \tag{2}$$

The length of the block *r* is chosen if a high level of stability can be achieved, and if the value of the probability of successful attack of the intruder of the user E after the transmission of one block s $(s(I, q, d) = \left(\frac{1-q}{1-q\cdot(1-d)}\right)^{I/I_0}$ was insignificant:

$$r = -kI_0 / \lg((1-q)/(1-q\cdot(1-d))), \quad (3)$$

where k - the exponent for calculating the probability of a non-detected attack of the intruder E; I_0 - the amount of information that the intruder E can receive in one cycle of the message transmission mode, q - the probability of switching to the eavesdropping control mode, d - the error level occurring from the actions of the intruder E. As a result of an experimental research of the simulation model of a deterministic protocol with pairs of quitrites in a depolarized channel with an attack of the intruder E, there were obtained statistical data on error levels in the bases x, z and their average values (see. table. 1 in [15]). In the above table, such designations and parameter values are accepted:

1) $length = 100000$ trit - length of the transmitted ternary data;

2) $k = 4$, that is $s(I,q,d,)10^{-k}$ - an exponent of ten, in order to calculate the probability of a non-detected attack of the intruder E;

3) $q = [0{,}1; 0{,}9]$ - probability of protocol switching between the eavesdropping control modes of and message transmission;

4) r - block length;

5) $d = 1/3$ - the error level occurring from the actions of the intruder E;

6) $d_x = 0 \ldots 2/3$ - the probability of attack detecting measured in the basis x;

7) $d_z = 2/3$ - the probability of attack detecting measured in the basis z;

8) $\rho = 0 \ldots 0{,}5$ - the probability of state depolarization;

9) $(1-\rho)$ - the probability of the qubit unchanged state;

10) $q_x = q_z = 0{,}5$ - the probability of switching of the users A and B between the basis x and z;

11) d_{Eva} - the average probability of attack detecting on two basis in an ideal channel;

12) l – the amount of blocks to which the transmitted data is divided;

13) Err_x, Err_z, Err_{mean} - the error probabilities for measurements in the basis x, z and the average value for the two basises;

14) $q, (1-q)$ - the probability of switching between the eavesdropping control modes and message transmission, respectively;

15) Err_x - the probability of modeling the error for the basis x;

16) Err_z - probability of modeling the error for the basis z;

17) $MinErrlvl_x$, $MinErrlvl_z$, $MinErrlvl$ - minimum values of error levels;

18) $MaxErrlvl_x$, $MaxErrlvl_z$, $MaxErrlvl$ - maximum values of error levels;

19) $MeanErrlvl_x$, $MeanErrlvl_z$, $MeanErrlvl$ - average values of error levels.

Experimental results

Analysis of the statistical data of the experimental research of the proposed simulation model. On Fig. 1-3 there are presented the diagrams of the dependencies of the *min* value of the error levels, $MinErrlv_l$ at modeling the deterministic protocol operation for different values of d_x, d_z, d_{Eva}, which are constructed on the basis of Tables 1-3.

Table 1 - Modeling results for $d_x=0$, $d_z=0{,}667$, $d_{Eva}=0{,}333$

q	p1	p2	p3	p4
0,1	0,091	0,154	0,231	0,304
0,25	0,115	0,167	0,2	0,36
0,5	0,08	0,154	0,24	0,296

Table 2 - Modeling results for $d_x=0,333$, $d_z=0,667$, $d_{Eva}=0,5$

q	p1	p2	p3	p4
0,1	0,226	0,227	0,318	0,353
0,25	0,263	0,29	0,32	0,343
0,5	0,263	0,29	0,32	0,343

Table 3-Modeling results for $d_x=0,333$, $d_z=0,667$, $d_{Eva}=0,5$

q	p1	p2	p3	p4
0,1	0,382	0,367	0,423	0,419
0,25	0,385	0,333	0,381	0,375
0,5	0,381	0,37	0,353	0,32

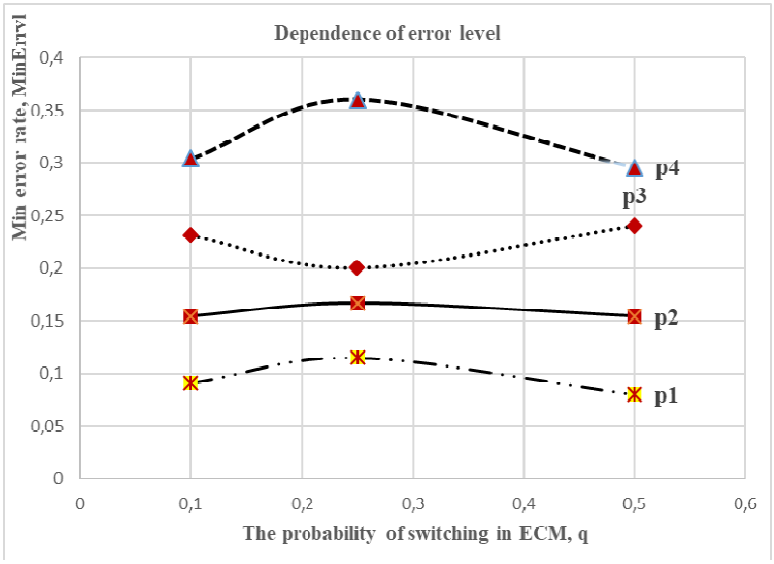

Figure 1 – Dependence of *min* error value levels, $MinErrlvl$ at modeling $d_x=0$, $d_z=0,667$, $d_{Eva}=0,333$ and the probability of depolarization of the state of quitrites from $\rho = 0,1$ to $\rho = 0,7$

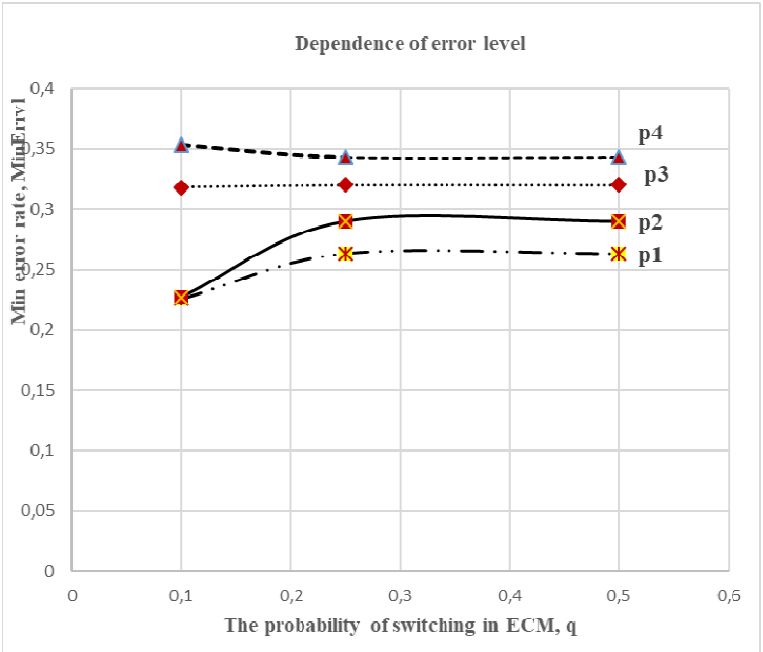

Figure 2 – Dependence of *min* error value levels, $MinErrlvl$ at modeling $d_x=0,333$, $d_z=0,667$, $d_{Eva}=0,5$ and the probability of depolarization of the state of quitrites from $\rho = 0,1$ to $\rho = 0,7$

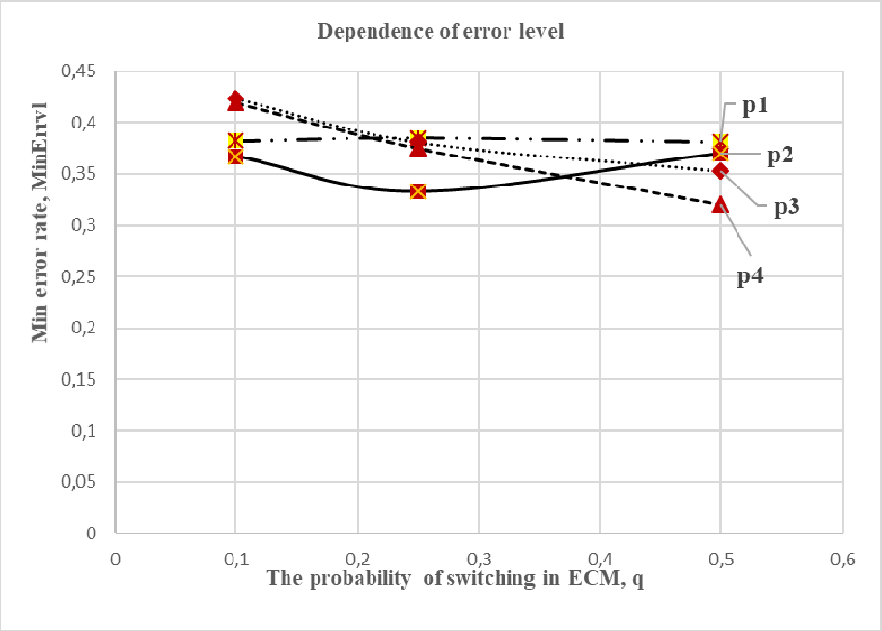

Figure 3 – Dependence of *min* error value levels, $MinErrlvl$ at modeling $d_x=0,333$, $d_z=0,667$, $d_{Eva}=0,5$ and the probability of depolarization of the state of quitrites from $\rho = 0,1$ to $\rho = 0,7$

Analyzing Fig. 1-3, the following conclusions can be done:

1. The minimum error levels for both basises (*MinErrlvl*) are sufficiently small and in most cases less than the level of natural noise ρ (especially for $\rho \to 0,7$). This means that the users A and B can make an incorrect conclusion about the presence of the intruder E, therefore, at a sufficiently high level of natural noise the legitimate users must transmit a sufficiently large amount of blocks and only then decide whether there is the attack of the intruder E;

2. The probability q significantly influences the data transmission rate by a deterministic protocol - the smaller q is, the more often the data is transmitted and the higher the speed is. In addition, the length of the block r also depends on q - with the decreasing q according to the exponential law it increases;

3. At $\rho \to 0,7$ and at the attack of the intruder E with zero error level in one of the basis (for example, $d_x=0$, $d_{Eva}=0,333$ - figure 1), the average error level of *MeanErrlvl* almost does not exceed p, therefore legitimate users can accept incorrect decision about the absence of the attack - it is necessary to check the average level of errors in each of the basises x and z separately, in one of these basises the error level will be close to the value $2/3$;

4. For reliable detection of the attack the legitimate users should use a quantum channel with a natural noise level - in practice this means using a channel of the limited length.

Conclusion and future work

Therefore, in this work there were carried out experimental researches of the simulation model of the secure direct communication protocol in a quantum channel with noise for a pair of quitrites in the eavesdropping control mode proposed by the authors earlier. The obtained results allow legitimate users to choose the most effective strategy for secure data exchange, depending on the level of noise in the quantum communication channel. These results can be used for the construction and optimization of the quantum cryptography systems in terms of increasing the asymptotic stability of the system and the speed of its operation.

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ШУЫ БАР КВАНТТЫҚ АРНАДА ҚАУІПСІЗДІК БАЙЛАНЫСТЫҢ ДЕТЕРМИНИСТИКАЛЫҚ ХАТТАМА ЖҰМЫСЫНЫҢ ИМИТАЦИЯЛЫҚ ҮЛГІСІНІҢ ЭКСПЕРИМЕНТТІК ЗЕРТТЕУЛЕР

Аннотация. Бүгінгі күнге шифрлауды қолданусыз хабарларды жіберудің құпиялығын қамтамасыз ету үшін көптеген әдістер мен көзқарастар бар. Ең дамыған технология кванттық криптография, соның ішінде кванттық түзу қауіпсіз байланыс. Ол ақпаратты ашық арнамен алдын ала шифрлаусыз жіберуге мүмкіндік береді. Осыған байланысты, берілген жұмыста тыңдауды бақылау режимінде кутриттер жұбы үшін шуы бар кванттық арнада авторлар ұсынған қауіпсіз байланыстың детерминистикалық хаттамасының имитациялық үлгісінің эксперименттік зерттеулері өткізілген. Алынған нәтижелер кванттық криптография жүйелерін жүйенің асимптотикалық беріктілігін және жылдамдығын жоғарлату көзқарасынан оңтайландыру және құру үшін қолдануға болады.

Түйін сөздер: ақпаратты қорғау, кванттық криптография, детерминистикалық хаттама, кванттық кілттерді тарату, кванттық түзу қауіпсіз байланыс, кубит, кутрит.

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ЭКСПЕРИМЕНТАЛЬНЫЕ ИССЛЕДОВАНИЯ ИМИТАЦИОННОЙ МОДЕЛИ РАБОТЫ ДЕТЕРМИНИСТИЧЕСКОГО ПРОТОКОЛА БЕЗОПАСНОЙ СВЯЗИ В КВАНТОВОМ КАНАЛЕ С ШУМОМ

Аннотация. На сегодняшний день существует много методов и подходов, используемых для обеспечения секретности передачи сообщений без применения шифрования. Самая развитая технология это квантовая криптография, в частности квантовая прямая безопасная связь, позволяющая передавать информацию по открытому каналу без предварительного шифрования. В этой связи, в данной работе проведены экспериментальные исследования предложенной авторами имитационной модели детерминистического протокола безопасной связи в квантовом канале с шумом для пары кутритов в режиме контроля подслушивания. Полученные результаты могут быть использованы для построения и оптимизации систем квантовой криптографии с точки зрения повышения асимптотической стойкости системы и скорости ее работы.

Ключевые слова: защита информации, квантовая криптография, детерминистический протокол, квантовое распределение ключей, квантовая прямая безопасная связь, кубит, кутрит.

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PHISYCO-CHEMICAL ANALYSIS OF A TIN-CONTAINING ELECTROLYTIC SLIME

Abstract. This article is devoted to the problems of formation and of determination of the tin-containing slime composition formed during the electrolytic tinning. Slimeformed in acidic or subacidelectrolytes is a product of hydrolysis containing hydrated salts and metal hydroxides, which is shown in this work on the example of tin.In alkaline electrolytes, along with specified tin compounds and impurity metals, sulphate compounds of metals can be present in the slime, since sodium sulfate is added to stabilize and increase the ionic strength of the electrolyte.

To assess the quality of tin-containing slime proposed for the research by Kasting LLP (Almaty), elemental, X-ray fluorescent, X-ray phase and IR spectroscopic analysis methods were used using the appropriate modern analytical equipment.

From the presented analysis results, it follows that the main components of the slime are tin, lead, copper and iron, with tin accounted for more than 11%, which implies that this slime could be considered as a rich secondary source of tin.Copper, lead and tin are present in the slime as Sn_3O_4, SnO_2, $CaSn(OH)_6$, Na_2SnO_3, $Na_4(Sn(OH)_3)_2(Sn_2O(OH)_4)$, $Na_2Sn(OOH)_6$, $CaCu(C_2H_3O_2)_4(H_2O)_6$, $Cu_3(SO_3)_2(H_2O)_2$, PbO_2, $NaPb_2(CO_3)_2OH$. Regarding other important metals, it is worth mentioning the presence of gold and silver in the slime.

It was additionally confirmed by IR-spectroscopic analysis that the slime contains the following groups: $[OH]^-$, $[SO_3]^{2-}$,$[HSO_3]^-$and $[SO_4]^{2-}$.

Keywords. Tin, tin-containing slime, hydrolysis, physico-chemical analysis, secondary raw materials.

Introduction. Nowadays, the production and consumption of tin in the world reaches significant proportions.Tin consumption data of 171 companies over the world, with a total refined tin consumption share of more than 47% in 2009, is shown in the table 1(source : ITRI – International Tin Research Institute).

Table 1 – Data on the consumption of primary refined tin in the world[1]

Product name	Refined tin consumption by year, thousand tons						
	2004	2005	2006	2007	2008	2009	2010
Solders	157.3	168.5	197.2	203.4	182.3	172.0	194.3
Tinplate	60.5	59.7	59.6	58.1	57.2	53.8	58.8
Chemicals	49.7	48.7	50.0	52.5	47.8	42.5	51.0
Brass and bronze	20.2	20.0	21.5	21.1	20.1	18.2	19.5
Glass	6.6	6.8	6.7	7.7	6.5	7.5	7.0
Other	33.5	31.9	32.7	30.0	34.5	26.2	29.7
Total	**327.7**	**335.5**	**367.7**	**372.7**	**348.4**	**320.2**	**360.3**

As follows from Table 1, more than 50% of tin consumption is accounted for by solders, and a significant amount - by tinplate, chemicals and alloys production. Moreover, it should be noted, that the consumption of solders tends to increase.

It is known that there is a shortage of tin in the world, so the return of secondary tin to production is of particular importance. Secondary tin is used in industry mainly in the form of alloys (bronze, solders, babbits), but some of it comes back in the form of pure metal during regeneration from various wastes.

Classification of tin-containing industrial wastes [2, 3], processed for the production of secondary alloys or pure tin, is given in Table 2.

Table2 – Classification of the main types of tin-containing waste

Type of tin waste	Content of tin, %
1. Bell bronze scrap	≥6.0
2. Cannon bronze scrap	≥6.0
3. Shavings and scrap of high-tin bronzes	≥6.0
4. Paper factories grid	≥2.0
5. Shavings and scrap of tin bronzes	≥2.0
6. Tin foil	≥ 98.5
7. Scrap and shavings of high-tin babbits	83.0
8. Scrap of typographic tin foams, babbits, die cutting, shavings of lead-tin babbit	≥ 5.0
9. Tin scraps, used cans and other	1-2
10. Lead-antimonic-tin solders (depending on the brand of solder)	1-95
11. Sludge, electrolytic sludge, etc.	≥1.0

The processing of tin-containing scrap and solders is most often done by melting them and by producing another tin-containing product (solders, bronze, pure tin). Tin scraps and bronze are often recycled using electrochemical technologies [2, 4-8].

A number of authors [9-11] propose to make the recycling of ash and electrolytic slimes,containing lead along with tin, in two main stages.

The first stage is soda-reduction melting, the main technological parameters of which are the following: temperature - 1523 + 50 K, consumption of reducing agent - 8.5%, consumption of soda - 3%. At this stage, the yield of the alloy reaches 48-52%, and the extraction of lead and tin into the alloy reaches 98 and 95%, respectively. At the second stage, it is proposed to conduct electrolysis using fluorosilicic and fluoboricelectrolytes and the following process conditions :current density - 200 A / m2, cathode sediment build-up time - 96 hours, electrolyte circulation - 0.9 m3 / h, electrolyte adjustment for lead.An alloy with a content of 60-65% Pb and 34-39% Sn, which is useful as analloy for the preparation of solders [9-11], is produced on the cathode.

Such types of waste always attract the attention of scientists and researchers. The electrolytic slime, which was chosen as the object of this research, is of particular interest, in view of its changing composition depending on the type of electrolyte.

In acid and subacid sulfuric acid electrolytes, tin-containing slime is mostly formed as a result of the hydrolysis proceeding through the following reactions in two stages [12, 13].

The first stage of the hydrolysis:

$SnSO_4 \rightleftarrows Sn^{2+} + SO_4^{2-}$ (dissociation of salt); (1)

$Sn^{2+} + HOH \rightleftarrows SnOH^+ + H^+$ (cation hydrolysis); (2)

$Sn^{2+} + SO_4^{2-} + HOH \rightleftarrows SnOH^+ + SO_4^{2-} + H^+$ (3)
(ionic equation);

$2SnSO_4 + 2H_2O \rightleftarrows [Sn(OH)]_2SO_4 + H_2SO_4$ (4)
(molecular equation).

The second stage of the hydrolysis:

$[Sn(OH)]_2SO_4 \rightleftarrows 2SnOH^+ + SO_4^{2-}$ (dissociation of salt); (5)

$SnOH^+ + HOH \rightleftarrows Sn(OH)_2\downarrow + H^+$ (cation hydrolysis); (6)

$SnOH^+ + SO_4^{2-} + HOH \rightleftarrows Sn(OH)_2 + SO_4^{2-} + H^+$ (7)
(ionic equation);

$[Sn(OH)]_2SO_4 + 2H_2O \rightleftarrows 2Sn(OH)_2 + H_2SO_4$ (8)
(molecular equation).

In the case of muriatic tin-containing electrolytes, that are used less often than sulfuric acid electrolytes, hydrolysis is also proceeded in two stages [12, 13].

The first stage of the hydrolysis :

$SnCl_2 + HOH \rightleftarrows SnOHCl + HCl$ (molecular equation); (9)

$Sn^{2+} + 2Cl^- + HOH \rightleftarrows SnOH^+ + Cl^- + H^+ + Cl^-$ (10)
(complete ionic equation);

$Sn^{2+} + HOH \rightleftarrows SnOH^+ + H^+$ (net ionic equation). (11)

The second stage of the hydrolysis:

$SnOHCl + H_2O \rightleftarrows Sn(OH)_2 + HCl$ (12)
(molecular equation);

$SnOH^+ + Cl^- + H_2O \rightleftarrows Sn(OH)_2 + H^+ + Cl^-$ (complete ionic equation); (13)

$SnOH^+ + H_2O \rightleftarrows Sn(OH)_2 + H^+$ (net ionic equation). (14)

When dissolving tin salts, so-called combined hydrolysis may occur, which occurs in two cases: by dissolving a tin salt, the anion of which is an anion of a weak acid, and by mixing solutions of two salts that contain hydrolyzablecations and anions. Often hydrolysis of this type is an almost irreversible reaction.

Such situation can be considered using the following example of tin silicate (II): the dissociation of the tin salt when in contact with water proceeds according to the scheme of cation and anion hydrolysis in two stages.

$SnSiO_3 \rightleftarrows Sn^{+2} + SiO_3^{2-}$, (15)

The first stage of the hydrolysis:

$Sn^{+2} + H_2O \rightleftarrows SnOH^+ + H^+$ (cation hydrolysis); (16)

$SiO_3^{2-} + H_2O \rightleftarrows HSiO_3^- + OH^-$ (anion hydrolysis); (17)

$Sn^{2+} + SiO_3^{2-} + H_2O \rightleftarrows SnOH^+ + HSiO_3^-$ (18)
(general hydrolysis equation).

The second stage of the hydrolysis:

$SnOH^+ + H_2O \rightleftarrows Sn(OH)_2 + H^+$ (cation hydrolysis); (19)

$HSiO_3^- + H_2O \rightleftarrows H_2SiO_3 + OH^-$ (anion hydrolysis); (20)

$SnOH^+ + HSiO_3^- + H_2O \rightleftarrows Sn(OH)_2 + H_2SiO_3$ (21)
(general hydrolysis equation).

Thus, in the electrolyte slime obtained by tinning from acidic and neutral electrolytes, both basic sulfur and chlorine-containing tin salts and tin hydroxides can be detected.

During electrolytic tinning, among alkali electrolytes, along with impurity metals and hydroxides and basic salts of tin, the following could be present in the slime: carbonates sulfates, sulfites, and spongy tin deposit on the cathode.The presence of sulphate and sulphite compounds in the slime is due to the fact that sodium sulfate and sulfite are added to stabilize and increase the ionic strength of the electrolyte.

As a result of the oxidation of tin compounds and sponge tin, tin oxides can be detected in a certain amount - another possible component of electrolytic slimes formed by tinning from alkaline electrolytes [11, 15-16].

The method of tin-containing slimes processing depends primarily on their nature and composition, therefore the purpose of the present work is to determine the composition of the sulfate tin electrolyte slime proposed for its composition study by Casting LLP.

The relevance of the study is justified by the fact that there is currently no industrial production of tin in the Republic of Kazakhstan,thoughthe tinning technology is established, but the resulting electrolytic slimes are not processed, despite the high content of tin.

Results and discussion. Physico-chemical analysis of electrolyte tin-containing slime was done using several methods, each of the analyzes was performed in three parallel experiments. Therefore, the chemical composition of the slime is an average value obtained during the research, and the X-ray diffraction pattern, micrograph and IR spectrum are chosen to be the most representative and consistent with the chemical composition.

Analysis of the slime sample was performed using a Phenom XL scanning electron microscope of the company Phenom-World (Thermo ScientificTM, The Netherlands) under FOV conditions: 50.7 μm, Mode: 15kV-Point, Detector: BSD Full. It showed that both the structure (Figure 1) and the composition (Table 3) of the slime are heterogeneous.

When examining the microphotography of the in the slime, it can be seen that there are phases of different nature and size. In the composition of the slime were found copper, lead, antimony, aluminum and iron in addition to tin. It means that, the slime is multicomponent and may be difficult to process.

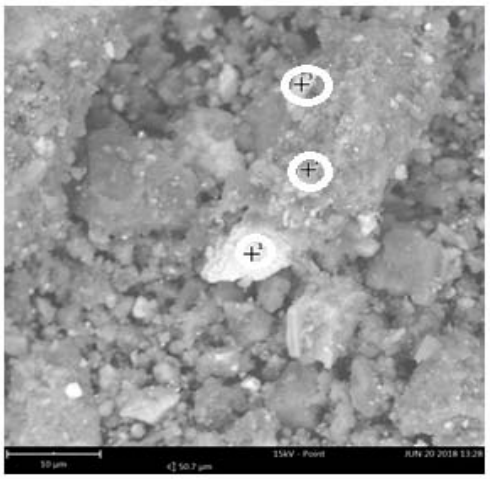

Figure 1 - Micrograph of electrolytic tin-containing slime indicating the points at which its elemental analysis was performed

Table 3 - Elemental analysis of tin-containing slime obtained using the Phenom XL electron microscope

Element	Content					
	at. %	wt. %	at. %	wt. %	at. %	wt. %
	Point on the microphotography (Figure 1)					
	1		2		3	
O	59.40	32.70	68.96	50.08	65.56	44.90
Sb	7.52	31.49	-	-	-	-
Na	25.56	20.22	21.71	22.65	20.87	20.54
Pb	1.58	11.30	1.13	10.65	0.98	8.66
Sn	-	-	1.41	7.61	1.44	7.33
Si	1.37	1.33	2.10	2.67	1.54	1.86
Ca	-	-	1.09	1.98	0.52	0.88
S	0.98	1.08	0.91	1.33	1.18	1.62
Al	0.77	0.72	1.03	1.27	0.60	0.70
Fe	-	-	0.44	1.10	1.34	3.19
C	2.81	1.16	1.22	0.66	2.69	1.38
Cu	-	-	-	-	3.28	8.92

In order to carry out further research, a more thorough averaging of the slime by the methods of quarting and rolling is done. A preliminary elemental analysis of the given slime is then carried out. The results of the analysis are shown in Table 4. The Fe, Se, Ag, and Au contents were determined by the neutron activation analysis method, the Cu, Ni, Sn, Pb content - by inductively coupled plasma atomic emission spectrometry (ICP-AES). The accuracy of elements identifying is given below. It was not possible to determine silicon in the slime composition by these methods.

Table 4 - Results of preliminary elemental analysis of sulfate electrolytic tin-containing slime

Sample	Contents							
	wt. %							ppm
	Fe	Cu	Ni	Se	Ag	Sn	Pb	Au
1	2.13±0.22	3.2±1.0	0.33±0.11	0.107±0.012	0.189±0.019	11.0±3.3	9.6±2.9	43.5±0.5
2	2.02±0.20	3.3±1.0	0.33±0.11	0.108±0.012	0.188±0.019	11.5±3.5	9.7±2.9	46.0±0.05

From the presented analysis results, it follows that the main components of the slime are tin, lead, copper and iron, with tin accounted for 8-11%, which implies that this slime could be considered as a rich secondary source of tin. Regarding other important metals, it is worth mentioning the presence of gold and silver in the slime.

To refine the elemental composition of the slime, X-ray fluorescence analysis was also performed using Venus 200 AxiosPANalyical B.V. wave diffuser spectrometer. (Holland). The results are presented in Table 5.

Table 5 – The results of X-ray fluorescence analysis of electrolyte slime

Element	Contents, %	Element	Contents, %	Element	Contents, %
O	46.711	Sb	1,103	Se	0,099
S	3.673	As	0,431	P	0,036
Si	3.309	Cl	0,148	Cr	0,131
Na	18.776	Ca	0,718	Ti	0,117
Sn	10.450	Zn	0,550	K	0,115
Pb	6.244	Mg	0,376	Mn	0,040
Cu	3.047	Ba	0,328	Nb	0,026
Fe	1.963	Ni	0,210	Sr	0,011
Al	1.242	Ag	0,144	Other	0,002
Total					100.0

As it follows from the results (Table 5), the Fe, Cu, Ni, Se, Ag, Sn, and Pb contents is within the limits of the preliminary elemental analysis (Table 3), i.e. tin, lead, copper and silver may be significant for the processing of this slime.

The presence of a large amount of oxygen, sulfur and silicon in the samples of the slime (Tables 3-5) suggests that sulfates, oxides, hydroxides, basic metal salts, possibly silicates or silica of various modifications can be detected during the phase analysis.

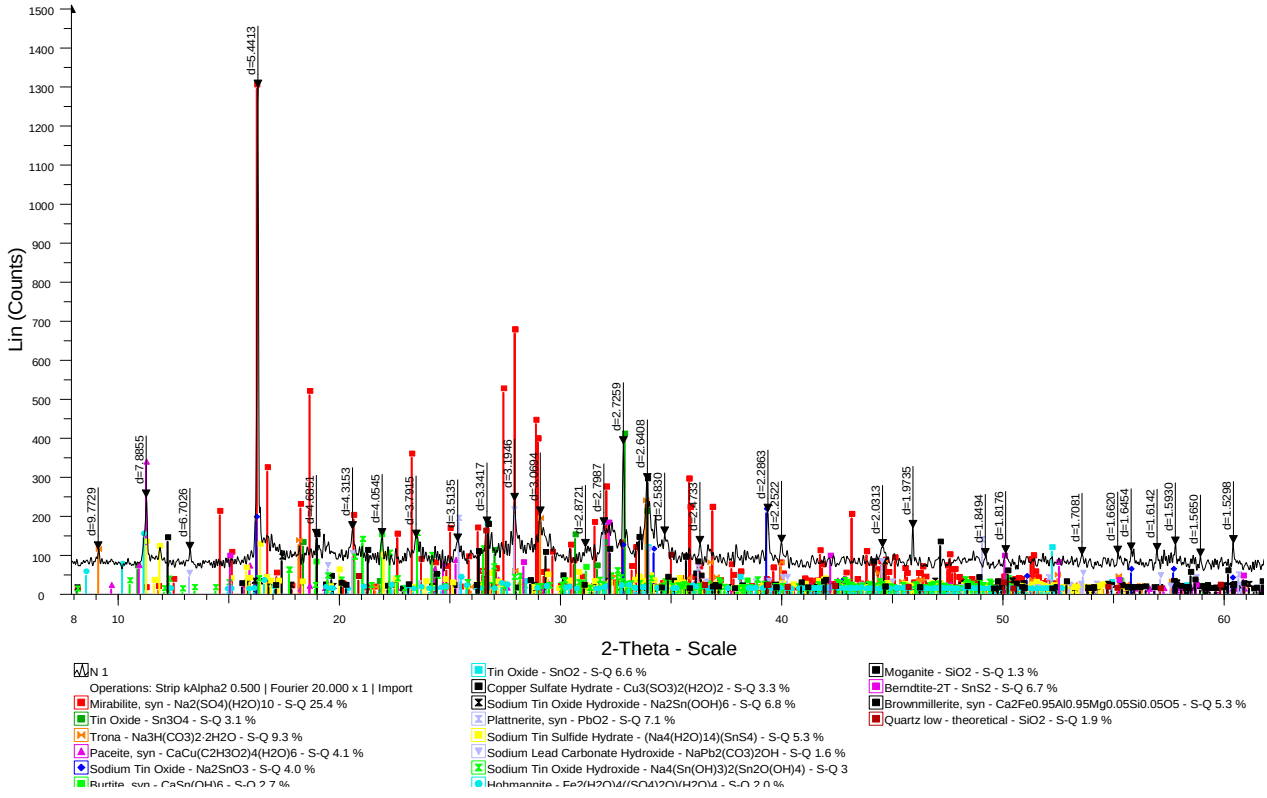

Figure 2 - Diffraction pattern of electrolyte tin-containing slime
(diffractometer D8 Advance, *a*-Cu radiation)

When X-ray diffraction analysis was carried out using the diffractometer D8 Advance (BRUKER), it was found that because of diffraction reflexes overlapping and non-stoichiometric phase composition, it is not possible to clearly select and determine the concentration of phases present in the sample. In addition, there are unidentified peaks in the sample. The results of qualitative X-ray diffraction analysis of tin-containing slime are presented in Figure 2 and Table 6.

Table 6 - Results of qualitative X-ray phase analysis of electrolyte tin-containing slime

Phase	Formula	Phase	Formula
Tin-containing compounds			
TinOxide	Sn_3O_4	Burtite, syn	$CaSn(OH)_6$
TinOxide	SnO_2	SodiumTinOxideHydroxide	$Na_2Sn(OOH)_6$
Berndtite-2T	SnS_2	SodiumTinOxideHydroxide	$Na_4(Sn(OH)_3)_2(Sn_2O(OH)_4)$
SodiumTinOxide	Na_2SnO_3	SodiumTinSulfideHydrate	$(Na_4(H_2O)_{14})(SnS_4)$
Compounds containing ferrous and non-ferrous metals			
CopperSulfateHydrate	$Cu_3(SO_3)_2(H_2O)_2$	Paceite, syn	$CaCu(C_2H_3O_2)_4 \cdot 6H_2O$
Plattnerite, syn	PbO_2	SodiumLeadCarbonateHydroxide	$NaPb_2(CO_3)_2OH$
Brownmillerite, syn	$Ca_2(Fe,Al)_2O_5$	Hohmannite	$Fe_2(SO_4)_2(OH)_2 \cdot 7H_2O$
Other phases			
Quartzlow - theoretical	SiO_2	Trona	$Na_3H(CO_3)_2 \cdot 2H_2O$
Moganite	SiO_2	Mirabilite, syn	$Na_2(SO_4) \cdot 10H_2O$

As follows from the presented results (Fig. 2, Table 6), oxidized compounds-oxides, hydroxides, carbonates and hydrated compounds prevail in the composition of tin-containing slime. The main phases containing tin are the following compounds : Sn_3O_4, SnO_2, SnS_2, Na_2SnO_3, $CaSn(OH)_6$, $Na_2Sn(OOH)_6$, $Na_4(Sn(OH)_3)_2(Sn_2O(OH)_4)$ and $(Na_4(H_2O)_{14})(SnS_4)$. Of the phases containing non-ferrous metals, it should be noted copper-containing phases$(Cu_3(SO_3)_2(H_2O)_2$ and$CaCu(C_2H_3O_2)_4 \cdot 6H_2O)$, as well aslead-containing compounds (PbO_2 and $NaPb_2(CO_3)_2OH$).The accuracy of the X-ray phase analysis did not allow us to establish the phases in which silver and gold are included.

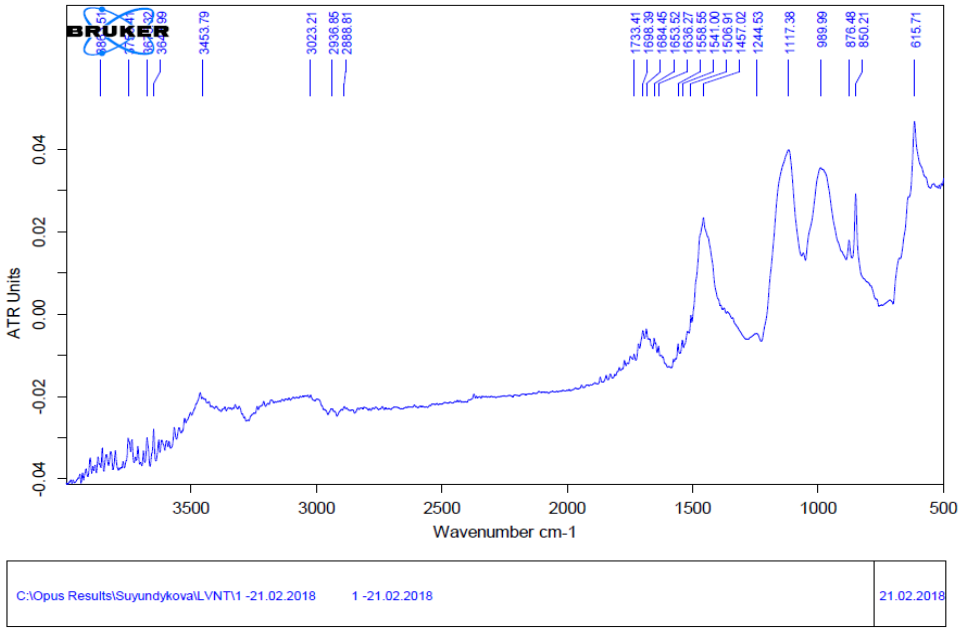

Figure 3 - IR spectrum of tin-containing slime

Silicon dioxide in the form of phases "Quartzlow - theoretical" and "Moganite" was detected in the slime. It may negatively affect the processing of the investigated slime when using both mineral acids and bases as reagents. Crystalline hydrates - sodium sulphate and hydrogen carbonate - can influence the acid

processing of slime and electrolysis of the resulting tin-containing solutions. Therefore, when selecting reagents and calculating the thermodynamic characteristics of slime leaching, the presence of these compounds should be taken into account.

In order to clarify the picture of the phase analysis of the tin-containing slime, its group analysis was carried out using an infrared spectrophotometer BrukerAlpha in the wave number range from 4000 to 500 cm^{-1}, the spectrogram of which is shown in Figure 3.

The IR spectroscopic analysis (Figure 3) shows that in the compounds present in the slime, the main functional groups are the following: $[OH]^-$, $[CO_3]^{2-}$, $[HSO_3]^-$, $[SO_3]^{2-}$ и $[SO_4]^{2-}$. Thus, absorption bands with wave numbers of 3454 and 3023 cm^{-1}, related to the valence vibration of the [OH] group, are observed in the high-frequency region of the spectrum. The absorption bands with a wave number of 1698 cm^{-1} correspond to the deformation vibrations of the [OH] - group.

The absorption bands with a wavenumber of 1457 cm^{-1}correspond to the stretching vibrations of $[CO_3]^{2-}$ groups. The ones with wavenumbers of 1117 cm^{-1} and 990 cm^{-1}correspond to $[HSO_3]^-$ and $[SO_3]^-$ groups respectively. The ones with wavenumbers of 876 and 850 cm^{-1}also correspond to the stretching vibrations of $[HSO_3]^-$ and $[SO_3]^-$ groups. An absorption band with a wave number of 617 cm^{-1} corresponding to the stretching vibrations of the groups $[SO_4]^{2-}$ was also detected.

Thus, using the IR spectroscopic analysis method, the presence of hydroxides, carbonates, sulfates and sulfites in the electrolytic tin-containing slime is confirmed. In addition, the presence of hydrosulfite is possible in the slime.

Заключение. During the study of elemental, phase and group composition of tin-containing slime, it was found that both the structure and the composition of the slime are heterogeneous. The main components of the slime are tin, lead, copper and iron,with tin accounted for 8-14 %.

According to X-ray phase analysis, oxidized compounds (oxides, hydroxides, carbonates and hydrated compounds) prevail in the composition of tin-containing slime. Using IR spectroscopic analysis, the presence of hydroxides, carbonates, sulfates and sulfites in the electrolytic tin-containing slime was confirmed and the possible presence of hydrosulfites was detected.

The present research allows to conclude that tin-containing electrolytic slime can be a rich source of secondary tin. This findingis relevant for the Republic of Kazakhstan, which does not have its own industrial production of tin.

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ҚҰРАМЫНДА ҚАЛАЙЫ БАР ЭЛЕКТРОЛИТТІ ҚОЖДЫ ФИЗИКО-ХИМИЯЛЫҚ ТАЛДАУ

Аннотация. Бұл мақалада электролитті тазалау кезінде туындайтынқұрамында қалайы бар қождардың қалыптасуы мен құрамы қарастрылды. Қалайы алу мақаласының мысалында көрсетілгендей қышқылды және әлсіз қышқылды электролиттен, электролитті қож - гидролиз өнімі болып табылады. Сілтілі электролиттерде берілген қалайы қосылыстары мен металл қосылыстарынан бөлек, қожда сульфатты қосылыстар болуы мүмкін, себебі, иондық күшті жоғарылату және тұрақтандыру үшін электролитке натрий сульфатын қосады.

«Кастинг» ЖШС-нен (Алматы қаласы)құрамында қалайы бар қождың құрамын анықтау мақсатында заманауи құрылғылар қолданылатын электронды микроскопия, элементті, рентгенофлуоресцентті, рентгенофазалалы және ИҚ-спектроскопическиялық талдау әдістері қолданылады.

Берілген талдау нәтижелеріненқождың негізгі компоненттері болып мыс, қорғасын және қалайы екені анықталды, соның өзінде қалайының мөлшері 11 % асады, бұл берілген қождың екіншілік қалайыға бай екенін көрсетеді. Мыс, қорғасын және қалайы қож құрамында Sn_3O_4, SnO_2, $CaSn(OH)_6$, Na_2SnO_3, $Na_4(Sn(OH)_3)_2(Sn_2O(OH)_4)$, $Na_2Sn(OOH)_6$, $CaCu(C_2H_3O_2)_4(H_2O)_6$, $Cu_3(SO_3)_2(H_2O)_2$, PbO_2, $NaPb_2(CO_3)_2OH$ қосылыстар түрінде кездесетіні анықталды. Қож құрамындағы $[OH]^-$, $[SO_3]^{2-}$,$[HSO_3]^-$ және $[SO_4]^{2-}$ топтары ИҚ-спектроскопияәдісімен байқалған.

Түйін сөздер. Қалайы, қалайы құрамды қож, гидролиз, физико-химиялық талдау, екіншілік шикізат**.**

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ФИЗИКО-ХИМИЧЕСКИЙ АНАЛИЗ ЭЛЕКТРОЛИТИЧЕСКОГО ОЛОВОСОДЕРЖАЩЕГО ШЛАМА

Аннотация. Настоящая статья посвящена вопросам образования и определения состава оловосодержащего шлама, образующегося в ходе электролитического лужения. Шлам, образующийся в кислых и слабокислых электролитах – продукт гидролиза, содержащий гидратированные соли и гидроксиды металлов, что показано на примере олова. В щелочных электролитах, наряду с указанными соединениями олова и примесных металлов, в шламе могут присутствовать сульфатные соединения металлов, поскольку для стабилизации и увеличения ионной силы электролита добавляют сульфат натрия.

Для оценки качества оловосодержащего шлама, предложенного для изучения состава ТОО «Кастинг» (г. Алматы), применяли метод электронной микроскопии, элементный, рентгенофлуоресцентный, рентгенофазовый и ИК-спектроскопический методы анализа с использованием соответствующего современного аналитического оборудования.

Из представленных результатов анализа следует, что основными компонентами шлама являются олово, свинец, медь и железо, причем на олово приходится более 11 %, что позволяет считать данный шлам богатым вторичным источником олова. Медь, свинец и олово присутствуют в шламе в виде соединений Sn_3O_4, SnO_2, $CaSn(OH)_6$, Na_2SnO_3, $Na_4(Sn(OH)_3)_2(Sn_2O(OH)_4)$, $Na_2Sn(OOH)_6$, $CaCu(C_2H_3O_2)_4(H_2O)_6$, $Cu_3(SO_3)_2(H_2O)_2$, PbO_2, $NaPb_2(CO_3)_2OH$. Из других значимых металлов следует отметить наличие в шламе золота и серебра. Наличие в составе шлама групп: $[OH]^-$, $[SO_3]^{2-}$,$[HSO_3]^-$ и $[SO_4]^{2-}$ дополнительно подтверждено ИК-спектроскопическим методом анализа.

Ключевые слова. Олово, оловосодержащий шлам, гидролиз, физико-химический анализ, вторичное сырье.

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GEOINFORMATION TECHNOLOGIES IN VARIOUS SYSTEMS

Abstract. This article examines geoinformation systems in various branches of education and industry. GIS-technologies are an effective tool for creating demonstration materials and electronic manuals for performing laboratory work, for mining, in finding the most favorable harvest places for the agricultural sector of the economy, etc. Thus, the search for minerals begins with the comparison of satellite imagery with the geological maps obtained earlier on the investigated territory of the Earth. Also, modern information technologies have become one of the main elements of new areas of resource-saving direction in the field of agricultural crops. Thus, a high degree of informatization of the society contributes to the active introduction and use of information technologies, both in the education system and in business.

Keywords: information technology, system, geography, maps, education, extraction, industry.

INTRODUCTION

The ideology of GIS education is built on the one hand to ensure the content of the courses being read by theoretical content and modern practical work, and on the other hand to use computer technologies for organizing the educational process. This is especially evident in the development of educational and scientific GIS. These systems serve as a means of planning and organizing topographic and geodetic works, many types of geographic, biogeographical and geological surveys, the results of which can be used by teachers. It should be noted that 90% of these GIS are created by students who pass all the GIS mapping cycles - from design to creation of thematic databases and maps. Geoinformation systems are an effective means of creating a demonstration-methodological material and electronic manuals for performing laboratory work.

In the Word editor environment, methodical instructions have been prepared for working with such systems as Surfer, MapInfo, Geodraw / Geographer, Microstation, illustrated with examples of performing separate procedures.

MAIN PART

The special task of students' GIS education is to teach the management of data and, more importantly, the use of professional models of socio-economic and natural processes, multidimensional analysis techniques and expert analysis in the optimization of nature management and environmental monitoring.

The basis of the GIS-discipline block is:

1. Introduction to GIS;
2. Databases;
3. Computer graphics;
4. Creation of GIS and
5. Use of GIS.

In the introduction to GIS, prototype GIS, historical reference, typical GIS architecture, functions of basic modules, data formats, organization of data management, basic methods of data analysis, a survey of modern GIS shells and their comparative characteristics, industry specialization of modern GIS.

Modern experience in the application of the software packages under consideration is discussed in the subject "Use of GIS". In this discipline, concrete results are examined from domestic and foreign practice.

The use of modern geology information systems is widespread and practically unlimited. GIS is used successfully in both military and civil affairs:

- creation of navigational and hydrographic maps;
- solving urban problems (planning, designing of engineering systems);
- in the management of forest, agricultural, fishery resources;
- topographic mapping;
- geology, geophysics;
- business (mapping of purchasing power zones of the population, analysis of transport access areas, delivery and routing);
- demographic analysis, etc. The use of school GIS-technologies contributes to the formation of the most important geographical skills:
- read information stored in digital geographic maps;
- search for geographical objects by specified parameters, for example, by object names;
- carry out measurements and calculations on digital maps;
- translate in the process of multiple exercises the ability to determine the geographical coordinates of the skill;
- To form the students' spatial thinking, demonstrating the studied natural objects in a three-dimensional dimensional dimension;
- Compose your own digital maps, especially from the observations of students, for example, the weather conditions of their locality.

Thus, a high degree of informatization of the society contributes to the active introduction and use of information technologies in the educational general educational process, which allows to bring the teaching to a higher level, to integrate knowledge into various fields and subjects, and to pupils to feel themselves active participants in the learning process, to acquire new knowledge, skills , skills and to be in constant search and development of oneself.

The search for minerals begins with the comparison of satellite images with geological maps obtained earlier on the investigated territory of the Earth. The main factor of the presence of natural resources in this or that sector is the presence of plicative (folded) structures, as well as zones of faults and lineaments (rectilinear geological formations that are well reflected in space images). Geologists, analyzes the direction, length, density, and other properties of the map according to the map and, from these data, determines deposits of minerals.

The active use of the power and flexibility of the technology of geology information systems (GIS technology) can drastically help solve the problem of increasing the efficiency of oil prospecting and operating with oil-related data. When combined with other oil software, GIS can significantly speed up data retrieval and reduce the cost of their exchange.

GIS is a system for collecting, storing, analyzing and graphically visualizing geographic data and associated information about the objects under study. In this article, the concept of the geographic information system is used as a software product.

Before the analysis of the oil data begins, the circulation to the necessary data from the universal computers can be taken from geologists three-quarters of the time. And when it comes to the actual analysis, data exchange between hundreds of analytical programs takes even more time. The use of GIS technology redistributes the time resources so that the main goal of geologists is fulfilled - to give an accurate forecast of the economic value of the proposed oil fields.

Software vendors for the oil and gas industry, which integrated GIS technology with their specialized products, have achieved the integration of petroleum data in one software environment. As a result, geologists can easily transfer data between different software for geophysical, petro physical and seismic analysis. Access to data based on a general-purpose computer is much faster when controlled by a software interface that minimizes data retrieval time.

Customers can download the data directly into the GIS and immediately begin the analysis. In addition, data vendors integrate many types of data in multimedia GIS databases: aerial photographs, satellite data and paper maps. GIS can combine all these data sources, transforming them into a complete digital map of the oil-bearing region. With this integration capability, data vendors are likely to deliver even more specialized products to the market, along with data.

This enhanced integration enhances the power of GIS systems, especially their flexibility in adapting too many areas of the oil industry - now mostly applications in exploration and production, but they will obviously be followed by application programs in other areas. GIS will remain a vital tool for oil geologists and a central element in the integration of data and applications for this industry.

Modern information technologies have become one of the main elements of new areas of resource-saving direction in the field of agricultural crops, known as "precise farming" or "precision farming". This approach, as international experience shows, provides a much greater economic effect and, most importantly, improves the reproduction of soil fertility and the level of ecological purity of agricultural products. World practice has shown that with the right use of precision agriculture, technology pays off quickly by saving fertilizers, seeds, fuel, by reducing labor costs, by increasing the fertility of soils. According to statistics, 80% of farmers in the United States to some extent use technology of precision farming. And they, of course, know how to take profits.

The first significant results in the use of electronic devices on farming. Technicians have developed machines for plant protection. For example, the Tecnoma Hydroelectron sprayer, which won a gold medal at the SIMA-1976 international exhibition in Paris, was equipped with an electronic regulator for supplying the solution in proportion to the speed of the unit. A similar machine was developed by the English company Agmet. In comparison with the analogues used in the CIS countries, they maintain a constant solution flow per unit time, and the rate of its application per 1 ha varies significantly with each gear change, engine speed and wheel slippage, which saves up to 20% of the pesticides. And this is not only an economic, but also an environmental effect.

It was more difficult to solve the problems of the exact sowing of seeds of grain crops. Experimental samples of such seeders were shown at an international exhibition in Munich in 1982, and the serial machine with the electronic regulator of seeding by Blanchot appeared only after three years and was marked at the Paris exhibition SIMA-1985. The company Rider (Germany) went even further, creating a Saxonia seeder, which provides the exposure not only of the specified distance between the seeds in a row, but also the depth of their bedding.

Significant successes in the electronization of agricultural crops. Techniques have reached the firm Amazone, Diadem, Rotina, Lely, etc. In centrifugal type machines, they have achieved a correlation of fertilizer application rate per hectare from the unit speed. In addition, the frequency of rotation of the scattering discs and the actual dose of fertilizers applied per hectare are constantly displayed on the monitor, and the last tractor driver can change from his workplace.

Using modern information technologies, farmers can obtain very accurate data on the state of the field and use this information to improve crop cultivation, and to maximize profits from each square meter of the field. This became possible due to the use of precision growing technologies, precision or "precision" farming technologies including:

- Geoinformation systems (GIS);
- Earth remote sensing technology (ERS);
- Global Positioning Technology (GPS);
- variable rate technology (Variable Rate Technology);
- Technology management of agricultural machines using sensors and microcontrollers;

1. Yield Monitor Technologies.

The main difference between traditional and exact farming is the use of modern information technologies for the collection, processing and analysis of various data with high spatial and temporal resolution for decision making and agricultural work. Thus, the basis of all production technologies for precision farming is geoinformation systems based on remote sensing (ERS) technologies, which allows you to shoot, store and process information to indicate characteristics of crops or arable land.

CONCLUSION

Detailed digital field maps obtained using unmanned aerial vehicles make it possible to plan, strictly record and control all agricultural operations, as they are based on accurate knowledge of the area of fields, the extent of roads, information about fields and other objects. Based on these maps, a full analysis of the conditions that affect the growth of plants in this particular area (or even in 10x10m or 100x100m areas) is carried out. Field maps form the basis for crop rotation models and are used to optimize production in order to maximize profits, as well as for the rational use of all resources involved in production.

Using a multispectral camera as a sensor for remote sensing of UAVs, as well as geology information technologies of GIS, it is possible to carry out an effective survey and inventory of lands, to accompany reclamation, to quickly create NDVI maps, to plan fertilization and to supervise agro technical activities.

When conducting regular aerial surveys of agricultural lands, daily or once a week, and post-processing them in specialized software, it is possible to trace the dynamics of changes within the same field. These data can be accurately correlated with the productivity of land.

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ГЕОИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ В РАЗЛИЧНЫХ СИСТЕМАХ

Аннотация. В данной статье рассматриваются геоинформационные системы в различных отраслях образования и промышленности. ГИС-технологии являются эффективным средством в создании демонстрационно-методического материала и электронных пособий для выполнения лабораторных работ, для добычи полезных ископаемых, в поиске наиболее благоприятных урожайных мест для аграрного сектора экономики и т.д. Так, поиск полезных ископаемых начинается со сравнения спутниковых снимков с полученными ранее геологическими картами об исследуемой территории Земли. Так же современные информационные технологии стали одним из основных элементов новых областей ресурсосберегающего направления в области сельскохозяйственной культуры. Таким образом, высокая степень информатизации общества способствует активному внедрению и использованию информационных технологий, как в систему образования, так и в бизнес.

Ключевые слова: информационные технологии, система, география, карты, образование, добыча, отрасль.

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Ж.Е.Кенжебаева

«Қаржы академиясы» АҚ, Астана, Қазақстан

ТҮРЛІ ЖҮЙЕЛЕРДЕГІ ГЕОИНФОРМАЦИОНДЫҚ ТЕХНОЛОГИЯЛАР

Аннотация. Бұл мақалада білім беру мен өнеркәсіптің түрлі салаларында геоақпараттық жүйелер қарастырылады. ГАЖ-технологиялар - зертханалық жұмыстарды орындауға, тау-кен өндіруге, экономиканың агроөнеркәсіп секторына қолайлы егін жинау орындарын табуға және т.б. көрсету үшін демонстрациялық материалдар мен электронды нұсқаулықтарды жасаудың тиімді құралы. Осылайша, минералды іздеу ғарыштық суретті Жердің зерттелген аумағында бұрын алынған геологиялық карталармен салыстырудан басталады. Сондай-ақ, заманауи ақпараттық технологиялар ауылшаруашылық дақылдары саласындағы ресурстарды үнемдеу бағытының жаңа бағыттарының негізгі элементтерінің бірі болды. Осылайша, қоғамды ақпараттандырудың жоғары дәрежесі білім беру жүйесінде де, бизнесте де ақпараттық технологияларды белсенді енгізуге және пайдалануға мүмкіндік береді.

Түйін сөздер: ақпараттық технологиялар, жүйе, география, карталар, білім, өндіріс, өнеркәсіп.

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NEW BREAKTHROUGH CRISPR/CAS9 BIOTECHNOLOGY OF GENOME EDITING FOR CREATION OF ELITE CROPS IN KAZAKHSTAN

Abstract. The potential role of the CRISPR/Cas9 technology is reviewed. The technology, a genome-editing tool called CRISPR/Cas9, revolutionized the life sciences when it appeared on the market in 2013. CRISPR/Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats, associated with protein 9 - Cas9), is RNA-regulated protection mechanism in bacteria and archaea, in which based new "crazy' popular technology of gene editing in human, animal and higher plants. CRISPR/Cas9 system is a simple, inexpensive and versatile tool for genome editing, resulting in a groundswell of research based on the technique which popularity in the last 4,5 years has become known as the 'CRISPR craze'.

In bacteria organism, the Cas9 nuclease associates with two RNAs, the CRISPR RNA (crRNA) and the trans-activating crRNA (tracrRNA), to direct sequence-specific cleavage of foreign DNA. This bacterial acquired immune system has been shown to be effective for gene editing in mammalian cells, and is now routinely used as an effective genome engineering tool in multiple high organisms including crops.

Elite crops cultivars with improved resistance to fungal or viral pathogens will benefit farmers and the local economy in Kazakhstan by increasing harvest yields, and grain quality with high economic benefit through establishment of disease resistant crops genotypes using CRISPR/Cas9 plant genome editing. CRISPR/Cas9 system for plant genome editing is a breakthrough technology in breeding - prospects for application in nearest future, could be exempt from GM classification.

Key words: genome engineering, genome editing, CRISPR/Cas9, gene knock-out, crops, breeding perspective, non-GMO classification.

Abbreviations

CRISPR - clustered regularly interspaced short palindromic repeats
Cas - CRISPR-associated (protein)
crRNA - CRISPR RNA
DSB - double-strand DNA break
HDR - homology-directed repair
NHEJ - non-homologous end joining
PAM - protospacer adjacent motif
sgRNA - single guide
shRNA - short hairpin RNA
tracrRNA - trans-activating crRNA

Introduction

The biomedical award – 'Breakthrough Prize' - was received by Jennifer Doudna from the United States and Emmanuelle Charpentier from Germany in 2013 - for the discovery of the CRISPR/Cas9 mechanism, which protects bacteria from virus attacks. This system determines the viruses by DNA and releases the Cas9 enzyme, which acts as scissors cutting the genetic material of the aggressor. However, scientists found that using CRISPR/Cas9 it is possible to rewrite defective human DNA, replacing damaged genes with healthy ones. In this case, the place of the spacer in such RNA occupies the sequence chosen by the researcher. The Cas9 protein is able to "learn" and connect to such a synthetic CRISPR RNA (it is called a "guide") and becomes programmed to recognize and cut the corresponding place in the DNA. The groups of J. Doudna and E. Charpentier [1] demonstrated the possibility of such an approach *in vitro*.

Almost at the same time, groups of George Church and his former graduate student Feng Zhang from the Broad Institute in MIT have shown that the bacterial protein Cas9 and the RNA guide are able to "work", recognize and aim to cut DNA in cells of higher organisms, particularly in higher plants. MIT managed to apply for a patent a day earlier [2, 3].

It is now proving useful in the plant science community as a powerful tool for the improvement of agricultural crops. It is estimated that up to 40% of harvest is lost worldwide to pests/diseases threatening our food supply. The major crops – wheat, rice, barley, are susceptible to many viral and fungal diseases that can result in drastically reduced yield and poor quality grain [4-11]. Crops cultivars with improved resistance to fungal or viral pathogens will benefit farmers and the local economy by increasing harvest yields and grain quality.

Results and Discussion

CRISPR/Cas9: What is it and how does it work?

In August 2013, five reports were published discussing the first application of CRISPR/Cas9-based genome editing in plants [4-8]. This first group of studies already demonstrated the immense versatility of the technology in the field of plant biology by embracing the model species *Arabidopsis thaliana* and *Nicotiana benthamiana* as well as crops such as rice, by using a range of transformation platforms (protoplast transfection, agroinfiltration and the generation of stable transgenic plants), by targeting both endogenous genes and transgenes and by exploiting both NHEJ and HR to generate small deletions, targeted insertions and multiplex genome modifications [9-11]. Subsequent work focused on additional crop species such as sorghum and rice [12], wheat [13, 14] and maize. Most recently, the CRISPR/Cas9 system was shown to work in tomato hairy roots following transformation with *Agrobacterium rhizogenes* [15] and was the first genome editing platform used in the fruit crop sweet orange [16].

Interestingly, four independent groups have shown that the CRISPR/Cas9 system can introduce biallelic or homozygous mutations directly in the first generation of rice and tomato transformants, highlighting the exceptionally high efficiency of the system in these species [9, 17-19]. It was also shown in *Arabidopsis*, rice and tomato that the genetic changes induced by Cas9/gRNA were present in the germ line and segregated normally in subsequent generations without further modifications [6, 17-21].

CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats. The discovery of the type II prokaryotic CRISPR "immune system" has allowed for the development for an RNA-guided genome editing tool that is simple, easy and quick to implement. The CRISPR/Cas9 system consists of a single monomeric protein and a chimeric RNA. A 20-nt sequence in the gRNA confers sequence specificity and cleavage is mediated by the Cas9 protein. Watson–Crick base pairing with the target DNA sequence is the basis for gRNA-based cleavage, making sophisticated protein engineering for each target unnecessary. Only a 20 nt in the gRNA is needs to be modified to facilitate the recognize a different target (Figure 1).

CRISPR/Cas9 immune defense system in bacteria and archaea

CRISPR/Cas9 is a new technology for editing genomes of higher organisms, based on the immune system of bacteria. This system is based on specific areas of bacterial DNA, short palindromic cluster repeats, or CRISPR. Between identical replicas there are different DNA fragments - spacers, many of

which correspond to the genome regions of viruses parasitizing on this bacterium. When a virus enters a bacterial cell, it is detected using specialized Cas proteins associated with CRISPR RNA. If the virus fragment is "recorded" in the CRISPR RNA spacer, the Cas-proteins cut the viral DNA and destroy it, protecting the cell from the infection. In early 2013, several groups of scientists have shown that CRISPR/Cas systems can work not only in bacterial cells, but also in cells of higher organisms, which means that CRISPR/Cas systems make it possible to correct incorrect gene sequences and thus treat hereditary human and higher plants diseases [22-26] (Figures 2, 3).

Advantages of CRISPR/Cas9 genome editing

Main advantages of CRISPR/Cas9 are in terms of simplicity, accessibility, cost and versatility. Advantages of the CRISPR/Cas9 system in comparison with ZFNs or TALENs have no objections. Multiplex editing with the CRISPR/Cas9 system simply requires the monomeric Cas9 protein and any number of different sequence-specific gRNAs. In contrast, multiplex editing with ZFNs or TALENs requires separate dimeric proteins specific for each target site. Unlike its predecessors, the CRISPR/Cas9 system does not require any protein engineering steps, making it much more straightforward to test multiple gRNAs for each target gene. Furthermore, only 20 nt in the gRNA sequence need to be changed to confer a different target specificity, which means that cloning is also unnecessary. Any number of gRNAs can be produced by *in vitro* transcription using two complementary annealed oligonucleotides. This allows the inexpensive assembly of large gRNA libraries so that the CRISPR/Cas9 system can be used for high-throughput functional genomics applications, bringing genome editing within the budget of any molecular biology laboratory [27, 28].

CRISPR components and mechanism

The natural CRISPR/Cas9 consists of a Cas9 protein, a CRISPR RNA (crRNA), and a trans-activating crRNA (tracrRNA). In gene editing applications, crRNA and tracrRNA are often fused into a single guide RNA (sgRNA). The crRNA is the part that is complementary to the target DNA sequence, thus recognizing the sequence to be cleaved. The tracrRNA is a small helper RNA that enables maturation of the crRNA and functions as a scaffold for the crRNA-Cas9 interaction. In nature, the crRNA and tracrRNA segments exist as a duplex. Synthetically, they can be engineered as one seamless fusion sequence known as single-guide RNA (sgRNA). The ribonucleoprotein invades the target with crRNA guide sequence by forming a 20-bp RNA/DNA hybrid and displacing the opposite DNA strand after it encounters a protospacer adjacent motif (PAM), such as NGG.

The design of gRNA and choice of the nuclease depends on the desired application. The right choice of components is crucial for a successful experiment. As the gRNA will guide the nuclease to the cutting site, it is important to ensure that the design yields minimum off-target (unintended) cuts while also providing maximum on-target efficiency. Nevertheless, while designing gRNA for KO experiments, it is essential to ensure that the sequence conforms to the following criteria. Sequences that target exons are preferred to minimize the risk of splicing of the targeted gene from the mRNA. In addition, sequences coding for N-terminus of protein are selected, as they are more likely to damage the region critical for protein-function. To edit the genome using the CRISPR/Cas9 system, a single protein (unlike TALEN, Zn-fingers) is used, and the RNA guide can be created in a short time in the laboratory or purchased [20 - 28].

Several platforms are available to help design guide RNAs by predicting their on-target and off-target activity. We have listed some of these below: Synthego's free design tool is one of the fastest and most efficient design tools available for researchers. The tool offers easy design of synthetic sgRNAs with up to 97% editing efficiency and the lowest off-target effects. It includes a library of more than 100,000 genomes and 9,000 species, and offers a convenient way to order your guides within the tool. You can also use the tool to validate gRNAs designed using other platforms. Free websites for gRNAs creation *in silico*: CRISPRdirect http://crispr.dbels.jp/, CRISPR-PLANT www.genome.arizona.edu/ crispr, CRISPR-P http://cbi.hzau.edu.cn/crispr/, E-CRISP http://www.e-crisp.org/ E-CRISP/, CRISPR RGEN Toolshttp://www. rgenome.net/cas-designer/, Synthego, Addgene, Origene, [29] etc.

Selecting a nuclease. The most commonly used system in cell applications is derived from the *Streptococcus pyogenes* Type II CRISPR/Cas9 system and consists of the Cas9 protein as the nuclease

that cleaves double-strand DNA when guided by the crRNA and tracrRNA (dual RNA). Cas-protein is, though very large [1]. If in standard systems, several proteins are assembled into a complex that binds CRISPR RNA, and then this complex recognizes the viral DNA target and attracts another protein that "bites" the viral DNA, then in a system that was lucky to study Charpentier, one protein called Cas9, performs all these functions: and binds CRISPR RNA, and recognizes the target, and "bites" it. The Cas9 nuclease recognizes the motif 5'-NGG-3'.

However, other nucleases that exist in nature or have been developed in the lab can be used depending on the specific need of the experiment. Cas9 nickase is a modified version of the Cas9 protein, which nicks a single DNA strand, rather than generating a DSB.

Cpf1 is another common nuclease, which stands for 'CRISPR from *Prevotella* and *Francisella*', recognizes and binds a different PAM 5'-TTN-3', is preferred for experiments relying on the HDR repair outcome and does not require a tracrRNA.

S. aureus Cas9 (SaCas9) from the species *Staphylococcus aureus,* recognizes the same PAM as SpCas9, much smaller by length of about 1kb.

CRISPR loci in a bacterium contain "spacers" (viral DNA inserted into a CRISPR locus) that in type II adaptive immune systems were created from invading viral or plasmid DNA (called "protospacers"). On subsequent invasion, Cas9 nuclease attaches to tracrRNA: crRNA which guides Cas9 to the invading protospacer sequence. But Cas9 will not cleave the protospacer sequence unless there is an adjacent PAM sequence. The spacer in the bacterial CRISPR loci will not contain a PAM sequence, and will thus not be cut by the nuclease. But the protospacer in the invading virus or plasmid will contain the PAM sequence, and will thus be cleaved by the Cas9 nuclease [4]. For editing genes, guideRNAs (gRNAs) are synthesized to perform the function of the tracrRNA: crRNA complex in recognizing gene sequences having a PAM sequence at the 3'-end [7, 8].

The canonical PAM is the sequence 5'-NGG-3' where "N" is any nucleobase followed by two guanine ("G") nucleobases [9]. Guide RNAs (gRNAs) can transport Cas9 to anywhere in the genome for gene editing, but no editing can occur at any site other than one at which Cas9 recognizes PAM. The canonical PAM is associated with the Cas9 nuclease of Streptococcus pyogenes (designated SpCas9), whereas different PAMs are associated with the Cas9 proteins of the bacteria *Neisseria meningitidis*, *Treponema denticola*, and *Streptococcus thermophiles* [10]. 5'-NGA-3' can be a highly efficient non-canonical PAM for human cells, but efficiency varies with genome location [11]. Attempts have been made to engineer Cas9s to recognize different PAMs to improve ability of CRISPR-Cas9 to do gene editing at any desired genome location [12]. Using either *Agrobacterium tumefaciens* or by trans-fecting plasmids that encode them, programmable nucleases can be delivered into plant cells, where these nucleases cleave chromosomal target sites in a sequence-dependent manner. The result is site-specific DNA double-strand breaks (DSBs) whose repair by endogenous systems results in targeted genome modifications.

So, the mechanism of genomic editing using CRISPR/Cas9 includes the next points. To correct the "wrong" gene, we need a very precise molecular "scalpel" that will find a mutant sequence of nucleotides and can "cut" it from DNA. This "scalpel" is Cas9. With the help of an RNA guide, the sequence of which coincides with the desired place, he can make a break in the right place of the genome. The recognition of the target takes place on a length of 20-30 nucleotides. On average, sequences of this length are found once in the human or plant genome, which allows for accuracy.

For genome editing purposes, generation of a targeted double-strand DNA break (DSB) is the key event that opens up multiple repair options both for the cell and the genome engineer [19, 20]. Such breaks are generally repaired by one of two pathways, homology-directed repair (HDR) or non-homologous end joining (NHEJ). Cells use NHEJ more frequently than HDR because the latter requires a template homologous to the regions flanking the break and to insertions or deletions (INDELs) at its position which can result in functional knock out of a gene [1, 2, 14, 22, 23, 29] (Figures 1, 4).

In all phases of the cell cycle other than S phase, a homologous region of the chromosome is rarely in close enough proximity to act as this template, and thus NHEJ acts as a stop gap to quickly repair the break and maintain chromosomal integrity. NHEJ is an error-prone process that uses ligases, nucleases and polymerases to reseal a break, and generally results in nucleotides being inserted or deleted (indels) in an unpredictable process. If the break occurs in a protein-coding region, these indels will often result in a frame shift mutation and subsequent premature stop codon, abrogating the protein's function. A properly

targeted DSB engineered in a coding sequence of a protein of interest may thus result in a loss-of-function allele. As the efficacy of this process varies based on the target site and experimental conditions, a mixture of homozygous null, heterozygous and unmodified cells will be present, and this heterogeneity must be taken into account when interpreting observed phenotypes [23, 30, 31].

The magic of CRISPR is in its ability to force a DSB event. Cells must repair DSBs, or risk dying. Thus, all of the editing that comes from CRISPR is due to the cell's innate ability to repair itself. The cell will not die from inserting a rupture into DNA, as it will be corrected by a healthy copy of the pair chromosome due to the natural process of DNA repair. If the pair chromosome is not present, as in the case of hemophilia, it is possible to insert the "right" gene site into the cell simultaneously with Cas9 and RNA guide and use it as a template for healing the inserted rupture [29 - 31].

In other worlds, NHEJ typically leads to a frameshift mutation and a knockout of the targeted genetic element's function. NHEJ-mediated gene knockouts are the simplest form of targeted modification, and these could be used e.g., to eliminate genes that negatively affect food quality, to confer susceptibility to pathogens or to divert metabolic flux away from valuable end-products [14]. The insertion of large sequences by NHEJ or HR would allow the introduction of transgenes at defined loci that promote high-level transcription and do not interfere with the activity of endogenous genes.

Alternatively, if the objective of the experiment is to replace the targeted genetic element with a different sequence (e.g., gene insertion, single-base editing, etc.), the cell can be directed towards an alternative repair pathway, homology directed repair (HDR). To accomplish this, a homologous DNA template bearing the desired sequence must be introduced in the cell, along with the CRISPR components. A certain number of cells will use this template to repair the broken sequence via homologous recombination, thereby incorporating the desired edits into the genome.

Using CRISPR/Cas9, you can do multiplex editing of several wrong genes at once. To do this, just enter the protein Cas9 and several different RNA guides. Each of them will send Cas9 to its own target, and together they will eliminate the genetic problem. In general, the described mechanism functions due to the principle of complementarity, which was first proposed by Jim Watson and Francis Crick (1952) in their famous model of double-stranded DNA.

In the other opinion, there are three types of genome modifications. First type of modification is the insertion of small insertions and deletions (INDEL - INsertion or DELetion) to knock out any gene, while INDEL can lead to a shift of the reading frame or the destruction of the splice site. The second type of modification is the introduction of target DNA sequence into a specific region of genome. The third type of modification is creation of large deletions (from hundreds to hundreds of thousands of bases) [30-31].

Specialty of CRISPR/Cas9 editing for monocots

A codon optimized Cas9 protein and a gRNA are expressed from a single vector and provided as ready-to-use, transfection-grade DNA. The native Cas9 coding sequence was codon optimized for expression in dicots [32-38] and monocots [39-42], respectively. The monocot Cas9 constructs contain a monocot U6 promoter for sgRNA expression. The plant selection markers include hygromycin B resistance gene, neomycin phosphotransferase gene, and the bar gene (phosphinothricin acetyl transferase) [29, 43].

In the field of plants genome engineering, cereals such as wheat, maize and barley with big complicated genomes are difficult material for transformation [39-42]. At the same time, cereals are the main food products of more than half of the world's population and serve as important sources of vegetable protein, carbohydrates, vitamins, mineral salts, bioethanol and cellulose. The first reports of successful genome editing using the CRISPR/Cas9 dated to 2013, so there are still no proven methods for genomic editing in cereal plants with complex genomes [29, 44, 45].

The process of monocots genomic editing includes the following stages: 1) selection of target sequences and design of gRNA; 2) construction of genetic vectors carrying the nuclease Cas9, sgRNA; 3) delivery of "editing tools" to plant cells; 4) detection of changes in genomic DNA; 5) clean the expression cassette with foreign DNA [29].

Cassettes of expression of specific gRNA includes promoter, gRNA, and terminator. Size of one gRNA expression cassette is 400-500 nucleotides. The promoters U3 and U6 from rice, wheat and maize

have been successfully used for gRNA monocots [6-11, 46]. Start for transcription initiation from the U3 promoter is A nucleotide, and from U6 promoter – G nucleotide.

Cassettes for Cas9 expression, as a rule, consist of a promoter adapted by the codon composition of Cas9 coding sequence, the nuclear localization signal and terminator. Optimized codon composition in accordance with the frequency of codon using in human genes, Cas9 has been successfully used to edit the genomes of a number of plants, including barley [27, 28]. At the same time, it was shown that Cas9, optimized for the codon composition of plant genes (both monocots and dicots), is more effective for monocot plants than the codon-optimized human genes [43, 46].

Many genes of *Gramineae* family plants are characterized by increased GC-composition of 5' region of coding part. Cas9, according to GC composition corresponding to the structure of the cereal genes (62.5%), with a total GC composition of 54.2%, demonstrated high efficiency of rice genome editing [29]. In monocot plants promoters of ubiquitin genes of maize or rice have been successfully used for Cas9 expression. Optimally composed expression cassettes let to achieve 90% of the editing efficiency in rice T_0 [36]. Genes of resistance to hygromycin (HPT) and bialaphos (Bar), under the control of the 35S promoter from Cauliflower mosaic virus, are often used as the selective markers for editing genomes of monocotyledonous plants.

Procedure of CRISPR/Cas9 genome editing tools includes: 1. Design sgRNA. Requires the identification of target sites with specific sequence criteria, while also avoiding the potential for off-target effects. 2. Transcribe and screen sgRNA *in vitro*. Quickly transcribe any sgRNA in vitro at high yields, without ligation. Don't waste time delivering ineffective sgRNAs to cells - test the cleavage efficiencies of individual sgRNAs *in vitro* before performing gene editing in your target cells. 3. Deliver sgRNAs and Cas9 into cell. There are several options for delivering sgRNAs and Cas9 to your target cells: for plasmid delivery, Cas9/sgRNA co-expression vectors allow seamless insertion of sgRNAs, and express bright fluorescent markers. Use gesicles, which are cell-derived nanovesicles, for efficient delivery of active Cas9 ribonucleoprotein (RNP) complexes to a broad range of cell types with reduced off-target effects and very low cytotoxicity. To prevent genomic integration of Cas9, using this single reagent to transfect target cells with Cas9 mRNA and sgRNAs without cytotoxic effects. This AAV2-based system for delivery of sgRNAs and Cas9 enables efficient gene editing in difficult-to-transfect cells without genomic integration of Cas9. 4. For sgRNAs and Cas9 delivering into barley, we are using our elaborated *A. tumefaciens* - mediated pollen germ – line transformation technique. 5. Detection Cas9 protein and confirmation gene editing. Confirm that Cas9 protein is being expressed in target cells. Ensure that your cell population contains mutations at your target locus by using a mismatch detection assay that outperforms a CEL-1 based assay. 6. Genotype determination. If there are indels on one or both copies of your target gene, Cas9/sgRNA-mediated in vitro cleavage reaction can accurately determine cell's genotype after gene editing. 7. Identity indels. Characterize CRISPR/Cas9-induced indels with a simple four-step protocol using the Guide-it Indel Identification Kit [43].

For example, we study knock out of epigenetic factor of viruses' translation initiation eIF4E: sc-9976, caused many virus translation initiation in barley. RNAi silencing of eIF4E has conferred resistance to multiple viruses in melon, cucumber and broad spectrum resistance to potyviruses in tomato [47]. More recently, *Arabidopsis* complete resistance to Turnip Mosaic Virus has been successfully engineered by editing eIF4E using the CRISPR/Cas9 tool [27]. CRISPR/Cas9 constructs and plasmids for use in plants have been shown in figures 5, 6. Electrophoregrams of Cas9 *Streptococcus pyogenes* recombinant protein in combination with DNA, sgRNA are represented in figures 7. Epigenetic factor of viruses' translation initiation eIF4E is represented in figure 8, [46].

Delivery of CRISPR components into the cell

The CRISPR machinery is delivered in cells using different methods depending on the cell type and format of the CRISPR components [6-9, 23, 29, 30, 31].

In a lipid-based delivery system, cationic lipid reagents facilitate delivery of biomolecules into cells. This method is high-throughput, shows low cell-toxicity, and is applicable in various cell types. Traditionally used for delivering nucleic acids in cells, lipid-delivery method has recently been optimized for delivering ribonucleoprotein (RNP) format of CRISPR components in cells.

Electroporation enables delivery of the CRISPR machinery in cell types that are difficult to transform using lipid-based delivery systems. Application of a controlled, short electric pulse to the cells forms pores in the cell membrane, allowing entry of foreign material.

Nucleofection is a variant of electroporation, in which the electric pulse is optimized such that the nuclear membrane of the cells also forms pores. The CRISPR components are thus directly delivered inside the nucleus.

Microinjection is commonly used to inject the Cas9 and gRNA ribonucleoprotein complex in embryos, although it can also be used in cells. Zebrafish, mouse, and most recently human embryos have been manipulated using this technique.

Plant CRISPR/Cas9 products are intended for *Agrobacterium*-mediated plant transformation or biolistic microparticle bombardment or protoplast transformation.

Agrobacterium and bioballistic are the main methods of monocots transformation [9]. There are two different approaches to the expression of targeted genetic constructs in plant cells: transient (temporal) expression and stable transformation of the genome, which allows the production of transgenic plants [29]. Transient expression involves the introduction of a genetic construct simultaneously into the maximum number of cells without selecting the transformed variants, which results in a local peak of transgene expression in the cell population within a short time after transformation. A stable transformation consists of the insertion of genetic construct in the genomic DNA of a single plant cell, from which a transgenic plant can later be obtained by regeneration and growing on special selective media. The production of monocot transgenic plants takes a long time, for many cultures it is laborious and difficult technology [44, 45].

Most of the early work was carried out by the method of transient expression of genetic constructs in plant cells. The effect of the CRISPR/Cas9 system was demonstrated on wheat protoplasts [9, 13], cells of immature sorghum embryos [12], protoplasts and rice calli [11, 12], apple and maize protoplasts [35, 40]. At the same time, there were first reports of transgenic rice plants with mutations produced at target loci [36, 38], a little later there were publications of similar studies on wheat [39, 41, 42] and barley [33].

Agrobacterial transformation is an effective method of "tools" delivery if genome changes use such a mechanism of reparation as non-homological stitching of the ends. This method was successfully used for genome editing of maize [40], rice [11, 18, 19] and barley [29, 33]. Biobalistics was successfully used for wheat [13], maize [40] and rice [19]. Experimental evidence suggests that editing the genomes of rice and maize with using of homologous recombination mechanism was more effective in the case of biobalistics transformation [29].

We are developing a stable germ-line genetic transformation in wheat, soybean and barley by agrobacterium pipetting of targeted genes into stigma of flower before anthesis and transporting them into mature but not divided zygote, using natural pollen tubes.

Analysis of CRISPR editing

After transfecting the cells, the efficiency of DNA editing using CRISPR needs to be determined. A qualitative approach involves treatment of the CRISPR-edited DNA and the non-CRISPR edited DNA (control) with an enzyme that cuts DNA at mismatched sites. Gene deletions by the CRISPR system often result in mismatched bases during DNA repair. Thus, the CRISPR-edited DNA shows multiple small fragments after size-based separation in a gel, while the control shows a single band of uncut DNA. This method is a simple and crude way of estimating the CRISPR editing efficiency.

The quantification consists in determining the proportion of mutated cells in the case of cell culture or the ratio of plants carrying and not carrying mutations at the target locus in the production of transgenic plants. A qualitative assessment includes determining the type of mutations obtained. The most informative method is the amplification, cloning and sequencing of a fragment of genomic DNA containing a target sequence. Restriction endonucleases and PCR are used to enrich the preparation with the modified variants and to estimate the fraction of the mutated DNA [14]. The insertion of two double-stranded breaks into the knockout gene (due to multiplex editing) causes deletions, which are easily detected by PCR on the basis of the analysis of the length of the amplification product in the gel and sequence [11, 23, 29].

Alternatively, next generation sequencing (NGS) is a gene sequencing method that can be used for accurate and quantitative analysis of the editing efficiency of CRISPR. It also provides additional information regarding off-target edits in the DNA. However, due to the high cost of this method, alternative cost-effective and semi-quantitative methods are also used.

Optimization of on-target activity

Although the CRISPR/Cas9 system is an excellent tool for genome editing, the extent of off-target mutation needs to be investigated in more detail as well as the differences in cleavage efficiency among different but perfectly matched targets [23, 27, 28]. When attempting to design sgRNAs to target a gene of interest, CRISPR technology presents an embarrassment of riches, as the number of potential sgRNA sequences scales with the size of the gene. As either the coding or template strand of the DNA may serve as a target, the *S. pyogenes* PAM site (NGG) appears on average once every 8 nt. How, then, to choose from the dozens to hundreds of potential sgRNA sequences? Avoidance of off-target activity, discussed in more detail below, may be used to eliminate some sgRNA sequences, and target-specific features may be incorporated to choose sgRNAs that are more likely to be effective. For example, to generate loss-of-function alleles of protein coding genes, targeting closer to the N-terminus increases the chance that a frameshift allele will be deleterious, as more of the coding sequence will be disrupted. Likewise, for CRISPR technology, proximity to the transcriptional start site is critical for recruiting appropriate factors [18, 23, 30, 31]. The first genome-wide libraries were designed according to these general criteria, but did not take into account any sequence-specific information that may enhance on-target activity.

Interestingly, an extended PAM sequence beyond the canonical NGG motif was shown to affect activity, with CGGH being the most-optimal sequence (where H = A, C or T). This quantitative analysis led to a predictive model for designing optimal sgRNA sequences for any target of interest. Initial studies have shown that there are sequence features that affect the ability of Cas9 to bind sgRNAs, cleave DNA, and result in a loss-of-function allele. Further characterization of these rules, and incorporation of them into library design, will be critical for successful deployment of genome-wide libraries, and will result in libraries with progressively higher fractions of active sgRNAs.

Minimizing off-target activity

While optimizing on-target activity has clear ramifications for use of CRISPR technology, understanding off-target effects is equally important to avoid erroneous interpretation of experimental results. Initial experiments in mammalian cells showed that *S. pyogenes* Cas9 cleavage activity tolerates a number of mismatches between the sgRNA and the DNA target [10]. In general, mismatches closer to the 5′ end of the RNA are more tolerated than mismatches close to the PAM. Currently, there are not enough data to create fully predictive models of when an sgRNA will lead to appreciable levels of off-target DNA cleavage, as the exact base composition of the mismatch appears to affect activity [10, 23]. Given the tolerance of mismatches by Cas9 and the likelihood of finding certain sequence motifs in multiple locations in the genome, it is essential to consider possible off-target locations when designing sgRNA sequences. Several strategies have been developed to minimize the off-target effects of Cas9. One uses a shortened sgRNA of 17 nt, rather than the standard 20 nt sequence; under the conditions tested, the 17 nt [23].

Prospects for application of breakthrough technologies in Breeding: the CRISPR/Cas9 system for plant genome editing

“Although future studies are needed to examine the germ line transmission and heritability of the CRISPR/Cas-induced mutations and to evaluate any potential off-target effects of the CRISPR/Cas, our results here suggest that the CRISPR/Cas technology will make targeted gene editing a routine practice not only in model plants but also in crops”- Z. Feng [2].

The potential efficiency of CRISPR/Cas9 technology is much higher than traditional breeding approaches, and excludes the residual portion of the donor genome in editing crops (Figure 9).

About 10 years ago the first results on genome editing were achieved on plants, and during the last 4 years, thanks to the use of the relatively simple and convenient CRISPR/Cas9 system, there has been a sharp increase in the number of published works reporting successful editing genome of plants, including

the directed modification of economically valuable genes of cultivated plants (potatoes, cabbage, tomato, maize, rice, wheat, barley, soybeans, sorghum) [10-15, 17-20, 29-42, 44, 45]. Published works demonstrate the possibility of obtaining non-transgenic plants using CRISPR/Cas9 system with specific predetermined mutations stably inherited in generations. This possibility offers the challenge to obtain varieties with predetermined mono- and olygogenic traits.

The main practical advantage of CRISPR/Cas9 is the ease of multiplexing. The simultaneous introduction of DSBs at multiple sites can be used to edit several genes at the same time and can be particularly useful to knock out redundant genes or parallel pathways. The same strategy can also be used to engineer large genomic deletions or inversions by targeting two widely spaced cleavage sites on the same chromosome [7, 13, 19, 32]. It is possible to edit several genes simultaneously by introducing multiple or long DNA breaks in the genome to embed a whole complex of useful genes that will be transmitted in the offspring as a single locus.

The average term for the creation of a stable genotype by CRISPR/Cas9 technology is 2 years, which is 3-4 times faster than 10-12 years by backcross methods of conventional breeding, or 2-3 times faster than modern methods of marker-assisted selection (MAS) + marker double haploid (MDG) + backcross (BC) or obtaining double haploid hybrids [36 - 39].

Studies of 145 target genes in 15 crops obtained for 4,5 years from 2013 to 2018, demonstrated the possibility of obtaining modified non-transgenic plants. Editing of 37 genes was related to improvement of crops yield and stress resistance. In these studies, the ability to get transgene-free modified plants was widely demonstrated. In most of these cases, modifications resulted in knockout of the genes such as negative growth and development regulators or negative regulators of plant resistance. In most cases, the phenotype of modified plants was assessed, and the presence of desired changes was shown. Essential success has been achieved over a short period since the first publications on CRISPR/Cas application in plants [32 – 45, 47].

Generally, the CRISPR/Cas9 system for plant genome editing is a breakthrough technology in breeding, and the main prospect for creation of elite high yielding crops today and in the nearest future with social and economic benefit, in comparison with other breeding approaches: conventional breeding, non-targeted mutagenesis (like chemical mutagenesis) with polygene control of indexes, double haploids and marker assisted selections.

Discover regulations for gene editing

In the United States, a product-oriented concept has been adopted and it is established that CRISPR/Cas genome edited plants are not GMOs, as contain **no** recombinant foreign DNA.

In Europe, Russia and Kazakhstan, a process-oriented concept is still adopted and plants with edited genomes are GMOs.

Removal of undesirable plasmid DNA including the Cas9 and guide RNA achieved following segregation and screening of ‘clean’ plants in the next generation that carry only the edited event.

In the case of using CRISPR/Cas9, several methods are possible for creating of non-transgenic modified plants: 1) by using programmable nucleases, including on the basis of temporary expression of nuclease components using agroinfiltration or viral vectors, or direct delivery of components in the form of functional gRNA and Cas9 protein; 2) by integrating the transgenes gRNA and Cas9 protein into a chromosome different from that of the edited gene, so as to get rid of transgenic structures due to independent inheritance in the offspring; 3) transient expression of structures carrying elements of the CRISPR/Cas9 system, without integrating them into genomic DNA. It is assumed that the temporary presence of nucleases and gRNA in the cell may be sufficient to introduce the necessary changes in the genome. It is shown that this principle can be realized in monocot plants [29, 48].

Although the European regulatory framework for genetically modified crops focuses on the process and not the product (hence two identical plants produced by conventional mutagenesis and genetic engineering would be regulated differently under the current guidelines), there is hope and confidence that plants altered by the excision of a few nucleotides using genome editing tools such as CRISPR/Cas9 would not be classified as genetically modified organisms [49, 50]. The classification of genome edited plants is currently under review to decide whether new breeding technologies including CRISPR/Cas9 are exempt from GM classification.

CRISPR in the future

CRISPR has received a lot of attention primarily due to its ability to genetically edit living organisms. However, while this side of CRISPR occupies the spotlight, researchers have begun tinkering with the technology to unlock its vast potentials that go beyond the applications discussed so far.

Scientists are now using a modified version of CRISPR to explore epigenomics -the genome-wide set of chemical groups that adorn DNA and its associated histone packaging proteins. Previously, researchers were merely able to catalogue the correlation between epigenetic markers and gene expression in cells. Now, a CRISPR complex that is capable of acetylating histone proteins at precise locations dictated by the complex's gRNA has been developed [22-26]. Such technologies can shed light on the causal relationship between epigenetic markers and gene expression in the future.

CRISPR is also enabling elucidation of large portions of the human genome, the function of the vast majority of which is unknown. Scientists have long been trying to identify the location and function of 'non-gene' genetic elements that do not code for proteins but are thought to have important regulatory roles in expression. CRISPR is allowing researchers to knock out these previously uncharted regions to study their role in the cell [31, 32].

Multiple gRNAs targeting the same promoter also demonstrate synergistic effects, indicating that tuning the level of transcriptional control is possible using this approach [25]. Furthermore, multiple gRNAs targeting different promoters allow the simultaneous inducible regulation of different genes. Two independent research groups have already extended this approach by layering CRISPR regulatory devices based on either transcriptional activators or repressors to create functional cascaded circuits. In this context, another peculiar feature of the CRISPR/Cas9 system is the ability to use orthogonal Cas9 proteins to separately and simultaneously carry out genome editing and gene regulation in the same cell [26]. Functional genomics attempts to understand the genome by perturbing the flow of information from DNA to RNA to protein, in order to learn how gene dysfunction leads to disease. CRISPR/Cas9 technology is the newest tool in the geneticist's toolbox, allowing researchers to edit DNA with unprecedented ease, speed and accuracy, and representing a novel means to perform genome-wide genetic screens to discover gene function [44, 45].

CRISPR is not only paving the way for us to solve the most difficult of problems in the life sciences, but it is also enabling the scientific community to explore dimensions of the genome that we've been unable to study up until this point. Due to its adaptability across a wide range of species and its simplicity of use, CRISPR/Cas9 has quickly revolutionized genome engineering. The CRISPR/Cas9 technology promises to deliver some truly stunning advances within the coming decades, particularly in relation to human therapeutics, agricultural biology, and basic scientific research.

Conclusion

CRISPR/Cas9 technology has revolutionized gene manipulation capabilities in many species including crops. The multitude of functions that can be performed with CRISPR/Cas9 and its many derivatives make it a molecular tool that will open new opportunities in the complicated world of plant–pathogen interactions and help design durable crop resistance to pathogens.

CRISPR tool will help integrate omics data in order to fully understand and increase crop improvement. Generally, the CRISPR/Cas9 system for plant genome editing is a breakthrough technology in breeding, and prospect for creation of elite high yielding crops today and in the nearest future with great social and economic benefit.

The agricultural applications described review represent only the very first, initial uses of this exciting technology, and we can expect many more valuable opportunities for agriculture in the near future. Although we may be in the heyday of CRISPR technology, we remain at the early stages of fully understanding the system and expanding its potential.

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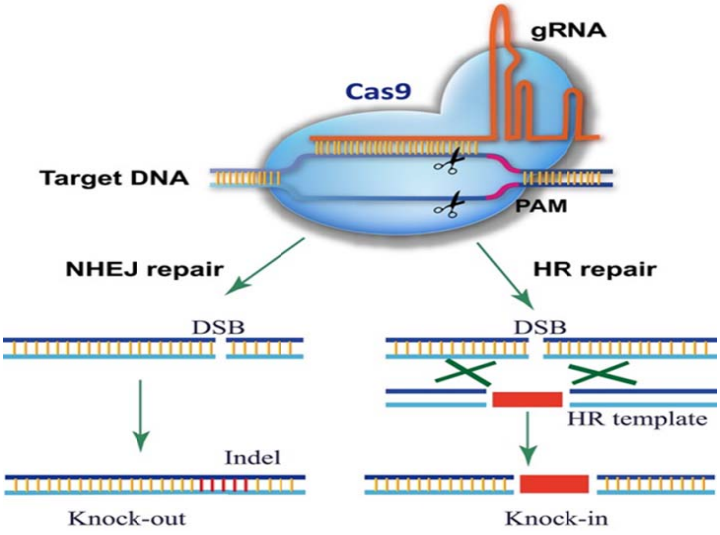

Figure 1 - Schematic of CRISPR/Cas9 genome editing mechanism

Cas9 is directed to its DNA target by base pairing between the gRNA and DNA. A PAM motif downstream of the gRNA-binding region is required for Cas9 recognition and cleavage. Cas9/gRNA cuts both strands of the target DNA, triggering endogenous DSB repair. For a knockout experiment, the DSB is repaired via the error-prone NHEJ pathway, which introduces an inDel at the DSB site that knocks out gene function. In a knock-in experiment, the DSB is repaired by HDR using the donor template present, resulting in the donor DNA sequence integrating into the DSB site [Origene. https://www.origene.com/products/gene.../crispr-cas9, 2015].

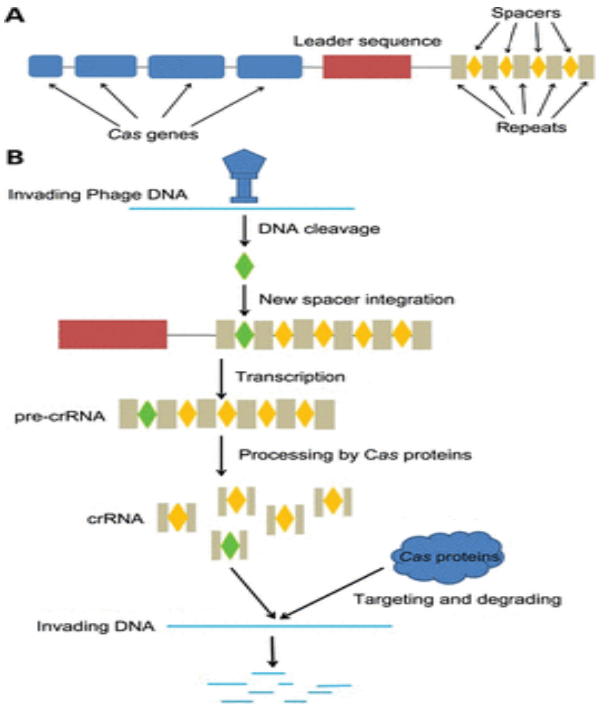

Figure 2 - Overview of CRISPR/Cas bacterial immune system

(A)A typical structure of CRISPR locus; (B) Illustration of new spacer acquisition and invading DNA cleavage [Feng Z., Yan W. and Xiong G., 2014].

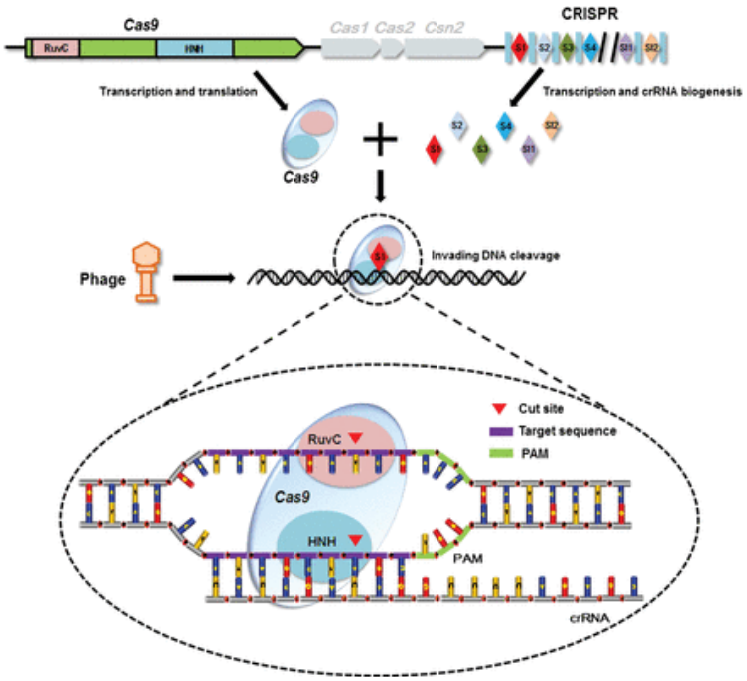

Figure 3 - Schematic of CRISPR/Cas9-mediated DNA cleavage

Mature crRNA guides Cas9 to the target site of invading phage DNA. The DNA single-strand matching crRNA and opposite strand are cut, respectively, by the HNH nuclease domain and RuvC-like nuclease domain of Cas9, generating a DSB at the target site [Feng Z., Yan W. and Xiong G., 2014].

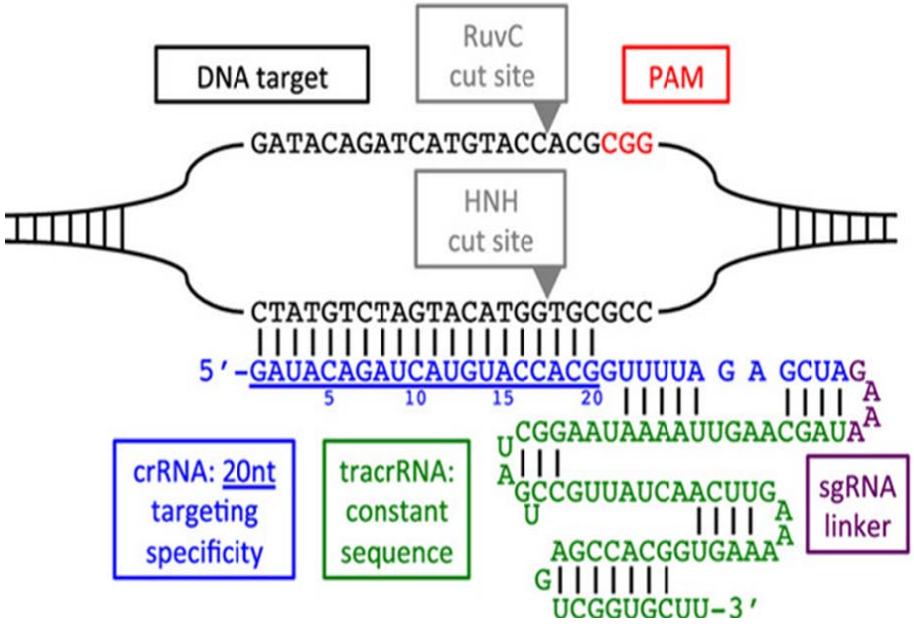

Figure 4 - Schematic of interaction between sgRNA and DNA.

The crRNA sequence (blue) and tracrRNA sequence (green) are fused together by a short loop (purple) to create an sgRNA. The 20 underlined nucleotides can be programmed to recognize any DNA sequence of interest. For *S. pyogenes* Cas9, the NGG PAM is required immediately downstream of the target site. The two strands of DNA are cut by the HNH and RuvC nuclease domains of Cas9. [Hartenian, Doench, 2015]

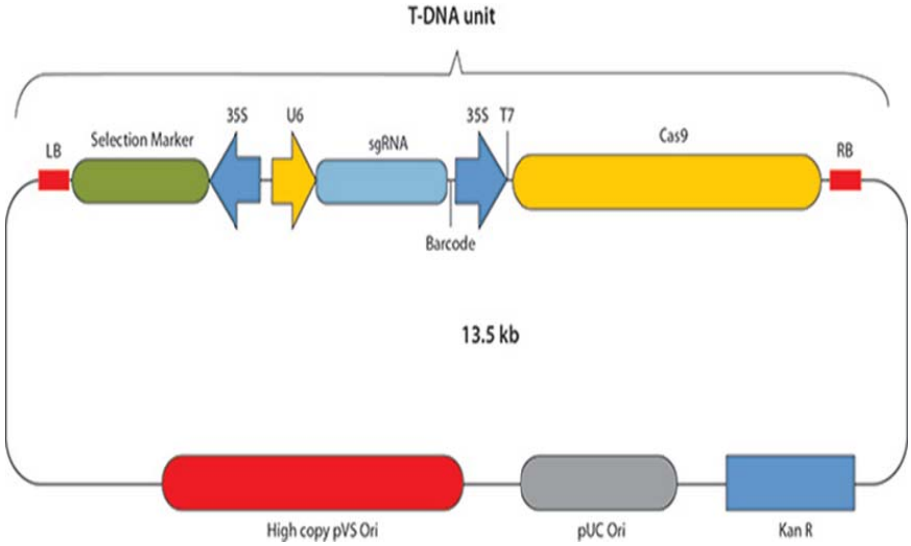

Figure 5 - Scheme of T-DNA unit for monocot CRISPR/Cas9 editing [https://www.sigmaaldrich.com/technical-documents/articles/biology/crispr-cas9-genome-editing.html]

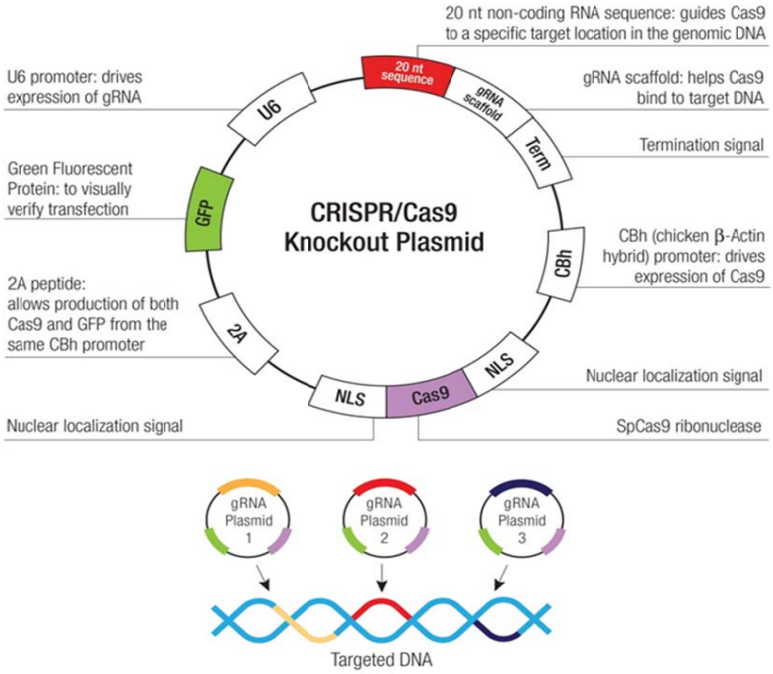

Figure 6 - CRISPR/Cas9 knockout plasmid

eIF4E CRISPR knockout and activation products [Origene. https://www.origene.com/products/gene.../crispr-cas9, 2015].

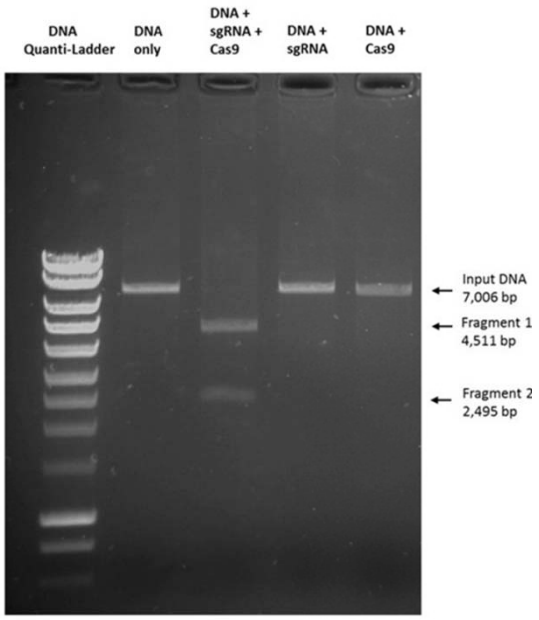

Figure 7 - CAS9 *Streptococcus pyogenes* recombinant protein [Origene. https://www.origene.com/products/gene.../crispr-cas9, 2015].

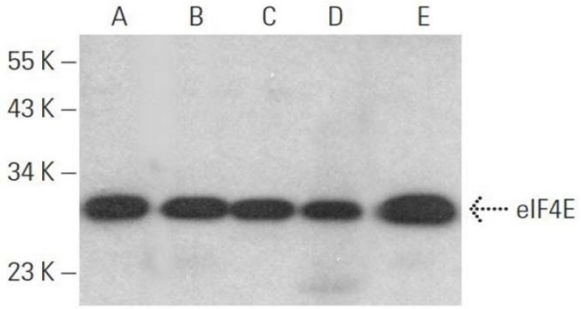

Figure 8 - Epigenetic factor of viruses' translation initiation eIF4E: sc-9976

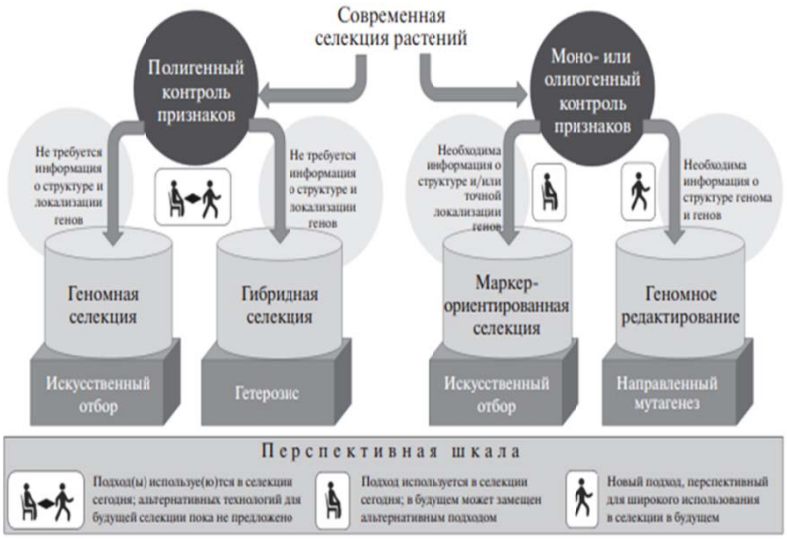

Figure 9 - Advantages of CRISPR technology for Breeding [Khlestkina, Shumny, 2016]

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ҚАЗАҚСТАНДА АУЫЛШАРУАШЫЛЫҒЫ ДАҚЫЛДАРЫНЫҢ ЭЛИТАЛЫ СОРТТАРЫН ҚҰРАСТЫРУ ҮШІН CRISPR/CAS9 ГЕНОМЫН РЕДАКЦИЯЛАУДЫҢ ЖАҢА РЕВОЛЮЦИЯЛЫҚ БИОТЕХНОЛОГИЯСЫ

Аннотация. Мақалада, 2013 жылы нарықта пайда болған, өмір туралы ғылым бағытында революция тудырған, CRISPR/Cas9 деген атаумен танылған геномды редакциялаудың жаңа, алдыңғы қатарлы технологиясы туралы әдебиетке шолу берілген. CRISPR/Cas9 (Cas9 – 9 ақуызбен байланысқан, топтасып, ұдайы кезектесіп келетін қысқа палиндромды қайталаулар), адамдардың, жануарлар мен өсімдіктердің гендерін редакциялайтын жаңа танымал технологияға негізделген, бактериялар мен археялардың РНК реттестіретін қорғаушы механизмі. CRISPR/Cas9 кешені, соңғы 4,5 жылда «CRISPR craze' - «сумасшествие CRISPR» атауымен танымал болған, іргелі және қолданбалы зерттелерге негізделген, геномды радекциялауға

арналған қарапайым, арзан және әмбебап құрал болып табылады. Бактерия ағзасындағы Cas9 нуклеаза, бөтен ДНК ыдырауын сиквенс-спецификалық бағыттайтын екі РНКмен, РНК CRISPR (crRNA) және транс-белсендіретін crРНК (tracrRNA) қауымдастырылады. Бұл бактериалды иммунды кешен, сүтқоректілер мен жоғарғы өсімдіктер ағзасындағы гендерді редакциялауда пайдаланылуымен қатар, қазіргі кезде жоғарғы өсімдіктер геномын редакциялауда және селекцияда тиімді қолданылады. Саңырауқұлақты және вирусты патогендерге төзімді ауылшаруашылығы дақылдарының элиталы сорттары, Қазақстанда фермерлер мен жергілікті экономикаға, өнімділігінің артуы мен дән сапасының жақсаруына байланысты пайда әкеледі.

Түйін сөздер: геномды инженерия, геномды редакциялау, CRISPR/Cas9, ген нокауті, ауылшаруашылық дақылдар, селекция перспективасы, ГМО емес жіктеу.

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НОВАЯ РЕВОЛЮЦИОННАЯ БИОТЕХНОЛОГИЯ РЕДАКТИРОВА-НИЯ ГЕНОМА CRISPR/CAS9 ДЛЯ СОЗДАНИЯ ЭЛИТНЫХ СОРТОВ СЕЛЬСКОХОЗЯЙСТВЕННЫХ КУЛЬТУР В КАЗАХСТАНЕ

Аннотация. В статье представлен обзор литературы по прорывной технологии, инструменту редактирования генома под названием CRISPR/Cas9, которая произвела революцию в области наук о жизни с тех пор, как она появилась на рынке в 2013 году. CRISPR/Cas9 (Сгруппированные регулярные чередующиеся короткие палиндромные повторы, связанные с белком 9 - Cas9), является РНК регулируемым защитным механизмом в бактериях и археях, на котором основана новая популярная технология редактирования генов у людей, животных и высших растений. Система CRISPR/Cas9 представляет собой простой, недорогой и универсальный инструмент для редактирования генома, лежащий в основе фундаментальных и прикладных исследований, популярность которого за последние 4,5 года стала известна как «сумасшествие CRISPR».

В организме бактерий нуклеаза Cas9 ассоциируется с двумя РНК, РНК CRISPR (crRNA) и транс-активирующей crРНК (tracrRNA), направляющей сиквенс-специфическое расщепление чужеродной ДНК, в настоящее время широко используется как эффективный инструмент редактирования генома у высших организмов, включая улучшение сортов сельскохозяйственных культур.

Система CRISPR/Cas9 для редактирования генома приоритетных сельскохозяйственных культур является прорывной технологией в селекции – важнейшей перспективой для применения в ближайшем будущем, и может быть исключена из классификации ГМ.

Ключевые слова: геномная инженерия, редактирование генома, CRISPR/Cas9, нокаут гена, сельскохозяйственные культуры, перспективы селекции, не-ГМО классификация.

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PROCEDURE OF CUSTOM MATING AND GENOMIC ANALYSIS OF BULL-CALVES IN DAIRY CATTLE BREEDING

Abstract. The research has been carried out on the formation of bull-producing cows, the production of replacement bulls from custom mating, the system work has been done to obtain the primary data of pedigree records with the entry of data into the information and analytical system (IAS) and on automatic calculation of estimated breeding value (EBV) of cows. Also, the work was carried out on the formation of first-calf heifers groups in order to organize targeted selection work with the dairy cattle. In total, 609 cows from 3 regions were formed. It was established that the dairy productivity of mothers the formed groups for lactation has significant fluctuations (3413...9611 kg), but the productivity of the mothers of their fathers is much higher (5000...14850 kg), which predetermines the genetic potential of the cows of the formed groups.

As a result of the custom mating, there was obtained 18 bull-calves, whose genomic analysis determined their breeding value in the laboratory for genomic analysis of the Holstein Association (Vermont, USA). Of the 18 bulls, the most valuable were 5 heads with a breeding value (TPI) of more than 1600 according to the American system, including 1 bull with TPI = 2169. The average index (TPI) of genetically estimated bull-calves of domestic reproduction was 1512.6 that allows to assert about a sufficiently high genetic potential of dairy cattle in the RK.

Keywords: dairy cattle, custom mating, genomic analysis, estimated breeding value.

Introduction. A promising alternative in the existing system of assessing breeding value is a genomic selection program that solves a wider range of issues, starting with the bulls' mothers, the type,and extent of the bulls assessment, their use based on the results of the genomic breeding value estimation. Economic efficiency and advantages of using genomic selection are based on the fact that genomic breeding value can be calculated for calves at the earliest age. If we compare genomic selection and traditional selection, in terms of the level of reliability of the quality of offspring, it is almost the same that is reliable, but faster due to a shorter interval between generations. Genomic selection can not only save costs, accelerate genetic progress by 50%, but also increase the selection pressure[1].

Estimation of the breeding value of dairy cattle is one of the links in the practical implementation of selective programs in herds and populations with the aim of directional formation in animals of the intended hereditary traits and the selection of animals in determining the breeding value of bulls. The need for a detailed study of the exteriors of cows arises because of the active use of the Holstein breed, which introduces changes to the existing type of animals [2,3].

Along with this, there is a process of approbation of the methods of linear evaluation of the exterior and the determination of genetically determined interrelationships between the exterior characteristics with such indicators as the duration of economic use. Identification in the shortest possible periods of time of the best genotypes of animals and their subsequent use for breeding and selective work with the herd is the basis of genetic progress in modern cattle breeding. At the same time, it is important to take into account the data on the exteriors, the lifetime productivity and the health status of the estimated livestock.

The cornerstone of achievement of the identified selective priorities is the accuracy of the evaluation of genetically determined economic traits of animals.In this regard, a need arises to accumulate the information obtained by creating electronic databases and their corresponding software. The use of linear statistical models using computer modeling of the breeding process in dairy herds in an accelerated mode will help to provide an objective assessment of the breeding value of dairy cattle and the selection of animals with a high genetic potential of productivity. The use of pedigree bulls with high indices of breeding value in generations will allow to increase the productivity of dairy cattle [4,5].

It should be noted that genomic studies are an improved method of selecting young bulls, the reliability of which is confirmed by a subsequent estimation of the offspring. Since 2009, genomic evaluation has become the official assessment system in the US and Canada, and since August 2011 in Germany and Austria. The only difference from the current evaluation is that the reliability indicators reflect the additional accuracy of genomic data [6,7,8].

Thanks to modern information technologies, the selectionwas made possible remotely. Improvement of the functions of the Information and Analytical System "The Republican Livestock System" in terms of monitoring, analyzing the accumulated data on the livestock of animals, analytical tools, as well as tools that automate the collection of data on the quality of milk, will significantly improve the quality of the recorded information and more fully use an existing base for breeding and selective work in farms. The collected data, improved by an additional control system, in combination with modern analytical tools will allow to conduct economic and scientific research work at a qualitatively new level [9].

Currently, a definite priority is to increase the economic efficiency of production and improve its quality characteristics by improving the breeding qualities of animals and the rational use of genetic resources. In solving this problem, the main role is played by the optimization of the general system of pedigree work at the level of breeds and animal populations. The programs of breeding and selective work in dairy cattle are based on three components: the evaluation of breeding qualities of animals, the formation of breeding groups and their intensive use in the reproductive system of the genetic material of the selected population. At the same time, the accuracy and objectivity of assessing the tribal (genetically conditioned) qualities of animals belong to the priority in the overall complex of tribal activities.In countries with developed animal breeding (the USA, Canada, Germany, Sweden, the Netherlands, etc.), the most theoretically substantiated methods are used to predict the genetic traits of individuals (primarily bulls): the best linear unbiased prediction (BLUP method) and the Animal Model (an improved version of BLUP). However, to date, the practice of dairy cattle breeding in the Republic of Kazakhstan officially uses the evaluation of producers by offspring based on a direct comparison of the productivity of daughters of test bulls with their peers within individual herds, which often leads to a bias in the results. In the end, in practically all breeds of domestic dairy cattle, the rates of genetic improvement in populations are far from optimal ones[10].

The set tasks for the development of a management system for the selection process in dairy cattle breeding are promising and effective for obtaining servicing bulls of domestic breeding. A comprehensive assessment of the phenotypic indicators and the classification evaluation of the cows' exteriors, along with pedigree, genetic analysis, will allow for better selection when forming bull-producing groups. New methods for assessing breeding value, taking into account the linear profile and genetic analysis of cows, will contribute to the intensification of breeding and selective work with dairy herds.

Aim of the research. Selection of farms and organization of custom mating with carrying out of the genomic analysis of bull-calves, obtained from custom mating.

Materials and methods. Objects of the research were brood stocks, as well as servicing bulls. The materials for research were the documents of primary zootechnical and pedigree accounting (from the IAS system), as well as the results of experimental studies, visual assessment, weighing, measurements, control milking of animals. In addition, biochemical studies of milk were carried out.

The calculation of the estimated breeding value was carried out according to the methodology developed by the co-workers of the Kazakh Scientific Research Institute of Animal Breeding and Fodder Production LLP.[11].

Results of the study. The traditional system of determining the breeding value of animals and the selection based on it require patience: often from six to seven years from the selection of parents to the completion of the productivity tests of their offspring. Genomic selection allows to "jump" through the

barrier of the generation interval: when selecting bulls at the age of four to six weeks, specialists have access to the breeding value (BV) based on genomic analysis.

A year later bulls with higher genomic value can be realized for stud purpose. Scientists have calculated that even with reliability (accuracy of determination) the BV is 75%, due to the use of the estimated "genomically" young bulls, the breeding efficiency will double.

Table 1 shows that the composition of bull-producing cows is represented by almost all the main breeds in the Republic of Kazakhstan. A total of 162 heads were formed, of which the smallest number of livestock was formed in a black-and-motley manner. It should be noted that animals of the black-and-motley breed are direct descendants of bulls of the Holstein black-and-motley breed, if we combine these two breeds, it turns out that the livestock of the Holstein and Holsteinized animals composes the greatest specific weight - 43.8 %, which corresponds to a given number of bulls. So if from 71 cows half of the bulls will be received ie. 35 heads of which will be evaluated 3-4 heads, then this will be fuller enough for the brood stock of the black-and-motley population.

Evaluation of the breeding value of dairy cattle is one of the links in the practical implementation of selection programs in herds and populations with the aim of directional formation in animals of the intended hereditary traits and the selection of animals in determining the breeding value of bulls.

During the formation of bull-producing cows, their own production was taken into account according to the highest lactation from 7.0 thousand kg and more.

Table 1 - Information on the formed bull-producing cows

Farm	Breed	Number of the formed bull-producing cows			Totalbybreeds
		II	III	IV	
Almaty integrated agricultural production centre	Alatau	7	3	2	45
Mamed farm		17	6	2	
Mezhdurechensk LLP		4	2	2	
EsilAgroLLP	Holstein	2	2	1	40
AF«Rodina”LLP		1	3	1	
Sadchikovskoe LLP		2	1	2	
Aidarbayev farm		16	6	3	
Kamyshinskoye farm	Simmental	14	8	4	46
KamyshinskoyeLLP		14	4	2	
Mezhdurechensk LLP	Black-and-motley	7	5	4	31
K. MarxLLP		5	3	2	
Sheminovka LLP		2	2	1	
TOTAL		91	45	26	162

It has been established that the limits of bulls-producing cows range from 7.0 to 10.3 thousand kg of milk (Table 2).

In order to obtain high-quality offspring from these cows, some of them were inseminated by servicing bulls of the North American breeding (table 3).

Table 3 shows that 72 heads are now inseminated, mostly by American and Canadian breeds, while the breeding value of these bulls is quite high, according to the TPI from 1600 to 2300, the remaining animals will be inseminated as they come in heat.

Of 18 bulls, 15 are representatives of the Holstein breed of domestic reproductions, two bulls of the Alatau breed and two bulls of the "Ertis" intra-breed type of the Simmental breed. (Table 4).

Table 2- Average productivity of bull-producing cows

Breed	n	Average milk yield of bull-producing cows, kg	
		$X \pm m_x$	Limit
Alatau	45	7824±207	7000-10131
Holstein	40	8279±194	7044-10191
Simmental	46	8584±261	7122-9105
Black-and-motley	31	8109+244	7012-10373

Table 3 - Information on custom mating of bull-producing cows

Breed	Servicing bulls (fathers)	Bullmother's productivity, kg	BV of bull (TPI, LPI)	Number of the inseminated cows, heads
Alatau	Emergency 199362	11598	2100	3
	Popstar 68101680	12475	1900	2
	Diego CAN M 11014268	13714	1800	1
Black-and-motley	AltaVITTEK 11HO10909	11386	2321	1
	AltaGREATEST 011HO10928	11903	2370	1
	AltaJOEL 011BS00644	10314	1681	2
	Eaton 69710369	15518	2279	3
	Murray 72436573	11314	2233	3
	Enrich 69710405	17550	1973	4
	Kano 69742883	12563	2114	2
	Alta Fire 07667	14108	1513	3
Simmental	Mazda 136722780	12062	1696	4
	Colley 63026616	14736	1664	5
	Artve 342516	10848	1720	7
	Skyfire 231465	10814	1840	6
	Brayday 50803818	16113	1650	1
Holstein	EATON HO00600656	10982.5	1884	6
	AltaGoalman USA000063449647	14751	2103	5
	BOMAZ SHTL USA63262902	14660	2141	2
	ZIMMERVIEW USA62510183	11122	1960	3
	Altasamurai09861	14840	1940	2
	AltaRoss 09703	14438	1877	3
Swiss	MVP 7BCF00828	10637.5	1730	3

It was established that out of 15 bulls that have passed the stage of determining the authenticity of origin, 14 bull-calves did not confirm their origin by father, and according to mother (belonging to mother was determined by mother's father), they were confirmed (table 5).

Table 4 - List of bulls selected for genomic analysis

No	Identitynumber	Breed	Farm
1	2	3	4
1	KZP157866611	Holstein black-and-motley	Sheminovka LLP
2	KZP157866636	Holstein black-and-motley	Sheminovka LLP
3	KZP157923541	Holstein black-and-motley	Sadchikovskoe LLP
4	KZP157923775	Holstein black-and-motley	Sadchikovskoe LLP
5	KZP157923673	Holstein black-and-motley	Sadchikovskoe LLP
6	KZP157923561	Holstein black-and-motley	Sadchikovskoe LLP
7	KZC158746855	Holstein black-and-motley	AF«Rodina”LLP
8	KZB157778956	Holstein black-and-motley	Mezhdurechensk-Agro LLP
9	KZB157507262	Alatau	Mamed farm
10	KZB157507352	Alatau	Mamed farm
11	516271	"Ertis" intra-breed type	Kamyshinskoye LLP/farm
12	516441	"Ertis" intra-breed type	Kamyshinskoye LLP/farm
13	KZT183231895	Holstein black-and-motley	Taiynsha-AstykLLP
14	KZT183231897	Holstein black-and-motley	Taiynsha-AstykLLP
15	KZT183231857	Holstein black-and-motley	Taiynsha-AstykLLP
16	KZB158174418	Holstein black-and-motley	ZKAPAmiranLLP
17	KZB158174428	Holstein black-and-motley	ZKAPAmiranLLP
18	KZB158174438	Holstein black-and-motley	ZKAPAmiranLLP

Genomic analysis was carried out in the Laboratory for Genomic Research of the Holstein Association (USA). The process of genomic analysis consists of several stages, one of which is the determination of the authenticity of origin (Table 6).

From the data in Table 6 it can be seen that 1 bull, born in Amiran LLP, received GTPI of more than 2000, this bull may become a superbull in the future. The average index of genetically estimated bull-calves of domestic reproduction was 1512.6, which allows us to confirm the sufficiently high genetic potential of the dairy cattle of the Republic of Kazakhstan. It was also established that all bull-calves were not confirmed by fathers.Since in the Laboratory for Genomic Research of the Holstein Association (USA), where the genomic analysis of bull-calves was conducted, there is a computer data bank on the genome of 80-90% of the Holstein servicing bulls, whose seeds are used all over the world, according to this fund, they found the real fathers of our bull-calves and the genome of the identified fathers served as the material for calculating the GTPI of our bull-calves. Three bull-calves did not have a genome analysis, because they were representatives of other breeds.

Table 5 - Name of farms from which the bulls were selected

No	Name of the farm	Breed	Number of heads	Confirmationoforiginby	
				father	mother
1	2	3	4	5	6
1	Sheminovka LLP	Holstein black-and-motley	2	-	+
2	Sadchikovskoe LLP	Holstein black-and-motley	4	-	+
3	AF«Rodina”LLP	Holstein black-and-motley	1	-	+
4	Mezhdurechensk-Agro LLP	Black-and-motley	1	-	+
5	Mamed farm	Alataublack-and-motley	2	-	+
6	Kamyshinskoye LLP/farm	Holstein red-and-motley	1	-	+
		Ayrshire	1		+
7	Taiynsha-AstykLLP	Holstein black-and-motley	3	-	+
8	ZKAPAmiranLLP	Holstein black-and-motley	3	+1 and -2	+

Table 6 - Results of the genomic analysis

Name of the farm	Identity number of bull-calves	GTPI	Confirmationoforiginby :	
			father	mother
1	2	3	4	5
Sheminovka LLP	KZP157866611	1293	-	+
Sheminovka LLP	KZP157866636	1478	-	+
Sadchikovskoe LLP	KZP157923541	1503	-	+
Sadchikovskoe LLP	KZP157923775	1397	-	+
Sadchikovskoe LLP	KZP157923673	1609	-	+
Sadchikovskoe LLP	KZP157923561	1573	-	+
AF«Rodina”LLP	KZC158746855	1421	-	+
Mezhdurechensk-Agro LLP	KZB157778956	1475	-	+
Mamed farm	KZB157507262	not determined	n/a	n/a
Mamed farm	KZB157507352	not determined	n/a	n/a
Kamyshinskoye LLP/farm	516271	1340	-	+
Kamyshinskoye LLP/farm	516441	not determined	n/a	n/a
Taiynsha-AstykLLP	KZT183231895	1666	-	+
Taiynsha-AstykLLP	KZT183231897	1276	-	+
Taiynsha-AstykLLP	KZT183231857	1167	-	+
ZKAPAmiranLLP	KZB158174418	1718	-	+
ZKAPAmiranLLP	KZB158174428	1604	+	+
ZKAPAmiranLLP	KZB158174438	2169	-	+
Average		1512.6	X	X

It was found that the average estimated breeding value (EBV) for all breeds was 81.4. Among all breeds, the highest EBV level was determined in Holstein cows (84.3) of imported breeding. The EBV level of cows of other breeds does not have a significant difference (Table 6).

Conclusion. The traditional system of determining the breeding value of animals and the selection based on it require patience: often from six to seven years starting from the selection of parents to the completion of the productivity tests of their offspring. The genomic selection allows to "jump" through the barrier of the generation interval: when selecting bulls at the age of four to six weeks, specialists have access to a breeding value (BV) assessment based on genomic analysis. A year later bulls with higher genomic value can be realized for stud purpose. It is proved that even with reliability (accuracy of determination) of the BV at 75%, due to the use of estimated "genomically" young bulls, the breeding efficiency will double.

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СҮТТІ СИЫР ШАРУАШЫЛЫҒЫНДА ТАПСЫРЫСПЕН ШАҒЫЛЫСТЫРУДЫ ЖӘНЕ ГЕНОМДЫҚ ТАЛДАУДЫ ҰЙЫМДАСТЫРУ

Аннотация. Тапсырыспен шағылыстырылып алынған табын толықтыратын бұқаларды өндіретін сиырлар тобын қалыптастырылды, ғылыми-зерттеу жұмыстары жүргізіліп, алынған алғашқы мәліметтер ақпараттық-аналитикалық жүйеге (АТЖ) енгізілді және сиырлардың асыл тұқымды құндылықтарының (ТБИ) индекстерін автоматты түрде есептеледі. Сүтті ірі қара малының сиырларын мақсаттытүрде асылдандыру жұмыстарын ұйымдастыру үшін бірінші тума сиырларының топтары құрылды. Барлығы 3 облыстан 609 сиыр топтары құрылды. Құрылған топтағы аналықтардың сауын маусымында сүт өнімділік көрсеткіштері (3413 ... 9611 кг) елеулі ауытқуларға ие екендігі анықталды, бірақ әкелерінің аналарының өнімділігі (5000 ... 14850 кг) едәуір жоғары, бұл қалыптасқан топтардағы сиырлардың генетикалық әлеуетін алдын -ала анықтайды.

Тапсырыспен шағылыстырудан 18 бас бұқа алынды, Гольштейн Ассоциациясының (Вермонт, АҚШ) геномдық талдау лабораториясында генетикалық талдауда асылтұқымдық құндылығы анықталды. 18 бұқаның ішінде 5 бастың асылтұқымдық құндылығы 1600-ден астам (ТРІ) жоғыры АҚШ жүйесі бойынша, оның ішінде 1 бұқа ТРІ = 2169. Отандық репродукциядабұқалардыңгеномды бағалаудың орташа индексі (ТПИ) 1512,6 құрады, бұл Қазақстан Республикасының сүтті сиырларының генетикалық әлеуетінің жеткілікті түрде жоғары екендігін білдіреді.

Түйін сөздер: сүтті ірі қара мал, тапсырыспен шағылыстыру, геномдық талдау, асыл тұқымды құндылық индексі.

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ОРГАНИЗАЦИЯ ПРОВЕДЕНИЯ ЗАКАЗНОГО СПАРИВАНИЯ И ГЕНОМНОГО АНАЛИЗА БЫЧКОВ В МОЛОЧНОМ СКОТОВОДСТВЕ

Аннотация. Проведены научные исследования по формированию быкопроизводящих коров, получению ремонтных бычков от заказного спаривания, проведена системная работа по получению первичных данных племенного учета с занесением данных в информационно-аналитическую систему (ИАС) и автоматическому расчету индексов племенной ценности (ИПЦ) коров. Проведена работа по формированию групп коров-первотелок для того, чтобы организовать целенаправленную селекционную работу с молочным скотом. Всего было сформировано 609 коров из 3 областей. Установлено, что молочная продуктивность матерей за лактацию сформированных групп имеет значительные колебания (3413…9611 кг), но продуктивность матерей их отцов значительно выше (5000…14850 кг), что и предопределяет генетический потенциал коров сформированных групп.

От заказного спаривания были получены бычки в количестве 18 гол, у которых посредством геномного анализа была определена их племенная ценность в лаборатории геномного анализа голштинской ассоциации (штат Вермонт, США). Из 18 бычков наиболее ценными оказались 5 голов с племенной ценностью (TPI) более 1600 по по американской системе, в т. ч. 1 бычок с TPI= 2169. Средний индекс (TPI) геномно оцененных бычков отечественной репродукции составил 1512,6 что позволяет утверждать о достаточно высоком генетическом потенциале молочного скота РК.

Ключевые слова: молочный скот, заказное спаривание, геномный анализ, индекс племенной ценности.

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ENTREPRENEURSHIP AS A DRIVER OF COMPETITIVENESS OF THE CITY OF ALMATY

Abstract. At the present stage of economic development there is a dynamic growth of competition seen at all of its levels. Studies based on economic nature of competition not just amongst countries and enterprises, but also competition at the meso-level, among regions and branches.

It is obvious that the potential of the government is completely formed through the capacity of its combining regions, as similarly seen in world affairs, which conduct competitive struggle in domestic markets. For this reason, questions concerning formation of competitive environment at the regional level and its adequate assessment are gaining primary importance, both for consolidation of provisions in the country, and for the purposes of elaboration of appropriate programs of development and effective management of core capabilities and competitive advantages. It s also important to note that, the understanding of the entrepreneurial potential of regions is the cornerstone of competitiveness.

It is shown that timely and reasonable coordination and exposure of problems can increase the level of competitiveness in the region from view of development of entrepreneurship in the social and economic environment.

The article analyses the questions of regional competitiveness, business activity of Almaty city is analysed and recommendations regarding the development of entrepreneurship to increase the level of competitiveness in the region are given.

Keywords: Almaty city, entrepreneurship, competitiveness, regions, the Republic of Kazakhstan.

1. Introduction

Competitiveness of any economy is correlated with effective business management, social responsibility of entrepreneurs, competitive strategies and tactics. According to international experience, the active and fast-growing companies make a decisive contribution to development of economy and increase in competitiveness of the country. In this regard, strong attention is given to the development of entrepreneurship in the world. The analysis of the existing theories has indicated the importance of development of entrepreneurial sector of an economy in order to increase the level of competitiveness in the region[1].

Almaty city is one of Kazakhstan's main cities with the status of a city of national significance and plays an important role in the development of the national economy.

The following may be referred to as distinctive features and competitive advantages of the city: first and foremost, high level of human capital development, well-developed financial infrastructure, progressive educational system and world-class multifaceted sports and entertainment infrastructure, unique natural and geographical environment that imply great opportunities for the development of tourism and transport-and-transit potential.

As for the issues of economy and development of entrepreneurship, it should be noted here that almost all the indicators of the city are marked with leading positions in the respective ratings.

2. Brief Literature Review

M. Porter analyses competitiveness at the international markets, amongst countries and regions. According to his view, the stronger is the competitive environment in the domestic market, the stronger is the possibility of success of a company from this country in international markets[2].

It is necessary to mark out world famous scientists J. Schumpeter and P. Drukr, for their studies of innovation and an entrepreneurship, modern researchers of regional economies and municipal authority L. Abalkina, A.N. Yanina, V.P. Oreshina, to T.G. Morozov. G. Granberg in his book "Fundamentals of Regional Economy" outlines the basic concepts and theories of regional economy as special branch of science, methods of regional researches, forms and instruments for regulation of regional development. He describes the structure of theories of regional economies as indicators of socio-economic development of the region, as methods of analysis of interregional communications. Mathematical models of spatial and regional economics are analysed [3 - 7].

Fatkhutdinov R.A. in the book “Strategic competitiveness” describes the methods for strategic management of personnel, goods, the organization, an industry, the region, country.

Vlasyuk L.I. in the article "Effective regions: criteria and classification" organises effective regions among where the regions involved in the resource production and recycling domain prevail. It is shown that stability of factor distribution in the environment determines the established and perspective specialization of regional economies.

Omarov A.K. in the article "Interrelation of Potential Production, Competitiveness and Investment Attractiveness of the Region and Its Infrastructure Security" carries out the analysis and assessment of attractive potential of regions of Kazakhstan, indicating evidence of interrelation of potential production and effectiveness of the state support of entrepreneurship and infrastructure of regions [8].

Scientists indicate main tendencies the in development of the cities of Europe which also find reflection in development of the Kazakhstan regions: on the one hand — decentralization, growth of economic opportunities, on the other hand — globalization of economy, increase in the role of interstate in decision making [9]. Globalization is expressed in expansion of international trade, liberalization of an international movement of the equity, strengthening of influence of multinational corporations and global restructuring of the industry [10].

These conditions give rise to a new phenomenon: the cities become "entrepreneur-cities" which are actively in charge of resources to increase the competitiveness in economic, social and nature sectors for the purpose of attraction of investment and people, which are capable to unite, mobilize localised social, economic and political resources [11]. Therefore, the need for development of entrepreneurial sector is the foundation of competitiveness, the driver of economic growth.

I. Begg considers the term "competitiveness" from two aspects: first, from a view of development of city economy; second: in comparison to other cities. In this sense, according to him, competitiveness of the city consists in protection of the market share (similar to the companies). I. Begg pays attention that a capability of the city to compete depends on its main "attributes" determining attractiveness of the city as a localisation of "city characters", and from strong and weak aspects of economic agents [12].

In order to make the city competitive, it is necessary to provide necessary localization conditions and to help competitiveness of the enterprises operating in the city. Competitiveness of the city depends on competitiveness of the firms located in it. However, in order to attract them to remain in the city, it is necessary to provide conditions promoting competitiveness of the firms.

Therefore the attractiveness of the city is a synonym to its competitiveness as a location for different types of activities. Moreover, the city has to be attractive not only for the enterprises, but, in conditions of globalization, increase in the role of qualified personnel and innovations, and for the population which is one of the major resources which the city can offer the enterprises. Another target group for which the cities fight is highlighted — tourists, visitors who not only bring income to the enterprises of the city, but also are the considerable data carrier about the city, which help to "put it on the map" [13].

V.F. Lever suggests that results of the competition can be expressed particularly in the income growth in the city and creation of workplaces [14]. Nevertheless, there are many indicators of competitiveness of

the city, we consider that the main, the most acceptable for measurement of competitiveness of the city is the level (quality) of life and effective business.

3. Results

So, today the Gross Regional Product is more than KZT10.3 trillion. Where, if we consider this issue in terms of industries and activities, we can find confirmation to what was said earlier about the specialization of the city. In particular, the biggest share in the GRP structure is held by the volume of wholesale and retail trade, namely 36%; followed by real estate transactions with a share of more than 11%, and finally, the third place is taken by the volume of services rendered in the field of finance and insurance with the GRP share of 9%. The remaining part of GRP of more than 44% is represented mainly by the service sector as well, and only a small part is represented by production activities. Thus, professional services made up 7%, other services - 6%, information and communication services made up 6% too, logistics services as represented by transportation and warehousing amounted to 5%, administration services made up more than 2%, education - 2%, healthcare and social services - about 2%, accommodation and meals amounted to a little over 1%.

As shown in Figure 1, the activity in the agricultural sector is represented in a very small volume. This is due to the fact that as a result of the expansion of the city boundaries, land areas that belonged to the territory of the region were joined to the city, and this explains the absolutely insignificant share of agricultural products in the Gross Regional Product, which is only 0.04 percent of the total mass.

The city of Almaty in its development is in harmony with the generally accepted trends for megalopolises, which is reflected in the gradual transition from the industrial model of development to the service model, mainly in the field of delivery of professional services, and the intensive development of the specialization types such as retail business, financial services, business and city tourism, architectural and other design services, and others.

Among the areas of services, we can distinguish those most important for the city, which form more than 63% of the annual gross value added, such as wholesale and retail trade, real estate transactions and financial services.

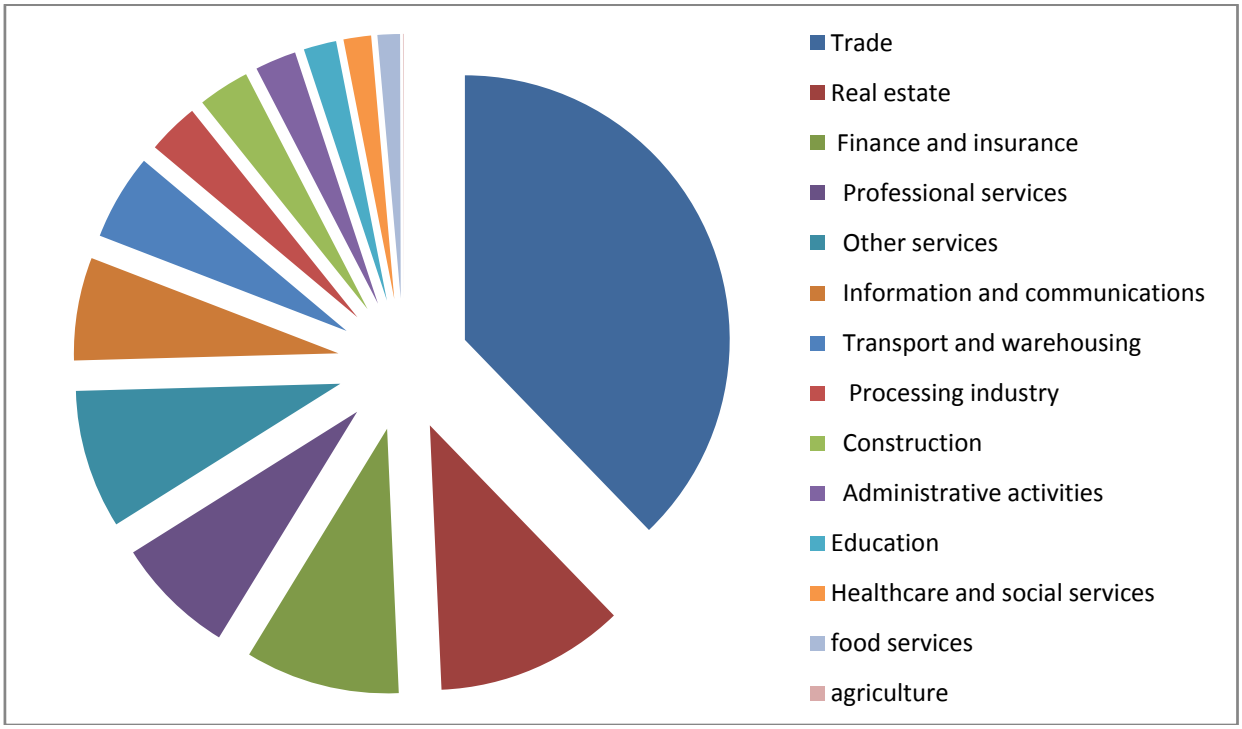

Figure 1 – AlmatyGrossRegionalProduct structure in 2016
Based on [15]

The analysis demonstrates that Almaty has potential in the field of transport and logistics services, financial sector and tourism.

The foregoing is also supported by analytical data on the availability and use of human capital. In Figure 2 we provide information on employment and remuneration in Almaty.

As can be seen in the Figure, the largest number of employees is registered in the field of trade and education, which respectively take the first two places with 183,510 and 88,936 people employed, respectively; followed by the industry and construction indicators, where 81,992 and 74,561 people are employed, respectively. All the following positions are essentially occupied by the service sector, except for the manufacturing industry that occupies the sixth position with 60,810 people employed.

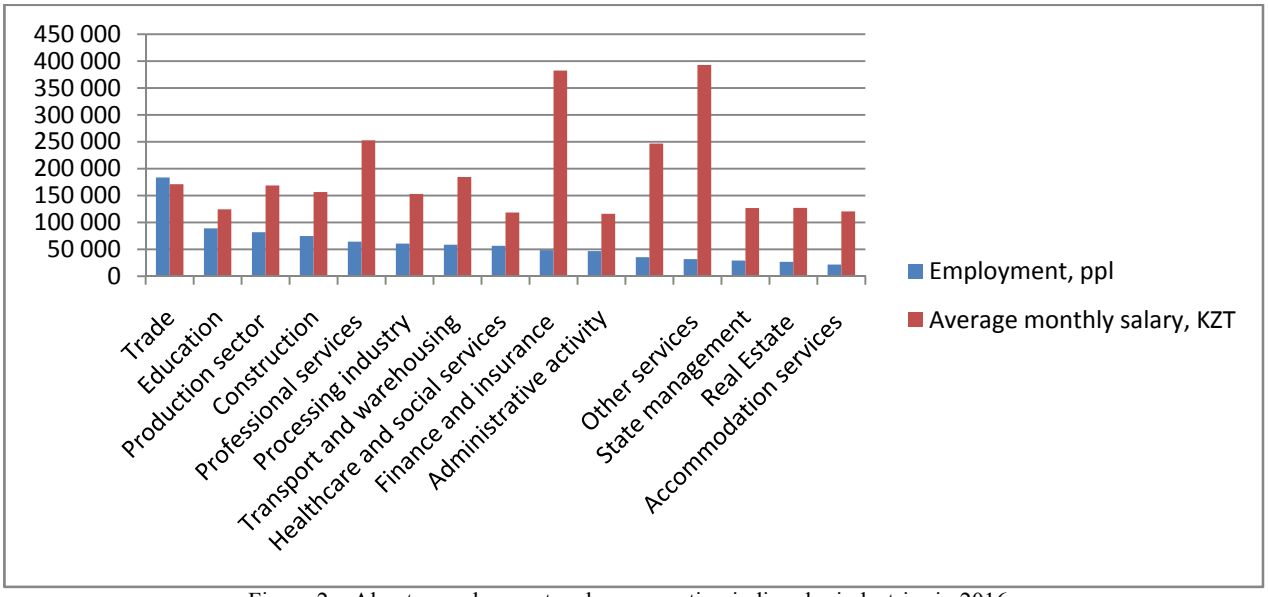

Figure 2 – Almaty employment and remuneration indices by industries in 2016
Based on [15]

The Institute for Social Research hasmaderelevant research to determine the level of the integrated index of the infrastructure development, which shows the availability and level of development of commercial and service infrastructure facilities in the regions.

Although the infrastructure in general and commercialinfrastructure, in particular,appears as a much broader range of facilities, we have decided to focus on the four main components, namely, tourist facilities, in the first instance, that promote the development of entrepreneurship in tourism.

Secondly, educational facilities, contributing both to raising the level of education of the population, and to attracting to the region people aspiring to gethigh-quality quality education, thereby promoting the development of entrepreneurship in the education sector.

Thirdly, facilities of the service infrastructure that influence the quality of services rendered to the population and, accordingly, the level of development of entrepreneurship in the service sector.

Fourthly, these are facilities of the communicative infrastructure that provide necessary information and communications to entrepreneurs and individuals.

Further, speaking of the entrepreneurial environment of the city of Almaty, we cannot avoid mentioning the "Park of Innovation Technologies" Special Economic Zone. This innovation cluster is an open scientific and technological platform created to develophigh-tech industries with high added value and significant export potential. The basic vector in the cluster’s activity is targeted not only to the further development of Kazakhstan economy’s priority sectors, but also to achieve the goal of diversifying the economy as a whole.

The largest share in the structure of the city's entrepreneurship is held by the wholesale-retail trade. Accordingly, it is important to provide a description of the sales markets in terms of domestic and foreign markets with a breakdown by suppliers and buyers. The relevant 2015 data is given in Table 1 below.

Table 1 – Almaty domestic sales markets in 2015

Region	Share in supplies, %	Volume of supplies, KZT bln	Share in purchases, %	Volume of purchases, KZT bln	Balance of settlements, KZT bln
Atyrau region	32,7	7586,9	7,5	1328,4	6258,5
South-Kazakhstan region	19,3	4476,9	14,3	2516,9	1960
West-Kazakhstan region	15,1	3500,6	4,6	831,1	2669,5
Mangystau region	11,9	2751,8	4,5	809,3	1942,5
Karaganda region	5,1	1188,5	15,8	2792,5	-1604
Almaty region	3,9	908,3	9,2	1620	-711,7
Pavlodar region	3,5	803,1	1,9	333,6	469,5
Aktobe region	3	700,7	0,1	10,9	689,8
Astana	3	689,3	15,5	2733,9	-2044,6
North-Kazakhstan region	2,5	606,2	1,9	336,9	269,3
East-Kazakhstan region	0	7,4	8,5	1493,4	-1486
Akmola region	0	6,3	2,2	380,4	-374,1
Zhambyl region	0	0	5,9	1032,3	-1032,3
Kostanay region	0	0	5,5	972,7	-972,7
Kyzylorda region	0	0	2,6	451,7	-451,7
TOTAL	100	23226	100	17644	5582

Based on [15]

As can be seen in the Table above, the largest suppliers to Almaty are the following four regions: Atyrau, South-Kazakhstan, West-Kazakhstan and Mangystau regions, with an aggregate share of supplies of more than 77%, while the remaining 23% account for the other 13 regions. And there five regions that do not make any supplies to Almaty.

In general, as the Table shows, purchases of Almaty city exceed its sales by more than KZT 5,582 billion or 31.6%.

Table 2 – Product Supplies to Kazakhstan regions from Almaty in 2015

Products	**Share in purchases, %**	**Volume of purchases, KZT mln**
milk and cheese	12,1	2138
cocoachocolate	10,1	1774
non-alcoholicbeverages	9,8	1734
tobaccoproducts	7,3	1280
fruits and vegetables	6,5	1148
coffee and tea processing	5,9	1041
alcoholicbeverages	5,3	935
refined products	4,7	821
pharmaceuticalproducts	3,8	663
grape wines	3,4	601
soapanddetergents	3,1	542
beer	2,6	452
oils and fats	2,1	370
margarine	1,5	267
bread, flourconfectionery	1,5	258
construction products made of concrete	1,2	214
other	19,1	3406
TOTAL	100	17644

Based on [15]

Further, we can distinguish sales that make up more than 5%, namely tea and coffee processing in the amount of KZT 1 billion or 5.9%, and alcoholic beverages processing in the amount of KZT 935 million or 5.3%.

The remaining supplies do not exceed 5% of the total mass of sales in the amount of about KZT 7,6 billion.

Thus, the analysis of the domestic markets data in terms of regions and products has shown that there is a wide spread of data, which in turn evidences uneven ratios between the regions and in the demand for products.

Different flow of goods from the regions to Almaty and back from the city to the regions evidences the existing difference between the needs of the regions, on the one hand and demonstrates the opportunities for diversification and optimization of supplies, on the other hand.

Table 3 - Almaty Foreign Trade Turnover in 2015

Countries	Share in supplies, export, %	Volume of supplies, USD thous.	Share in purchases, import, %	Volume of purchases, USD thous.	Balance of settlements, USD thous.
Russia	17,15	462389	33,87	3179704	-2717315
Ukraine	16,25	438142	1,48	138543	299599
China	9,78	263648	18,19	1707591	-1443943
USA	9,9	266992	3,98	373988	-106996
Uzbekistan	6,91	186190			186190
Poland	4,99	134636			134636
Kyrgyzstan	4,21	113464			113464
United Kingdom	3,13	84520			84520
France	2,53	68286	2,33	219071	-150785
Germany	2,52	67850	5,35	502273	-434423
India	2,07	55702			55702
Switzerland	2,02	54385			54385
Tajikistan	1,73	46531			46531
Turkey			3,14	294521	-294521
Italy			2,67	250362	-250362
Japan			2,37	222177	
Turkmenistan			2,12	199354	
Vietnam			2,06	193480	
Democratic People's Republic of Korea			1,48	138622	
other	16,81	453184	20,96	1967569	
TOTAL	100	2695919	100	9387255	-4423318

Based on [15]

As shown in the Table above, in this case there is also a serious gap in the ratios between the volumes of exports and imports, with imports almost 3.5 times higher than exports. This points to the fact that the region has a good reserve for export sales growth.

Further, the analysis of the data given shows that among the main suppliers and buyers in the international trade system of the city there are the same countries. They are Russia, Ukraine, China and the United States, which account for more than 53% of exports and about 58% of imports. Almost for all of them, except for Ukraine, imports dominate over exports, the biggest gap is observed in the positions of Russia, where the excess is almost 6.7 times; this indicates that Russia is the main supplier of goods for Kazakhstan and the consumer of Kazakhstan's products. Hence, we have shown that this region has quite good opportunities for growth in trade, both within the country between the regions, and in international relations with the countries of near and far abroad.

4. Conclusion

In general, the entrepreneurial potential of Almaty can be determined as a high one with good prospects for further development. While at the heart of this optimistic forecast lies first of all, the quality of human capital, both in the professional and scientific aspect.

Secondly, the geographical location of the city at the junction of the road infrastructure, and Almaty's special natural areas that favorably promote the development of tourism.

Thirdly, compliance of the city's specialization with all the standards of a large megalopolis: these are services, education, finance, trade, communications, transport and other factors that are fully represented in the city and have prospects for substantial growth.

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КӘСІПКЕРЛІК АЛМАТЫ ҚАЛАСЫНЫҢ БӘСЕКЕЛЕСТІККЕ ҚАБІЛЕТТІЛІГІНІҢ ФАКТОРЫ РЕТІНДЕ

Аннотация: Экономиканың дамуының қазіргі кезеңінде бәсекелестік барлық деңгейлерінде белсенді амуда. Бәсекелестіктің экономикалық сипатын зерттеу тек елдер мен кәсіпорындар арасында ғана емес, сонымен қатар өңірлер мен салалар арасында, яғни мезо деңгейде де өзекті болып келеді.

Мемлекеттің әлеуеті толығымен өңірлердің әлеуеті есебінен қалыптасады, бұл әлемдік үрдістерге ұқсас ішкі нарықта да бәсекелеседі.

Сондықтан, өңірлердің бәсекеге қабілеттілігін қалыптастыру және оны барабар бағалау еліміздің позициясын нығайту, сондай-ақтиісті даму бағдарламаларын әзірлеу және бар әлеуетті және бәсекелестік

артықшылықтарды тиімді басқару маңызды болып табылады. Бәсекеге қабілеттілік, еңалдымен, аймақтардың кәсіпкерлік әлеуетіне негізделгенін түсіну маңызды.

Кез-келген экономиканың бәсекеге қабілеттілігі бизнестің тиімді жүргізілуімен, кәсіпкерлердің әлеуметтік жауапкершілігімен, стратегия мен тактиканың бәсекеге қабілеттілігі мен байланысты. Халықаралық тәжірибеге сәйкес, белсенді және жылдам дамып келе жатқан компаниялар экономика дамуына және елдің бәсекеге қабілеттілігін арттыруда шешуші үлес қосып келеді. Осыған байланысты әлемде кәсіпкерлікті дамытуға аса назар аударылады. Қолданыстағы теорияларды талдау аймақтың бәсекеге қабілеттілігін арттыру үшін экономиканың бизнес секторын дамытудың маңыздылығын көрсетті.

Әлеуметтік-экономикалық ортада кәсіпкерлікті дамыту тұрғысынан аймақтың бәсекеге қабілеттілік деңгейін арттыру мәселелерін шешетін және байланыстыру уақытылы және орынды.

Мақалада өңірлік бәсекеге қабілеттілік мәселелері қарастырылған, Алматы қаласының кәсіпкерлік қызметі талданған және аймақтың бәсекеге қабілеттілігін арттыру үшін кәсіпкерлікті дамытубойынша ұсыныстар берілді.

Түйін сөздер: Алматы қаласы, кәсіпкерлік**,** бәсекеге қабілеттілігі, Қазақстан Республикасы

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ПРЕДПРИНИМАТЕЛЬСТВО КАК ФАКТОР РОСТА КОНКУРЕНТОСПОСОБНОСТИ Г. АЛМАТЫ

Аннотация. На современном этапе развития экономики активно развивается конкуренция на всех его уровнях. Актуальным становится изучение экономической природы конкуренции не только среди стран и предприятий, но и конкуренции на мезоуровне, среди регионов и отраслей.

Очевидно, что потенциал государства всецело формируется за счет потенциала своих регионов, которые аналогично мировым процессам также ведут конкурентную борьбу на внутреннем рынке. Именно поэтому вопросы формирования конкурентоспособности регионов и ее адекватной оценки приобретают первостепенное значение, как для упрочения положения страны, так и для целей разработки соответствующих программ развития и эффективного управления имеющимися потенциалом и конкурентными преимуществами. Также важно понимание того, что в основе конкурентоспособности лежит, в первую очередь, предпринимательский потенциал регионов.

Своевременным и целесообразным представляется увязать и раскрыть проблемы повышения уровня конкурентоспособности региона с позиций развития предпринимательства в социально-экономической среде.

В статье рассматриваются вопросы региональной конкурентоспособности, проанализирована предпринимательская деятельность города Алматы и даны рекомендации по развитию предпринимательства для повышения уровня конкурентоспособности региона.

Ключевые слова:город Алматы, предпринимательство, конкурентоспособность, регионы, Республика Казахстан.

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FORMATION AND DEVELOPMENT OF THE AGRARIAN LABOR MARKET IN NORTHERN KAZAKHSTAN (ON THE EXAMPLE OF THE AKMOLA REGION)

Abstract. According to the authors, labor indicators in rural areas determine the volume indicators of economic activity and indicators of economic efficiency, as well as indicators of the use of other agricultural resources. Analyzing the indicators of labor of agricultural workers, it is expedient, the authors believe, to single out the objects of agricultural research, to which attention must be paid: factors and ways to improve the efficiency of labor use; indicators of work; labor potential and labor productivity; influence of labor indicators on the final results of economic activity - the volume, range and quality of products, and financial results. Analysis of labor factors in rural areas and their final results are interrelated and interdependent, while the economic effect of the minimum in the agroindustrial complex should be compared with the level of the quantity of quality improvement in the additional life of the rural population.

Keywords: agriculture, export, potential, competition, economic growth, concept, partnership, business, sustainable development, livestock, crop production.

INTRODUCTION

The labor market in Kazakhstan is constantly evolving under the influence of political, economic and social factors and is still far behind the requirements of time in its development. Because of this, many unresolved problems have accumulated in the sphere of employment, social protection of unemployed citizens. Specificity of the labor market is such that its problems should be in the eyes of politicians, otherwise, unsettled problems not only can lead to irrational use of the main productive forces of society - labor resources, loss of competitive advantages of the country due to the reduction of human resources potential, but also turn into serious social conflicts. That is why it is necessary to deal with employment problems, improving methods and forms of state intervention in the functioning of the labor market, carrying out institutional changes, especially during the period of growing economic crises.

Thus, the role of labor indicators, under market conditions, has undergone significant changes. At present, these indicators and their dynamics should be used by their subdivisions in the evaluation and analysis of labor efficiency, that is, it is necessary to closely interlink the analysis of the number of employees with the productivity of their labor, increase in turnover, profitability.

MAIN PART

In 2011, the Employment Program - 2020 (hereinafter referred to as the Employment Road Map - 2020) came into force,

Agrarian causes the sector of the economy of the Akmola region is fully developed in the conditions of multi-fold economy and the further improvement of the role of integration processes. To ensure this, it is possible to ensure its steady, equal growth only by creating a favorable enterprise economic and economic conditions for an effective evaluation of the activities of all agricultural producers and the corresponding socio-economic conditions for Akmolinsk higher quality of life over the population's motivation for rural areas. In the almaty of this and is the effectiveness of the main task to take into account the regional agrarian policy.

Given the relatively low level of payment for the agricultural alpine labor, the problem of staffing from this sector of the economy is exacerbated. To attract and retain in these conditions young professionals and workers of the basic professions of experience, all systems become more complex, and therefore the implementation of the corresponding social package of conditions and benefits proposed here by future workers should be sufficiently weighty. It is because of unsatisfactory social conditions that it is now very difficult to direct or attract a young specialist of any agrarian specialty to work in agriculture, especially in areas very remote from the regional center.

The economic effect of the implementation of the national project in the regions, as well as of any investment project implemented in the agroindustrial complex, should be compared with the level of improving the quality of life of the rural population living in the corresponding rural area. These components should not only be interdependent, but also equal in proportion to the resultant effect.

Foreign investors come to the regional agrarian market with their business strategy, which establish new large agro-holding companies.

From an economic point of view, investors are not sponsors - everything is based on mutual economic benefits. For the region, this is the inflow of substantial real investments for the renovation of the material and technical base of the agricultural sector with the aim of introducing innovative technologies for the production of agricultural products, and its processing, this is an increase in tax revenues, including the local budget and rural employment. But especially important aspects of the implementation of such projects should be to ensure stable normal income of the employed and strengthened comprehensive social development of the respective rural areas.

The effectiveness of agribusiness, on the one hand, and the completeness of employee motivation, on the other hand, to the same extent largely depend on stimulating employees' interest in increasing labor productivity and rational use of the resource potential, from an adequate assessment of their labor contribution to the final results and from a competent staffing politicians.

The standard of living of the rural population determines, first of all, the level of its employment and wages. That is why, first of all, through wages, it is possible and necessary to solve a part of the social problems of rural areas and therefore one should not be afraid to increase it to those who work here.

The average level of wages in the agricultural sector, compared with the level of wages in other spheres of economic activity, is still low. And, this trend is typical not only for the country as a whole (where the average wage in agriculture is somewhere around 55% of the average Kazakhstan indicator), but also for our region.

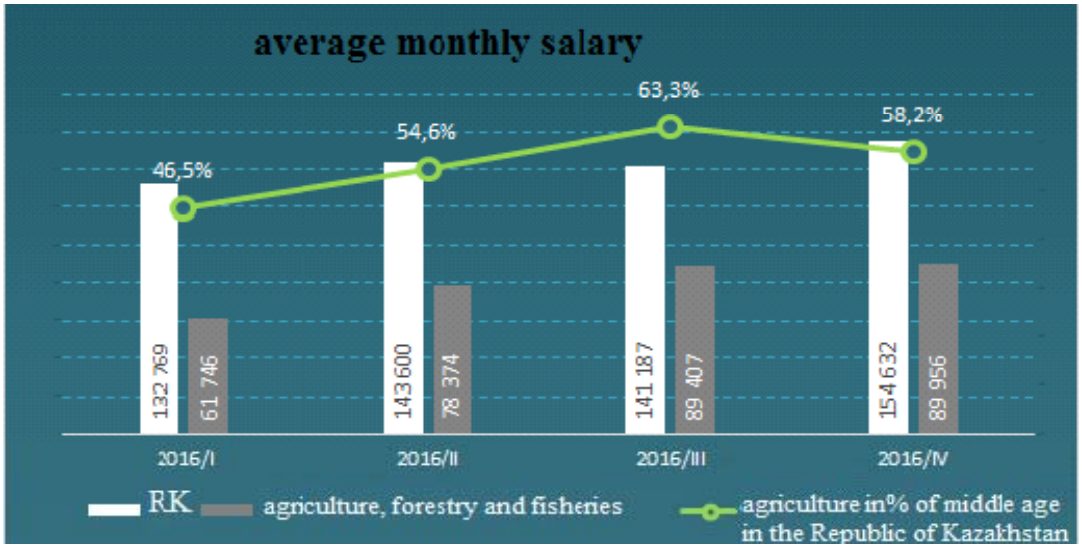

Figure 1 - Average monthly wage in the Republic of Kazakhstan in 2016

So, in the 4th quarter of 2016 the average monthly salary in agriculture was only 90 thousand tenge (+ 17% yoy). This is 41.8% less than in general for the branches of the Republic of Kazakhstan. The biggest

difference between the average monthly salary in the agricultural sector and in general in the RK was registered in the 1st quarter of 2016, when the wages of the agrarians were only 46.5% of the average salary in the country. In general, for the year 2016 the average monthly salary of workers in the agricultural sphere was 80.6 thousand tenge (+ 13.8% year-to-year), which is 43.3% lower than the average for the RK.

The highest salaries are received by forestry employees: in the last quarter of 2016 - 138.4 thousand tenge, 28.8% more than a year earlier. In the crop and livestock sector, as well as hunting, salaries in the fourth quarter reached 88.9 thousand tenge (+ 16.4% per year), for fisheries and aquaculture - only 46.9 thousand tenge (-6.9% yr- to-year).

This variation in the level of wages is an additional proof that there is room for improvement. One of the reasons for the low level of wages in agriculture is the lack of financial capacity of the organization to raise it. And, this despite the fact that the number of employees annually decreases significantly. If in part this situation can be justified at the expense of really low realizable prices for manufactured products and, accordingly, a low share of producers' incomes in the final price of the product, then high production costs are difficult. This is especially evident in the level of the prime cost of production of the main types of products. An unjustifiably low estimate of agricultural labor can really be increased.

The economic stability of many subjects of regional agribusiness, which provides a high level of income for their employees, is achieved largely through the search and the primary use of internal reserves to increase the production of competitive products and reduce its cost: the effective formation and use of productive capacity; development of innovative - resource-saving production technologies; a systematic approach to cost management; rational organization of labor and high motivation of workers; effective management.

The social orientation of the economic mechanism of management that develops in organizations reflects its wage policy, which is implemented in practice through a system of interrelated parameters. The main, principled positions that determine its features are the methodology for assessing labor, developing a system of payment standards and organizing the mechanism of distributive relations.

The organizations of the agrarian and industrial complex have long been granted the right to independently determine the parameters for building labor remuneration. However, many of them are still guided by the ETC criteria, thereby limiting the desire to improve existing methodological approaches to paying agricultural labor. For individual managers, they are a kind of "shield" that inhibits wage growth.

Unlike other spheres of economic activity in agricultural organizations, the issues of organization of remuneration of workers for a long time were practically open. However, in recent years, the number of agricultural organizations, which are covering the trade secret of the wage problem, is also constantly increasing.

One of the main such parameters that reveal the organization's wage policy is the structure of its wage fund. If we analyze the structure of the wage fund on average in LLP "Orlovka", the share of the basic payment is approximately at the same level - 80-81%, but the share of the premium from all sources, including remuneration based on performance, increased by an average of 30 -32%.

As is known, in countries with developed market economies, the share of the tariff part of wages is at least 90%, while ensuring a high level of wages for employees.

Two opposite variants of the formation of wages are visually here: in the first variant, the share of the basic wage can be minimal, for example, up to 30-35%; in the second variant, a maximum of 80-85%. Both these points of view have the right to exist and both, when building an effective system of motivation, can provide employees of a particular organization with a sufficiently high level of wages. However, only one option dominates the organization's wage policy, which determines the specifics of its construction.

In the first variant, 65-70% of the workers' wages are formed according to progressively increasing standards of material incentives for the achieved, final results of production activity, that is, the variable part dominates the structure of wages. The main part of wages is relatively low and takes into account not so much the labor contribution of the employee, as his professional qualification level and position held. It is this method of forming the wages of employees used in many effectively functioning agricultural organizations. Employees are given the opportunity to influence the level of their wages by motivating their labor, attitudes toward work, observing technological discipline, increasing their professional skills.

With the second option, the constant wage rate dominates in the wage structure of employees, while the variable part accounts for only 20-30%. In this variant, two scenarios are possible. If the absolute level of wages is low, then we are dealing with economically weak organizations, where the level of the tariff rate of the 1st tariff category of the tariff grids applied here is at the level of the minimum wage.

Unfortunately, there are still quite a few such agricultural organizations that have wage arrears. If the absolute level of workers' wages is high, then such a variant of wage formation is already more acceptable for economically stable organizations with a relatively stable workforce, with a high level of labor culture and, accordingly, a high level of labor productivity. He, too, is sufficiently motivational in nature, because in this case, workers value their workplace.

In the incentive mechanism, the role of the regulatory framework should be strengthened. One should not expect a special economic effect from the application of any wage system, even cost-based, unless it is based on a well-founded regulatory framework.

The most acceptable here, there should be a methodological approach when its composition and structure are formed not by separate norms and standards, but by a system of interrelated organizational and production (natural) standards by types of products and services provided. The standards of remuneration of labor (with a particular system) should be established depending on the degree to which this regulatory complex complies with this branch. Especially the system increases the importance of having such industry standards systems when implementing resource-saving production technologies.

It is possible to derive an approximate forecast about changes to the future:

1. Change in demand for staff
2. Competitive activity increased
3. Companies providing services in the field of information technology, dropped out of the top three in terms of the number of vacancies
4. General competition in the search for work will grow
5. The salaries offered will be higher by an average of 3-5%.

The modern wage policy of an agricultural organization should be aimed at creating a model of remuneration based on labor outcomes, which should be seen as an investment system to achieve a competitive advantage.

CONCLUSION

Recently, the degree of social orientation of the market economy is especially acute in agriculture. That is why to strengthen the social orientation of the economy, the economic efficiency of agribusiness, but equally the social one, is of special importance in rural areas. It is estimated, first of all, by the quality of life of the population of the corresponding rural area, including the level of wages of employees, and the level of employment. All this makes it necessary to change the performance indicators of any organization, and its leader, giving them a socio-economic focus. The effectiveness of management of any organization should be evaluated simultaneously by two equivalent indicators - the amount of profit received and the level of wages of employees.

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ФОРМИРОВАНИЕ И РАЗВИТИЕ АГРАРНОГО РЫНКА ТРУДА В СЕВЕРНОМ КАЗАХСТАНЕ (НА ПРИМЕРЕ АКМОЛИНСКОЙ ОБЛАСТИ)

Аннотация. Трудовые показатели, как и показатели использования других ресурсов, определяют объемные показатели хозяйственной деятельности и показатели экономической эффективности. В методике анализа показателей труда, целесообразно выделить следующие объекты исследования, на которые должно быть направлено внимание: факторы и пути повышения эффективности использования труда; показатели по труду; трудовой потенциал и производительность труда; влияние трудовых показателей на конечные результаты хозяйственной деятельности - объем, ассортимент и качество продукции, и финансовые результаты. Анализ факторов трудовых показателей и их конечных результатов взаимосвязаны и взаимообусловлены.

Ключевые слова: сельское хозяйство, экспорт, потенциал, конкуренция, экономический рост, концепция, партнерство, бизнес, устойчивое развитие, животноводство, растениеводство

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СОЛТҮСТІК ҚАЗАҚСТАННЫҢ АУЫЛ ШАРУАШЫЛЫҚ ЕҢБЕК НАРЫҒЫН ҚАЛЫПТАСТЫРУ ЖӘНЕ ДАМЫТУ (АҚМОЛА ОБЛЫСЫНЫҢ МЫСАЛЫНДА)

Аннотация. Еңбек индикаторлары, сондай-ақ өзге де ресурстарды пайдалану көрсеткіштері экономикалық белсенділіктің көрсеткіштерін және экономикалық тиімділік көрсеткіштерін анықтайды. Еңбек индикаторларын талдау әдіснамасында назар аудару қажет болатын келесі зерттеу объектілерін бөліп шығару орынды: еңбек өнімділігін арттырудың факторлары мен тәсілдері; жұмыс көрсеткіштері; еңбек әлеуеті және еңбек өнімділігі; еңбек индикаторларының шаруашылық қызметтің түпкілікті нәтижелеріне әсер етуі - өнімнің көлемі, ауқымы және сапасы және қаржылық нәтижелер. Еңбек индикаторларының факторларын және олардың түпкілікті нәтижелерін талдау өзара байланысты және өзара байланысты.

Түйін сөздер: ауыл шаруашылығы, экспорт, потенциал, бәсекелестік, экономикалық өсу, концепция, серіктестік, бизнес, тұрақты даму, мал шаруашылығы, өсімдік шаруашылығы

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FEATURES OF FORMATION OF STATEHOOD AND LAW IN THE REPUBLIC OF KAZAKHSTAN

Abstract. It is known that during the historical development the Kazakh people have passed the following types of statehood. First type: the nomadic state, which has been abolished after entry into the structure of the Russian Empire. Second type: the Soviet statehood, where Kazakhstan was the part of the former USSR. Third type of the state: independent statehood, sovereign Kazakhstan. The strategy of modern development of the Kazakh statehood is based on the unity of the country, ensuring national security. Here such phenomena as "integrity of the state", "the state and national security", "sovereignty of the state" are recognized as the supreme values of state and legal life. These ideas have been entirely enshrined in the Development strategy Kazakhstan - 2050. The concept "statehood" is wider, than "state". In the theory of state and law the state is defined as the political power with its own territory. At the same time the statehood is the most difficult complex of elements, structures, institutes of the public power and also the components of non-political character, caused by uniqueness of social, economic, political, spiritual and moral conditions of activity at the certain stage of development of the society. Thus, the statehood is the structure of elements and institutes, expressing the maintenance of the society and state.

Keywords: statehood, law, nomadic civilization, activity of the people, unity of the country, national security, integrity of the state, sovereignty of the state, political power, institutes of the public power.

During the many centuries of the historical development, since ancient times to the sovereignty and independence, our state is well-known all over the world; the Kazakh people followed the complicated and original path from the beginning of their ancient history, from the tribal states of the Kangyles and Usunes in Central Asia. These tribal states had close relations with China, the Huns Empire, southern Siberia, and the lands near the Ural Mountains. Economically, the state was based on extensive nomadic farming. The people's culture and language linked them to the branch of Turkish nomad group.

The first Kazakh state system was formed in the 6-th century within the Turkish Kaganate, stretching across lands from the Altai Mountains in the east to the Caspian Sea in the west, and from Semirechie up to Siberia. Most of the Turkish people continued tribal organization and nomadic way of life. There were already large areas of irrigated and cultivated lands occupied with gardening and vineyards. A lot of towns and settlements were established in ancient centuries. Indeed, at the head of the Turkish Kaganate was a Khan, with unlimited despotic power,with his servants, officials and military leaders.

The Usun union began to disintegrate in the 5-th and 6-th centuries, after successive invasions by the Altai Turks. These Kaganates were complex and stratified societies, consisting of aristocrats, urban traders, oasis farmers and pastoral nomads [1].

In the following centuries, the Kaganate was invaded many times, was in vassal dependence on neighboring China and was incorporated into the Karakhanid state (11-th century, until the beginning of the 13-th century). Despite the partial islamization of the Kazakhs in direct contact, the majority of Kazakhstan's tribal people continued their nomadic lifestyle, raising cattle on the vast steppe.The Kazakh ethno type was formed by people in more than 100 tribal divisions and nationalities, belonging to various ethnic, anthropological and racial types. Within the modern Kazakh ethno type, the mongoloid element accounts for about 70%.

At the end of the 15-th century and for most of the 16-th century, the Kazakhs were primarily the political union. The Kazakh Khanate and the Kazakh people were synonymous, as people formed by the

union of previously disparate clans and tribes of Turkish descent. They converged in the steppe lands around the Chu River and the Betpak-Dala Desert, where political void existed.

In the 17-th century under the rule of Khan Kasym, the Kazakh Khanate achieved political independence. The national name Kazakh means "free" in the sense of independence from other states, and freely moving in the vast steppes of Dashti-Qipchak. Thus, from the beginning of its own Kazakh Khanate, the idea of freedom and independence became the national idea of the Kazakh people.

The independent Kazakh Khanate was based on nomadic cattle, breeding and farming. It had a stable economy and ongoing political and cultural relations with its neighbors. The region supplied neighboring China, the Central Asia Khanates and Russia with the products of animal husbandry, such as cattle, skins, wool and fat, in exchange for wheat, textiles, tools and arms. In the Khanate, Jochi's descendants had dominant positions. Only the descendants could become khans or sultans. Representatives of the Kazakh tribal aristocracy (bii) could occupy the positions of tribal and aul chiefs (equivalent to aldermen). Economic, social and political relations were regulated by common law (*adat),* whose rules (ereje), were retained only in oral tradition, and passed from generation to generation, gradually becoming perfected. The*bii* were the experts of the law, who from time to time convened to clarify the rules. At the end of the 18-th century under the guidance of Khan Tauke the law was standardized under the seven most notable experts, who came to be known as*ZhietyZhargy* or "The Seven Rules". In Russian sources they were called the "TaukeKhan's Laws (or Acts)"; they represented as the type of Kazakh Common Law Code,which had great importance in Kazakh legal life [2].

The principles of*adat* were applied unequally; so sultans, tribal chiefs and the bii class enjoyed rather well-protected and privileged lives. Kazakh women, during and after the period of islamization, had much freer social, public and legal existence, than women in other muslim societies. They did not wear the face veil *(chadra),* and the first wife*(baibishe)* was the head of the family.

In spite of the heroic resistance and some military successes attained as the result of a temporary unification of the various zhuz under the three great*bii*leaders, ToleBii, KazybekBii and AitekeBii in 1723, Kazakhstan still remain besieged and had to turn to Russia for military assistance. It received this assistance in return for its eventual (in the 1730-s) incorporation into the Russian Empire [3]. The interests of the Tsar and his government in Kazakhstan and Central Asia primarily revolved around extending the size and reach of the Empire, and consolidating its ownpower at the expense of those peoples conquered.A new phase in the history of the Kazakh people begins with their incorporation into the Russian Empire. Until the 1820-s the Little Zhuz and Middle Zhuz retained their independence, while acknowledging dependence on Russia. However, the Elder Zhuz was finally formally annexed to Russia as the result of invasions against the Kokand and Khiva Khanates. The first conditions agreed to by the Middle and Little Zhuzes as they joined the Empire were:

(1) to recognize the sovereignty of the Zhuzes;
(2) to allow passage of Russian merchant caravans;
(3) to return Russian prisoners and deserters;
(4) to pay annual per capita taxes;
(5) to have relations with other countries only with Russia's express consent; and
(6) khans were force to send sons or other close relations to St. Petersburg as*amanats*(hostages).

The tsarist government, through the Ministry of Foreign Affairs and with the consent of the Military Department, appointed a vice-regent, who resided in Orenburg, exercised power and control in assuring the conditions of the above agreement. At the same time, the Russian military organized the Ural Cossack Army to patrol the border with the Zhuzes. Naturally, the tsar's vice-regent often interfered with the internal affairs of the Zhuzes, and continuously exercised oppression of the khans and local rulers. Nevertheless, these Zhuzes tried to maintain internal independence until the 1820-s. The legal status of these two regions within the Russian Empire resembled that of protectorates, which some Kazakh scholar's dispute [4].

In the 1820-s, Russia carried out pivotal reforms in the Zhuzes in order to establish semi-colonial regime. The khans' powers were nullified; their successors have received the titles of Russian nobility. The captive amanats received very directed and secular Russian military education, and were rewarded with lavish salaries. Furthermore, The Little Zhuz was divided into the regions for territorial administration with the governors, appointed by the vice-regent in Orenburg. The Middle Zhuz was

divided into areas called*okrug* and headed by sultans, elected by the local aristocracy and approved by Russian vice-regents. The Bigger (Elder) Zhuz had been conquered early on and was the subject of Russian military rule until the reforms of the 1860-s.

The Kazakh Khanate was relatively short-lived and generally unsuccessful political institution. The Kazakh state was unable and ill-equipped to maintain strong military presence in the steppe. The Kazakhs, though descendants of an indigenous warrior culture, were primarily pastoralist and more concerned with grazing than fighting. Their military organization, predicated on temporary periods of service, was no match for the Kalmyk forces [4].

In the 1860-s, Russia introduced a number of progressive reforms with the abolition of serfdom being most notable. Others included: universal military service; land and financial reforms; and improvements in citizens' legal status. At the end of the 1860-s a dual natured reform program, having progressive and colonial aspects, was introduced in Kazakhstan. Russia then divided Kazakhstan into three governorships: the first was Turkestan, with its center in Tashkent, which included Semirechie and all of Central Asia. The Steppes governorship, with its center in Orenburg, included a major portion of the Middle Zhuz; and the Siberian governorship, with its center in Omsk, included the territories of North and East Kazakhstan.

The governor's generals were appointed in Saint Petersburg, and all exercised administrative and military power. The general governorships were divided into*oblasts*(large administrative territories), headed by military governors. In Kazakh territories, the governors wielded military and civilian power, while in Russia itself the governors had no such military power. Oblasts were divided into*uezd*(district), governed by uezd heads. The hierarchy governing in Kazakhstan had clearly military/administrative character. The government apparatus consisted of representatives of Russia and all local nationalities. It was aimed at providing order in the Steppe: levying taxes; fighting crime; providing for an economy.

This system of management in Kazakhstan, as a part of the RussianEmpire, was kept with some changes until the 1917 revolutions of February and October. Its rather complicated legal system consisted of: Adat, the Common Law of Kazakhs, as well as Shariat or Muslim Law; and Russian Imperial law.

For the local populations of Kazakhstan, adat was the main source, of course. It better corresponded with the nomadic and semi-nomadic way of life. Norms of ShariatLaw were used mainly for regulation of some family relations, considering serious penalty for crimes against Islamic rules.

Russian Imperial Law had two kinds of norms. The first is civil law through which Kazakhstan was included into the general economic life of the Empire. Naturally, the law of ownership, the obligatory law of Russia did not differ from the analogues of European states and played a positive role in Kazakhstan. Criminal law and Administrative law played positive roles as more humane and civilized than that of Adat and Shariat.

Many works of Eastern, European, and Russian literature were translated into the Kazakh language, and thus the first Kazakh language newspapers were published. However, the Kazakhs continued to experience their formal and legal inequality in the Russian Empire. It was well known in tsarist Russia that social, professional and legally fixed inequality existed among the Kazakhs. Kazakhs had no nobility, nearly no mercantile or industrial class and no urban lower middle class. Further, since they were Muslims, Kazakhs were excluded from the privileges accorded only the Orthodox. Moreover, they had no representation among local elected officials and establishments, or the state Duma. For the Kazakh people, tsarism meant not only violent deprivation of primordial fertile grounds, but also the deprivation of an opportunity to employ their historical, primordial name "Kazakh". Historically, it was noted, that the Russian administration misapplied the term "Kirghiz-Kaisak" as evidenced through the records of imperial Russia.

Only the October Revolution brought some relief in the legal conditions for the Kazakhs and other aboriginal groups in the Russian Empire. The Soviets acquired tsarist territories and perpetuated the administrative structures. However, decisions of national problems were postponed until the establishing congress-UchreditelnoeSobranie. In 1917 Great October Socialist Revolution under the leadership of the Bolsheviks (Communists), headed by V.I. Lenin gaveall the power in the country to the soviet workers, peasants and soldiers' deputies. All the country, including Kazakhstan, entered a new stage of historical development.

The Great Decrees of October adopted at the 2-nd Congress of Soviets in 1917 were entitled "About Peace", "About Land", and also "About Nationalization of Factories, Railways, and Communications". There were also declarations about equality of nations and their right to self-determination, on abolishing

rank and its privileges, about gender equality, and the separation of church and state. For their victory against international armies they paid in millions of lives, destruction of the economy, hunger, and continued poverty.

Kazakhstan, along with the rest of the country, was the scene of fierce military struggles. In 1918, the southern region of Kazakhstan was joined to the Turkestan republic with its center in Tashkent. In 1919, a Provisional Committee was formed in Orenburg to manage the area of Kazakhstan in the ongoing Civil War, and to provide for the people's needs. Here, and other places, the population was largely Russian. Yet there were Kazakh supporters of the Bolsheviks, such as T. Ryskulov and S. Seifullin, as well as more democratic national elements.

In 1924-1925, on the initiative of the Central Committee of the VKP(B) (Communist Party) and the USSR government, a national- territorial demarcation was exercised on Kazakhstan and the Central Asia Republics. Indeed, for the first time in the modern history Kazakhstan now comprised all its historic territory. Thus, Kazakhstan formed its own soviet socialist state system, not complete of course, but still the part of the Russian Federation.

According to the census of 1926, Kazakhstan had a population, which included more than six million Kazakhs. During the first decades of the Soviet power in Kazakhstan new economic policy was exercised. Kazakhs were given back the lands, which had earlier been given to the Russian migrants. The economy quickly reconstituted, illiteracy was reduced, secondary schools and higher education centers flourished, new theaters, clubs, museums and reading halls were opened. Thousands of Kazakhs were sent to study in Moscow, Leningrad, Kiev, Novosibirsk, Saratov and Sverdlovsk to be trained for specialized trades and higher education. In nearly all oblast centers, pedagogical centers opened to train teachers for the national schools in Russian and Kazakh.

During World War II many millionsof people were evacuated to Kazakhstan from the western part of the USSR, a pattern which continued into the 1950-s. By the 1960-s Kazakhs constituted only about 32% of their republic's population. The policy of russification was established. Kazakh language and culture had both suffered: first, the Arabic alphabet variant, used for Kazakh, was replaced by new Latin substitute (distinct from others in Central Asia), and finally by stylized version of the Cyrillic (Russian) alphabet. Teaching of Kazakh in Russian schools ceased.

This period saw the creation of many institutions, including Kazakh State University, the medical institutes, women's pedagogical institutes, industrial, law, and many other institutes, as well as hundreds of specialized and secondary technical schools. The Kazakh Department of the All Union Academy of Sciences was established in 1945 inside the Kazakh Academy of Sciences, with many scientific institutions and research laboratories.

Twenty seven years of Kazakhstan's history as the sovereign state shows the greatest changes in our country. Within its framework, two main directions can be noted. First, there is state governing of the ethnic processes. The 1995 Constitution of Kazakhstan stated such democratic principles as civic approach to defining of people in the preamble. The principles of uniform and equal citizenship were fixed. All the principles of the Supreme Law gave no place for injury and claims of people against one another.

Second direction in the interethnic relations is the emancipation of the creative potential of ethnic groups.New form of ethnic self-determination principally differs from the previous situation in that it shifts stress from the collective level of national rights to a personal level. The role of legacy model, undoubtedly demanding serious conceptual elaboration and propaganda measures, growsrespectively.

In the conclusion we would like to note, that the transformation and modernization of Kazakhstan's society is not a single action, but rather a long process of changes, unfolding and yielding a clearer vision of the modern, independent Republic of Kazakhstan.

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ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ МЕМЛЕКЕТТІЛІК ПЕН ҚҰҚЫҚТЫҢ ҚАЛЫПТАСУ ЕРЕКШЕЛІКТЕРІ

Аннотация. Белгілі болғандай, қазақ халқы тарихи дамуы барысында мемлекеттіліктің келесі түрлерінен өтті. Бірінші түрі: Ресей империясының құрамына кіргеннен кейін жойылған көшпелі мемлекет. Екінші түрі: Қазақстан КСРО құрамына кірді кеңестік мемлекет.Үшінші түрі: тәуелсіз мемлекеттілік, егемен Қазақстан.Қазақ мемлекеттілігінің қазіргі заманғы даму стратегиясы ұлттық қауіпсіздікті қамтамасыз ете отырып, ел бірлігін сақтауға негізделген. Мұнда мемлекеттің және заңды өмірдің ең жоғары құндылықтары «мемлекеттің тұтастығы», «мемлекеттік және ұлттық қауіпсіздік», «мемлекеттің тәуелсіздігі» сияқты құбылыстар деп танылады. Бұл идеялар Қазақстанн-2050 даму Стратегиясында толығымен бекітілген. «Мемлекеттіліктің» тұжырымдамасы «мемлекет» дегеннен гөрі кең. Мемлекет және құқық теориясында мемлекет белгілі бір аумақта саяси билік ретінде анықталады.Сонымен бірге мемлекеттілік – қоғамның дамуындағы белгілі бір кезеңде белгілі бір адамдардың өмірінің әлеуметтік-экономикалық, саяси, рухани және адамгершілік жағдайының бірегейлігіне байланысты элементтердің, құрылымдардың, қоғамдық билік институттарының, сондай-ақ саяси емес сипаттағы компоненттердің күрделі жиынтығы болып табылады. Осылайша, мемлекеттілік – қоғам мен мемлекеттің мазмұнын білдіретін элементтер мен институттардың құрылымы.

Түйін сөздер: мемлекеттілік, құқық, көшпелі өркениет, халықтың тіршілік әрекеті, ел бірлігі, ұлттық қауіпсіздік, мемлекеттің тұтастығы, мемлекеттің егемендігі, саяси билік, көпшілік билік институттары.

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ОСОБЕННОСТИ ФОРМИРОВАНИЯ ГОСУДАРСТВЕННОСТИ И ПРАВА В РЕСПУБЛИКЕ КАЗАХСТАН

Аннотация. Как известно, в ходе своего исторического развития казахский народ прошел следующие типы государственности. Первый тип: кочевое государство, которое было упразднено после вхождения в состав Российской империи. Второй тип: советская государственность, где Казахстан был частью Союза ССР. Третий тип государства: независимая государственность, суверенный Казахстан. Стратегия современного развития казахской государственности основывается на всемерном поддержании единства страны, обеспечении национальной безопасности. Здесь высшими ценностями государственно-правовой жизни признаются такие явления, как «целостность государства», «государственная и национальная безопасность», «суверенитет государства». Эти идеи были всецело закреплены в Стратегии развития Казахстан- 2050. Понятие «государственность» является более широким, чем «государство». В теории государства и права государство определяется в качестве политической власти в рамках определённой территории. В то же время государственность– этосложнейший комплекс элементов, структур, институтов публичной власти, а также компонентов неполитического характера, обусловленных уникальностью социально-экономических, политических, духовно-нравственных условий жизнедеятельности конкретного народа на определенном этапе развития общества. Таким образом, государственность - это структура элементов и институтов, выражающая содержание общества и государства.

Ключевые слова: государственность, право, кочевая цивилизация, жизнедеятельность народа, единство страны, национальная безопасность, целостность государства, суверенитет государства, политическая власть, институты публичной власти.

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PROBLEMS OF ECONOMIC SECURITY OF THE FUEL AND ENERGY RESOURCES OF THE COUNTRY

Abstract. The view is growing that unilateral actions by energy security, and in general, economic security, can lead - and in the absence of appropriate coordination and consistency, as practice shows, often lead to trans border transfer of economic shocks and various kinds of "external shocks", and ultimately - to interstate, including military-political conflicts. In other words, real unilateral national energy security is impossible. The problems of energy conservation today are most acute in all countries of the world. Effective use of energy can reduce its consumption and improve the energy security of the state. Improving energy efficiency and implementing energy saving measures is one of the guarantees of the state's energy security . When deciding on the issues of determining financial investments for energy conservation, an individual approach to each facility is necessary. Knowledge of the priority tasks to reduce energy consumption, financial costs for energy resources, obtained on the basis of detailed surveys with the development of the priority of financial investments, is an indispensable condition for a diligent attitude towards public funds allocated for energy conservation.

Key words : mineral raw materials, mineral resources, energy resources, material well-being, new technologies, power generation, power plants, efficiency, production capacity.

INTRODUCTION

It is advisable to represent the energy system as a set of energy objects using different energy sources. Next, determine the unit costs for the life cycle of each of these objects or for a set of objects, combined into a single functionally and technologically related energy subsystem. Accordingly, in the next investment cycle, it should be possible to invest in various energy subsystems.

Specific risks of the functioning of the energy system are presented in Table 1 .

Table 1 - Specific risks of the functioning of the energy system

Group ofenergy sources	Risk	Effects	Impact on the economy
Traditional sources of hydrocarbons	Reducing inventory and reducing the resource base	decrease in production volumes, lack of energy resources	The growth of energy prices, the restriction of economic growth
Unconventional sources of hydrocarbons	technical and technological problems associated with the impossibility of solving scientific research problems	low production volume, lack of energy resources	
Alternative renewable sources	technical and technological problems associated with the impossibility of solving scientific research problems	insufficiently generated energy, lack of energy resources	
Note - the source DV Kotov, "The Utility of Improving the Efficiency of the Fuel and Energy Complex in the Conditions of Development of Alternative Energy," in Economics and Management No. 1, 2014-12)			

When optimizing energy sources for the level of unit cost at certain time periods, one energy source will be used. The risks associated with the creation of an energy system using primarily one energy source may be significant, which means that the conditions for ensuring energy security will not be fulfilled, which will affect the cost of energy and the implementation of regional economic development programs [1] .

Atomic energy complexes will allow optimal and balanced use of fuel and mineral resources available in the depths of our country, receiving cheap and environmentally friendly energy. It is clear that the events of 2011 in Japan have made some adjustments to the energy policy of a number of EU countries, and their plans to build nuclear power plants around the world are becoming more restrained [2] .

The authorities of Japan, six months after the radiation leak at the Fukushima-1 nuclear power plant, decided to gradually abandon the use of nuclear power plants in the national energy sector, but it is not easy to find an alternative to nuclear power plants. Indeed, at present, the share of alternative energy sources (hydro , wind and solar energy) is about 1% of the total energy consumed in the world. For example, in the same Germany, where much attention is paid to the prospects for the development of alternative energy sources , they provide only 10% of the country's energy needs. In addition, the transition from traditional energy to alternative requires huge investments, and it is understandable that today, in the midst of the crisis of the euro zone and the impending threat of a second wave of the global recession, not all states can afford a broad gesture that sweeps away the already established energy channels.

At the same time, China, India, Russia, South Korea declares their readiness to actively develop nuclear power. Kazakhstan has a very high potential both in terms of development of solar, hydro - and wind energy, and in terms of nuclear power [3] .

Despite the accident at the nuclear power plant (hereinafter - NPP) of Fukushima , the introduction of a significant number of new nuclear power plants and the growth of nuclear power generation are expected. The global demand for nuclear energy will continue to grow primarily at the expense of Asian countries. The main reduction in nuclear programs is planned in Europe and Japan. Until 2030, the number of nuclear reactors in the world will increase by 160 pieces (+ 35%), with the largest share of growth going to Asia - about 135 reactors (+ 115%). Thus, the global installed capacity of nuclear generation will grow by 55-60% by 2030 and amount to about 600 GW (generation in Asian countries will grow by 184%). The growth in the volume of nuclear generation will lead to an increase in demand for uranium by 50% by 2030 [4] .

According to current projects, until 2020, world uranium supplies are expected to grow by 22%. The global uranium market is balancing on the brink of a deficit, a slight surplus was observed only in the last few years and was due to the impact of the accident at the Fukushima nuclear power plant. In the future, demand will recover and continue to grow, but there will be a local failure by the uranium supply as a result of the completion of the global disarmament program and a temporary reduction in investment in the development of new fields. In 2014, the program " Megatonsto Megawatts "(HEU-LEU) for processing the nuclear arsenal of the Russian Federation, which provided supplies of about 10 thousand tons of uranium equivalent per year. The end of supplies from disarmament will be partly offset by the supply of uranium from US state reserves, but the global supply of uranium will shorten in the short term. In addition, the decline in prices in the uranium market led to a temporary suspension of a number of projects to develop new fields. For example, in 2012 BHP Billiton abandoned the $ 20 billion Olympic Dam development project , and the launch of Areva's large projects in Namibia and the CAR was postponed : Trekkopje and Bakouma [5] .

The leaders of the industry in almost all areas are the French Areva and Russian Rosatom , offering their customers full cycle power plant services, including all fuel redistribution and spent fuel (contracts like Nuclear Steam Supply System - NSSS). USA, which includes all the redistributions of the cycle of uranium fuel production: from extraction to fabrication. GE-Hitachi and Cameco also seek to develop an enrichment segment in order to be able to offer a complete product on the market. It is also advisable to close the entire fuel chain (before the fuel assembly is fabricated), as this will provide domestic demand for intermediate conversion products (conversion, enrichment), the market for which is oversaturated. In

addition, the development of processing facilities for uranium will neutralize a significant volatility of the price of uranium on the world market. Uranium is a commodity (commodity) product, and futures for it are traded on the New York Stock Exchange. Since 2004, hedge funds and specialized traders (UPC, NUL and others) have formed a significant share of demand and supply , while price volatility has increased significantly due to speculative reaction to various events (the implementation of US state uranium reserves, the accident at the Fukushima nuclear power plant , financial crisis, etc.). At the same time, the cost of enriched uranium and fuel assemblies is formed on the basis of medium- and long-term contracts and is not subject to financial speculation.

In the past few years, the fuel and energy sector has shown a tendency to reduce the replenishment and quality of the resource base, which is reflected in the oil and gas, coal and nuclear industries. From the point of view of long-term development, this trend can lead to a significant drop in the level of mineral extraction and a decrease in export revenues for the state. To develop the resource base, it is necessary to attract significant investments in geological exploration activities, especially in the crude oil and uranium production segments [6] .

One of the key tasks is to meet the growing needs of the state in electric and thermal energy and motor fuels. The growth of the economy and the population of the Republic of Kazakhstan will require the development of the electric power industry, and at the moment the country is not fully provided with high-quality gasoline, diesel fuel and commodity gas for the population. The preservation and enhancement of the energy security of the Republic of Kazakhstan is impossible without the creation of an appropriate infrastructure and the development of technologies.

Also, an important aspect of the functioning of the fuel and energy complex is environmental safety of the state, in particular, in the segments of oil and gas production and coal generation, as the main sources of environmental pollution, as well as within the planned nuclear power generation.

The long-term development goal of the fuel and energy complex is to increase the efficiency of energy resources use to promote economic growth and the quality of life of the population, as well as to strengthen foreign economic relations.

Strategic priorities for the development of the fuel and energy sector:

1) energy security;

2) development of resource base;

3) improvement of ecology.

The main tasks of the FEC:

1) modernization and construction of new assets in the generation and transmission of electricity and heat, refining;

2) development of domestic energy and fuel markets, consistent liberalization and development of competition;

3) intensification of geological exploration activities by attracting investments.

4) modernization of industry and transport, introduction of modern technologies to improve energy efficiency and reduce the negative impact on the environment.

5) development of technologies and infrastructure for the use of alternative energy sources: RES, nuclear power, associated gas processing, gas transportation, and coal-chemical production. [7]

In the 21st century, qualitative changes are taking place in the structure of world energy. Countries, especially developing ones, become the main dynamic factors that generate and close to themselves the main share and increase in consumption of energy resources surses.

According to E.A. Elibaeva, due to the large size of the territory and the uneven distribution of oil and gas resources, the solution of the energy security problems of many states combines the approaches typical for both importing countries and energy resource exporters [8] .

There are several definitions of energy security. World Energy (MIRES) defines it as "the assurance that energy will be available in the quantity and quality that are required under given economic conditions." Published in 1985, the IEA" Energy policy in the field of technology - neologies "energy security was defined as "adequate energy supplies at a reasonable price". The European Commission (1990) provides a more complete definition: " security of supply means that it is essential

energy needs will be met Fascinated as due to the use of adequate domestic resources developed in an economically viable way or supported as a strategic reserve, and at the expense of affordable and stable external sources, supplemented if necessary by a strategic reserve".

Already in the mid-1970s, as the world community became increasingly aware of the degree of interdependence world and all the problems that exist in it, energy security has become is understood much broader than only as a process of ensuring the continuity of energy supply and achieving maximum "energy independence" [9] .

This was emphasized by the experts of the Stockholm International Institute for Peace and Disarmament Research (SIPRI), expanding the concept of energy up to the concept of "between people's energy security, **"** and included in it the problems of fuel supply to not only developed but also developing oil-importing countries and other resources.

Difficulties in achieving international energy security, as well as a gradual transition to the creation of an alter native energy, that is, to the development of fundamentally new sources and technologies, the formation of energy-economic type of farming, the diversification of energy mix, -n apryamuyu linked with the situation on the oil market and its price. With increasing mutual no country in the world can, without prejudice to itself, remain in the external environment nomic self-isolation, especially exports tatting large volumes of energy carriers at highly volatile world market prices. Practically impossible long-term energy a strategic strategy that, firstly, does not have a corresponding system of rapid reaction to "external shocks" and, secondly, does not have broad coordination within the international community.

An analysis of such a complex phenomenon as between people's energy security, requires carrying out its structuring, building a " tree goals, "clarifying **"** dominant **"**problems, etc.

According to the Chinese analyst Zhao Daojin, energy security is not military guarantees, but is more connected with geopolitical factors and the national policy of countries that affect the control of energy resources and their transport beyond the limits of [10] . So, for example, the increasing year by year difference between internal security and consumption China's energy resources, forced the government to allocate energy security needs a number of basic national interests. At the state level, under the energy security the national security of the country, the state is of the population and the economy of the country from the threats of a deficit of economically accessible fuel and energy resources of acceptable quality and threats of violation of stable fuel and energy supply [11] .

Accordingly, increasing energy efficiency, implementing energy saving measures is one of the guarantees of such security and, as a consequence, the most important resource for accelerating economic growth.

It should be noted that increasing energy efficiency in Kazakhstan and Russia as a whole is a big macroeconomic task, and the expected effect of its solution depends on involving the entire society in this process. And for this, first of all, a powerful state information system and creation of stimulating factors and favorable conditions for financial support of innovative energy saving developments from private capital are needed .

Practical implementation of the policy in the field of energy conservation, energy efficiency of the economy should be implemented on the basis of a comprehensive integrated approach to the problem. The main element in the scheme of organization of this work on the basis of this approach is the modern legislative, regulatory and regulatory framework that combines market and administrative norms for regulating relations, as well as government support and promotion of energy saving and energy efficiency .

Over the past few years, in Kazakhstan, the issue of improving energy efficiency and energy conservation has been given close attention. For the practical implementation of measures to improve energy efficiency and energy conservation in the Republic of Kazakhstan, a Comprehensive Plan to Improve Energy Efficiency in the Republic of Kazakhstan for 2012-2015 was implemented.

The list of technical solutions used to reduce energy costs includes the following:

- Optimization of the operation of plants generating thermal and electric energy to meet production needs;

- Constructing the energy balance of the process streams and energy, with a view to their most effective use;

- Solving problems increase efficiency of each particular installation, by replacing the heat exchangers and the use of secondary energy resources;

- Improving the production technology, by use of more efficient catalysts and advanced refining technologies;

- The use of flow analyzers that enable conducting the process in the most optimal conditions for a more economical separation of oil fractions from the rectification, reduction and catalytic cracking temperature reforming , hydrogen production optimization, olefins, methanol and other aromatic hydrocarbons [1 0].

The main criteria for the efficiency of a modern power plant are its production of energy per unit of fuel used while minimizing environmental pollution. Well-known is the fact that the efficiency of thermal power station is 25 to 50%, depending on fuel quality and completeness of combustion. In addition, the important factor is the accuracy of the compliance process, ensuring the longevity of the expensive equipment. To one of the main quality parameters of electricity production for the supervision of the chemical composition of the water, this is essential to ensure reliable operation of the steam turbine. Indicators of water quality are its acidity and salt content, content of dissolved oxygen, phosphorus, hydrazine, sodium, iron, silicon and other elements. Verification be supplied as a flow of water in boilers to produce steam and condensate obtained from the steam. To obtain reliable information comparable to laboratory results, it is necessary to maintain a constant temperature, flow and pressure of water, which is achieved by special air conditioning systems supplied with the analyzers and computer equipment as a single-key system.

CONCLUSION

Thus, the development of fuel and energy complex operation, including investment processes should not be considered in isolation from the general ideology that underlies the whole of economic reform. In other words, the country's economic policy goals should not be in contradiction with the objective tendencies of functioning and development of the energy sector. Kazakhstan retained interest in the possibilities of use of renewable energy sources are likely overall effect of their use in the medium term remain quite limited at much lower volumes than previously accepted target by 2030 Georgia (30% of electricity production from renewable sources, hydro and nuclear power plants). Current costs and problems of integration in the network of relatively large amounts of electricity, produced from renewable sources, it is possible to understand from the experience of other countries. Renewable energy sources in Kazakhstan are still in the early stages of implementation and are faced with similar challenges. Thus, given the presence in Kazakhstan large number of cheap coal complex and large coal fired power plants over the next two decades the country will largely rely on coal fuel, although over time the share of coal for generating electricity will gradually shrink. Based on the availability in Kazakhstan large number of cheap coal complex and large coal fired power plants over the next two decades the country will largely rely on coal fuel, although over time the share of coal for generating electricity will gradually shrink. Based on the availability in Kazakhstan large number of cheap coal complex and large coal fired power plants over the next two decades the country will largely rely on coal fuel, although over time the share of coal for generating electricity will gradually shrink.

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ПРОБЛЕМЫ ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ ТОПЛИВНО-ЭНЕРГЕТИЧЕСКИХ РЕСУРСОВ СТРАНЫ

Аннотация. Все больше распространяется мнение, что односторонние действия государств по обеспечению своей энергетической безопасности, а в целом и экономической безопасности, могут привести - и при отсутствии соответствующей координации и согласованности, как показывает практика, часто приводят - к трансграничной передаче экономических потрясений и различного рода "внешних шоков", а в конечном итоге - к межгосударственным, в т. ч. военно-политическим конфликтам. Иными словами, реальная односторонняя национальная энергетическая безопасность невозможна. Проблемы энергосбережения сегодня стоят наиболее остро во всех странах мира. Эффективное использование энергии позволяет сократить ее расход и повысить энергетическую безопасность государства. Повышение энергоэффективности и реализация мероприятий в области энергосбережения – одна из гарантий энергетической безопасности государства. При решении вопросов об определении финансовых вложений на цели энергосбережения необходим индивидуальный подход к каждому объекту. Знание первоочередных задач по снижению энергопотребления, финансовых затрат на энергоресурсы, получаемое на основе детальных обследований с выработкой очередности финансовых вложений непременное условие рачительного отношения к государственным средствам, выделяемым на цели энергосбережения

Ключевые слова: минеральное сырье, минеральные ресурсы, энергетические ресурсы, материальное благосостояние, новые технологии, производство электроэнергии, электростанции, эффективность, мощность производства.

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ОТЫН ҮНЕМДІ ҚАУІПСІЗДІК ЖӘНЕ ЕЛІМІЗДІҢ ЭНЕРГЕТИКАЛЫҚ РЕСУРСТАРДЫ МӘСЕЛЕЛЕРІ

Аннотация. жиі себеп, тәжірибе көрсетіп отырғандай, және сәйкес келісу және үйлестіру болмаған кезде - мемлекеттер біржақты іс-шаралар, оның энергетикалық қауіпсіздігін obes¬pecheniyu бұл пікірін тарату, және жалпы, экономикалық және қауіпсіздік болып табылады, әкелуі мүмкін экономикалық көлік-шекара аударуға сайып келгенде, күйзелістер мен «сыртқы күйзелістерді» түрлі түрі, және - мемлекетаралық, ҚҚС әскери-саяси үшін қақтығыстар... Басқаша айтқанда, бір жақты ұлттық энергетикалық қауіпсіздікті мүмкін емес. Бүгінде энергияны сақтау проблемалары әлемнің барлық елдерінде ең өткір. Энергияны тиімді пайдалану тұтынуды азайтуға және мемлекеттің энергетикалық қауіпсіздігін арттыруға мүмкіндік береді. Энергия тиімділігін арттыру және энергия үнемдеу шараларын енгізу - мемлекеттің энергетикалық қауіпсіздігінің кепілдігі болып табылады. Энергия үнемдеуге арналған қаржы инвестицияларын айқындау мәселелерін шешуде әр объектке жеке көзқарас қажет. энергия тұтынуды азайту үшін басымдықтарды, энергия үнемдеу үшін бөлінген мемлекеттік қаражатты үшін алғышарт сақтықпен қатынасы басым инвестицияларды дамытумен толық сауалнама негізінде алынған энергияның қаржылық шығындарды білу.

Түйін сөздер: минералды ресурстар, минералдық ресурстар, энергия ресурстары, материалдық әл-ауқатқа, жаңа технологиялар, электр энергиясын өндіру, электр, тиімділігі, электр өндіру.

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MONITORING OF HUMAN CAPITAL DEVELOPMENT IN INDUSTRIAL ENTERPRISES

Abstract. The article considers a grouping of indicators that allow to study in more detail the state and use of human capital and noted that due to monitoring it was revealed the absence in the existing system of labor remuneration in the enterprises under consideration of the evaluation of collective labor. For the development of human resources, the creation of favorable conditions for production is the basis for the successful application of their knowledge in industrial enterprises. Thus, a higher level of wages in other regions, lower interest rates on mortgages in other regions have an impact on migration processes in the region under study. Human potential, which is part of the country's economic system, is one of the main factors directly influencing the formation of a favorable innovative, investment climate in the country.

Keywords: politics, management, human capital, competitiveness, training, retraining.

INTRODUCTION

Heads of all structural divisions: chiefs of services, departments, sectors, shifts, workshops of the enterprises under consideration can theoretically encourage the initiative worker, in practice - no. Leaders are economically helpless in the operational management of their subordinates. And administrative measures of influence, as a rule, not only do not motivate, but more often, on the contrary, demotivate employees. The latter circumstance is caused by the punitive nature of the application of the existing wage system in practice. A normal labor incentive system should be predominantly incentive, i. encouragement must prevail over punishment. Psychologists have smoothly proved the ineffectiveness of punishments, since they, in the main, reduce the labor activity of workers. And encouragement is caused by increased motivation of work. Therefore, we believe that equalization in the distribution and punitive nature of the wage system is a real scourge of labor collectives of these enterprises.

The focus of the current wage system is the distribution of the wage fund for workers. But it is practically impossible to solve this problem professionally, since the labor of the majority of workers is not measured. And immoderate work can not be properly rewarded. Hence inevitably arise "equalization" in the payment of labor [9-10].

Unfortunately, a significant number of enterprise managers have not yet realized the need to restructure the internal economic mechanism of the organization, and they do not know what to replace the obsolete system of organizing wages. Virtually all leaders do not underestimate the work with the staff.

The analysis leads to the following conclusion: wages in many respects lost their motivating significance not only because of their equalization in its distribution, its weak connection with the labor and general results of the organization's work, but also because of the large drop in real wages.

MAIN PART

The principle of the construction of tariff grids - a relatively slow increase in tariffs and salaries as it rises from the first to the last level - does not allow maneuvering the rates and salaries of certain categories of workers.

Sooner or later, enterprises will be guided by the price of labor in the local, regional and state labor market. Over time, with the development of the international labor market, managers will have to take into account the price of labor abroad. Widely spread the experience of Western firms that scan the amount of salaries in their positions and specialties from their competitors and, taking into account the local labor market, establish salaries, tariff rates, bonus amounts.

All the set of incentives that organizations use in modern conditions, especially in Western countries, can be classified as follows to stimulate the work of personnel:

- material incentive;
- moral stimulation;
- incentives for participation in management;
- Stimulation of participation in the capital;
- incentives for participation in profits;
- Stimulation of social benefits.

As we see, in the arsenal of enterprises a very complex system of incentives for staff. Unfortunately, in many cases, all these types of incentives are used at enterprises separately, distributed among different management bodies of the enterprise, which makes it impossible to use them in a comprehensive, systemic way. All this hinders the development of motivation for work. So, usually material incentives are given to the departments of labor and wages, which are subordinate to the director of economics (chief economist), moral incentives to the personnel department (personnel department), which is subordinate to the director of personnel, social benefits to the administrative and economic department (household service) , which is subordinate to the deputy general director for everyday life [12].

The problems of labor stimulation are acute problems not only for modern Kazakhstan, they are also topical and eternal for the economies of developed countries. The Achilles' heel of typical labor incentive schemes in the United States, Europe and other countries is the weak connection between pay and performance of firms. As a rule, workers are given "solid" salaries, their amount forms a wage fund, almost unrelated to production and other economic indicators.

As the great experience of Western firms shows, the participation systems in capital have little motivational potential. Possession of a small, symbolic, share of the company's shares does not allow to include the overwhelming majority of shareholders-workers in the process of business management. Without such inclusion, workers have little idea of how they can affect production at their workplace in the course of daily work. In addition, remuneration for participation in the capital is in the form of dividends only once a year. All this does not allow to significantly increase the motivation of their work [13].

In order to improve the system of motivation and pay for employees, it is proposed to introduce a new system of wage organization at the enterprises under consideration.

The main goal of all participation systems is to increase the efficiency of the business by increasing the motivation of the personnel. This is achieved by concession by the owners of part of the income in favor of the staff in the performance of the agreed conditions beforehand. In other words, the additional income received from the additional labor efforts of the personnel is divided in a certain proportion between labor and capital [14].

In this wage system, the wage fund directly depends on the main economic indicators of production: the volume of production and sales of goods and services, production costs, labor productivity and product quality. If any of these indicators improves, the production efficiency and staff income increase.

With this approach, the staff of enterprises is very interested in the growth of each of the main economic indicators and, in general, the efficiency of the entire production. Such rather abstract concepts for workers, such as labor productivity, production costs, sales volume and others, are filled with a very concrete economic content. Workers see a direct connection of their personal salary with the overall performance of production. With the correct setting of the work and the staff, employees will find out monthly how much they increased or decreased the wage fund due, for example, to the cost of production or its quality. In their minds, an understanding is established of the direct dependence of personal wages on the efficiency of production. All this generates collective and personal interests to save in big and small, work with fewer employees, improve product quality, etc. [15].

Thus, the new system of labor remuneration is a complex system of personnel participation in business. The staff receives a part of the income from the growth in the volume of production and sales of goods and services, from lower production costs, higher labor productivity and product quality.

An important feature of this system is that it motivates the improvement of the economic position of the enterprise with the growth of wages. Decrease in the economic indicators of enterprises immediately leads to a reduction in the wage fund and the average salary of employees. All this makes a new system of more motivating employees than the old wage systems.

This system of staff participation is not limited to the top level of management, where the payroll of its enterprise is formed. It permeates all levels of government and reaches to lower-level collectives (brigades, sections, departments, sectors, etc.) and individual workers. And every team and employee are economically interested in conducting production efficiently. All this makes it possible to define the system of labor management as a system of personnel participation in business.

The new system has a very valuable social and economic property: it opens the possibility of harmonizing the economic interests of owners of capital and hired personnel. The resulting growth in the average salary fixes the cadres, attracts a better labor force, which increases the efficiency of production and the mass of profit.

Economic interest encourages staff to innovate, creativity, enterprise - and this also entails an increase in the work efficiency and competitiveness of the enterprise. All this leads to an increase in the cost of business, growth of capital and income of owners.

When applying this system, the question arises about the minimum wage, less than which an enterprise should not charge employees. According to the labor legislation, the minimum wage is established by the state, and the enterprise has the right to be limited to it in case of a fall in production [16].

The system of participation in business has a fundamental advantage over the systems of participation in capital and profits in the field of labor motivation. It overcomes the weakness of these systems - a weak motivating force.

In the mid-80s of the last century, representatives of the Harvard Business School conducted a study, from which the important conclusion followed: the most important factor in reducing the competitiveness of American industry in world markets is the weak ideologization of work in American companies.

To create a civilized market economy in Kazakhstan, this factor is also of great importance. In the proposed wage system there is a section on corporate culture. In accordance with it, the formation of a modern corporate culture in any organization begins with the collective development of corporate norms containing the requirements of a high corporate culture, bringing these documents to every employee.

The following regulatory documents are being developed:

- - mission of the enterprise is a corporate document containing the main objectives of the enterprise, reflecting its social role, the main principles of external and internal corporate culture. The main groups of people whose interests are to be reflected in the mission of the enterprise are: customers of the products and services of the enterprise, its employees, business partners, the local community and society as a whole. The mission should be attractive, inspired, inspire and inspire the staff, sound like a call for creation, moving forward;
- - the declaration on corporate values - a corporate document addressed on behalf of the enterprise to the outside world, which solemnly proclaims the main principles of the corporate culture of the enterprise;
- - rules of corporate business relations - a corporate document containing rules of conduct of the personnel of the enterprise, norms of business relations both with partners and with colleagues on work;
- - rules of professional ethics - a corporate document containing the moral principles of work;
- - rules of internal labor regulations - an internal organizational and administrative document that determines the work schedule at the enterprise;
- - Regulations on structural subdivisions and job descriptions of employees, forming a unified system of interrelated documents. They are built on the basis of common principles and requirements for their content and reflect the basic requirements of the Labor Code and other fundamental corporate documents in force at the enterprise;

- - The system of assessment and remuneration of labor is an internal mechanism whose purpose is to create a system of motivation and stimulation of the work of personnel;
- - the system of strategic objectives of the enterprise - a corporate document reflecting the main lines of business of the enterprise;
- - the plan of measures to create a high corporate culture of the enterprise - a document through which it is possible to systematically and systematically form and develop the corporate culture of the enterprise.

The system of strategic objectives of the enterprise consists of the following groups of objectives:

social - aimed at increasing the degree of satisfaction of employees with the conditions, organization, content of labor, remuneration and labor relations in the enterprise;

- corporate culture - aimed at the formation of higher value standards, external and internal image of the enterprise;
- strategic development - aimed at adapting the enterprise to continuous changes in the external environment, shaping the attitude of workers towards development, change and continuous improvement as a new way of life;
- marketing - aimed at conquering the market, finding new market opportunities, working to promote products, goods and services;
- production and technical - are aimed at ensuring production of products in accordance with the demand of consumers, the growth of technical and technological level of production, the introduction of modern technology and technology;
- financial - aimed at improving the financial condition of the enterprise;
- economic - aimed at increasing the economic efficiency of the enterprise.

CONCLUSION

In the process of adaptation of personnel, it is identified with the enterprise. The decisive role in this is the corporate culture of the enterprise. [17] Each worker correlates his spiritual values with the values of the enterprise. In the event that the values mostly coincide, the identification of the employee with the enterprise takes place. If the values of the enterprise are alien to the employee, unacceptable, then there is a contradiction between employee values and corporate values [18].

Between corporate culture and corporate benefits there is a direct link: the higher the value of personnel, the more developed the system of corporate benefits. So, for example, in Japanese firms the staff as a whole, and every single employee is highly valued. All this finds expression in a ramified system of corporate benefits. Corporate benefits are aimed at achieving different goals: attracting and retaining the personnel of the enterprise, creating a favorable social and psychological environment in the teams, intellectual, moral and physical development of workers, strengthening health, organizing cultural leisure. Along with this, corporate benefits motivate labor. Part of the benefits is distributed depending on the labor contribution of employees, length of service, official position, etc.

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ӨНЕРКӘСІПТІК КӘСІПОРЫНДА АДАМ КАПИТАЛДЫ ДАМЫТУДЫҢ МОНИТОРИНГІ

Аннотация. Мақалада көрсеткіштер тобы толығырақ адам капиталының мәртебесін және пайдалану зерделеу үшін және байланысты мониторинг ұжымдық еңбек бағалаудағы кәсіпорынның ағымдағы еңбекақы жүйесінде болмауы анықталған, деп атап өтті. адам ресурстарын дамыту жұмыс орнында қолайлы жағдайлар жасау үшін оларды өнеркәсіпте білім табысты қолдану үшін негіз болып табылады. Осылайша, өзге аймақтарда жалақы жоғары деңгейі, өзге аймақтарда ипотекалық қарыздар бойынша төмен пайыздық мөлшерлемелер зерттеу облысында көші-қон процестерінің әсер бар. Адам әлеуеті, елдің экономикалық жүйесінің бір бөлігі, елдегі инвестициялық климат, қолайлы инновациялар қалыптастыру тікелей әсер етуі негізгі факторлардың бірі болып табылады.

Түйін сөздер: саясат, менеджмент, адам капиталы, бәсекеге қабілеттілік, оқыту, қайта дайындау

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МОНИТОРИНГ РАЗВИТИЯ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА НА ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЯХ

Аннотация. В статье рассмотрена группировка показателей, позволяющих более детально изучить состояние и использование человеческого капитала и отмечено, что благодаря мониторингу было выявлено отсутствие в существующей системе оплаты труда на рассматриваемых предприятиях оценки коллективного труда. Для развития человеческих ресурсов создание благоприятных условий на производстве является основой успешного применения ими своих знаний на предприятиях промышленности. Так, более высокий уровень зарплаты в других регионах, более низкие процентные ставки по ипотечным кредитам в других регионах оказывают воздействие на миграционные процессы в исследуемом регионе. Человеческий потенциал, входящий в экономическую систему страны, является одним из основных фактором, оказывающих непосредственное воздействие на формирование благоприятного инновационного, инвестиционного климата в стране.

Ключевые слова: политика, управление, человеческий капитал, конкурентоспособность, подготовка, переподготовка.

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PROSPECTS FOR STRENGTHENING THE QUALITY OF HUMAN CAPITAL

Abstravt. According to the authors, every year the quality of human capital increases and the share of specialists employed in the non-state sector of the economy increases. The increased competitive environment in the labor market pushes employers towards higher pay. In such conditions, private sector enterprises are forced to increase efficiency and productivity by using new technologies and equipment. The transition to market relations in the investment in human capital sector is accentuated by major consequences and leads, ultimately, to increased competition. Such predicted changes will create conditions for full-scale transformation. A new, emerging model of economic growth presupposes a new stage of reforms in higher education. They are able to awaken forces hidden in the human personality and determine the constituent features of human capital.

Keywords: strengthening, education, human capital, development, competitiveness, potential.

INTRODUCTION

Currently, constantly growing in scope and increasingly diverse in content, interstate economic ties form a great need for universal staff of specialists who receive professional training in national universities. Such a requirement predetermines a special attitude to the process of the formation of national higher education systems, which in form and content should strive for the so-called "world standards".

The processes of globalization also require the formation of a new target orientation from national higher education systems, taking into account the needs already at the international level. Also, in the context of globalization, the universalization of the content and technologies of higher education is inevitable. And this process can not be stopped with the existing world information and communication systems. It is already possible to speak about the global internationalization of higher education. It gradually acquires the features of a qualitatively new stage - integration, the all-round convergence of national educational systems and their complementarity.

MAIN PART

Formed the basic framework of higher education, representing one of the main elements of the world social system. It is characterized by a multitude of interrelated elements of different levels and character. Each university, taking its specific place in the market of educational services, now interacts in the form of cooperation or rivalry, thereby developing the main priorities and guidelines of this market. The need for the sustainability of the higher education system implies the development of adaptability to the changing conditions of the modern world. In this regard, the crisis of higher education, which many leading experts write in recent years, is nothing but a message to the need to reform its content, forms, methods, technologies and goals. The global economic crisis reinforces the need for international integration of higher education. Thus, it is quite obvious that the integration of higher education into the world system is an objectively developing process. International cooperation, being a powerful lever for the development of the world higher education system, is designed to solve a number of urgent tasks, such as: observance of the adequacy of content and level of higher education in the needs of the economy, politics, social and

cultural spheres of society; leveling of training levels in different countries and regions; Coordination of the activities of educational institutions for the development of higher education.

UNDP human development reports are prepared at the regional, national and international levels. The final report summarizes all the main indicators of the "standard of living" of the population of the countries and regions presented in the report. In determining the rating, many factors are taken into account, such as the situation of human rights and civil liberties, its ability to participate in public life, social security, the degree of territorial and social mobility of the population, indicators of the level of cultural development of the population, access to information, health, unemployment, state of crime, environmental protection and others. In the final ranking, all states are ranked on the basis of the HDI and classified by four categories:

- Countries with very high HDI levels.
- Countries with a high HDI level.
- Countries with an average HDI level.
- Countries with a low HDI level.

The greatest difficulties in the calculation of the Index are related to the need to obtain comparable indicators in the absence of the necessary social statistics in many developing countries, and in several sections - and in some countries with economies in transition. It should also be noted that the part of the data provided by national statistical organizations is not always reliable, as some governments deliberately embellish the situation in their countries. Currently, the Index covers 190 UN member countries, as well as special administrative territories - Hong Kong (China) and the Palestinian Territories (Israel).

Table 1 - Human Development Index of the World

A PLACE	A COUNTRY	HDI
1	Norway	0.944
2	Australia	0.935
3	Switzerland	0.930
4	Denmark	0.923
5	Netherlands	0.922
6	Germany, Ireland	0.916
7	USA	0.915
8	Canada, New Zealand	0.913
9	Singapore	0.912
50	Russia	0.798
56	Kazakhstan	0.788

In the light of this definition, human development has three components:

- Welfare: expanding the real freedoms of man in such a way that they can flourish.
- Empowerment, as well as agency: the ability of individuals and groups to act and receive valuable results.
- Fairness: increasing social justice, ensuring the sustainability of results in time, respect for human rights and other goals of society.

To ensure the improvement of the quality of human capital in the RK and its use as a factor in socio-economic development, it is necessary to develop and implement a set of measures to create a system for managing human capital at the macro and micro levels. At the macro level (at the state level), the following areas need to be developed in order to ensure the strengthening of human capital:

1) it is necessary to improve the state policy in the field of reproduction of human capital in order to create a socially-oriented innovative society. The improvement of the quality of human capital in the country should be the goal of the government, for which it is necessary to develop an appropriate program;

2) it is necessary to use modern methods of managing human potential;

3) the human condition should be monitored by region in a breakdown by groups: health capital, education capital, mobility capital, etc .;

4) it is necessary to develop sectoral employment promotion programs aimed at assessing the number of employees within the sectors, the needs of the branches in the employees, implementing measures to organize the retraining of the released personnel and their employment;

5) it is necessary to improve the instruments and mechanisms of state policy in the social sphere. In this area, it is necessary to develop measures to strengthen the motivation of people to develop their own "human capital" and responsibility for its condition;

6) support for enterprises providing vocational training for dismissed workers, the use of contractual forms of training of personnel, expansion of the scope of vocational training, retraining and skills development for specific applications of employers with the guarantee of subsequent employment are necessary;

7) it is necessary to create conditions for preserving, increasing and improving the efficiency of the use of the state's human capital in all spheres of life activity.

CONCLUSION

One of the tools that affect the qualitative growth of human capital in society is education. It is well known that education is the most important factor in the formation of a person as a person. In educational institutions, a person from an early age learns to read and write, learns national and universal values, studies the heritage of the people, attains the highest degree of culture and reveals other abilities. Sayings of the great scientist Abu-Nasr Al-Farabi about the content of the meaning of education, its place in the essence of man and to this day are important tools of educational activity. The ideas of the educational, social orientation of the great enlightenment scholars occupy an important place in the present conditions of social change. Indeed, there is no such ideological and spiritual power, a source of power as knowledge.

Therefore, throughout the world, a new ideology is primarily based on the irresistible power of knowledge. In this regard, the formation of an effective education system in the structure of the state must correspond to economic needs. And because of this, a huge work is being done to create a national model of domestic education. In our country, the established priorities in the field of education are being phased in. In order to achieve high qualitative results in the education system, modern teaching methods and technologies are introduced into the educational process, advanced experience of training in the system of vocational education is disseminated, work is being carried out to achieve the level of advanced educational institutions by all educational institutions, to raise the qualitative level of the pedagogical staff, implementation of the system of independent approval of qualifications.

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ПЕРСПЕКТИВЫ УСИЛЕНИЯ КАЧЕСТВА ЧЕЛОВЕЧЕСКОГО КАПИТАЛА

Аннотация. По мнению авторов, с каждым годом возрастает усиление качества человеческого капитала и увеличивается доля специалистов занятых в негосударственном секторе экономики. Возросшая конкурентная среда на рынке труда толкает работодателей в сторону повышения оплаты труда. В таких условиях, предприятия частного сектора вынуждены повышать эффективность и производительность труда, используя новые технологии и оборудование. Переход к рыночным отношениям в секторе инвестиций в человеческий капитал акцентируется важнейшими последствиями и ведет, в конечном счете, к усилению конкуренции. Такие прогнозируемые изменения создадут условия для полномасштабных преобразований. Новая, формирующиеся модель экономического роста предполагает проведение нового этапа реформ в высшем образовании. Они способны пробудить силы, скрытые в человеческой личности и определяют составляющие особенности человеческого капитала.

Ключевые слова: усиление, образование, человеческий капитал, развитие, конкурентоспособность, потенциал

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АДАМ КАПИТАЛЫНЫҢ САПАСЫН ҚЫСҚАСЫНЫҢ ПЕРСПЕКТИВАЛАРЫ

Аннотация. Авторлардың пікірінше, жыл сайын адами капиталдың сапасы артып, экономиканың мемлекеттік емес секторында жұмыс істейтін мамандардың үлесі артады. Еңбек нарығындағы бәсекелестік ортаны көтеру жұмыс берушілерді жоғары жалақыға мәжбүр етеді. Мұндай жағдайда жеке сектордағы кәсіпорындар жаңа технологиялар мен жабдықтарды пайдалану арқылы тиімділікті және өнімділікті арттыруға мәжбүр. Адами капиталға инвестиция салудағы нарықтық қатынастарға көшу басты салдарлармен ерекшеленеді және сайып келгенде, бәсекелестіктің артуына алып келеді. Мұндай болжамды өзгерістер толық ауқымды өзгерістерге жағдай жасайды. Экономикалық өсудің жаңа, дамып келе жатқан моделі жоғары білім берудегі реформалардың жаңа кезеңін болжайды. Олар адамның жеке басының жасырын күштерін оятуға және адам капиталының құрамдас бөліктерін анықтауға қабілетті.

Түйін сөздер: білім беру, адам капиталын дамыту, бәсекеге қабілеттілік, әлеует

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ASSESSMENT OF SOCIO-ECONOMIC DEVELOPMENT AND ENVIRONMENTAL SECURITY OF THE REGION (ON THE EXAMPLE OF ATYRAU REGION)

Abstract. The socioeconomic development of the region is an integral part of the development of the national economy. Adaptations of various processes of effective management of economic entities occur, as a rule, at lower levels of socioeconomic systems. The study of best practices in the development of regions is relevant and in demand in the current economic conditions. Such economic development leads to the emergence of environmental problems, impedes the sustainable development of the region. Problems arise when the anthropogenic load on the territory of Atyrau region exceeds its ecological capabilities, due to the natural resource potential and the general stability of natural complexes to man-caused stresses. The development of the economy is connected with the impact on the environment, as the creation of new and expansion of existing production leads to positive economic and social results, but it also has negative aspects, in particular, the environmental situation may worsen. Therefore, an important scientific problem is the assessment of the impact of economic development on the environment. The article deals with the concept of social and economic potential. The urgency of the social and economic development of the region is determined. The calculations of the change in the gross regional product per capita, the structure of the GRP, and the indices of the volume of industrial production in the Atyrau region were made. Also, the main constituent elements of the environmental safety of the region were identified, and the ecological and economic situation of the region was assessed.

Key words: Socio-economic potential, economic development, industrial production, environmental safety, environmental problem.

Introduction. The socio-economic potential is one of the basic concepts of the economy, reflecting the real state of things, as well as the prospects for the development of various sectors of the regional economy. The fundamental characteristic visually representing the development of the economy is the increase in economic potential. In calculating this indicator, in addition to the generally accepted volume, quality and competitiveness of the products, it is necessary to take into account the development of the economic system itself, which ensures stable, efficient functioning, as well as prospects for the future. In the system of the national economy, production and regional organization, the economic potential is the material basis[1].

As we have mentioned above, the economic development of the region is the main indicator of its dynamics. Thus, it should be noted that the efficiency management of the regional development should be aimed at the rational use of the economic potential, i.e. to maximize efficiency with limited resources. In addition, the region's economic potential is not a constant. This indicator in most cases changes during the discovery of new deposits or new types of mineral resources and according to the statistics of the last decade the economic potential of the region is largely influenced by innovations. As the process of assessing innovations is difficult to perform it is proved to be not permanent, so respectively the economic potential is not constant.

Methods of study. To disclose the content of the paper and achieve the goals set by the given study, the following methods have been used: analysis and comparative study, integrated economic and ecological as well as system analysis.

Results obtained. With its huge economic potential Atyrau region plays a significant role in the socio-economic development of Kazakhstan. The number of companies with foreign investments is increasing annually and at the present the region cooperates with about 1000 companies from more than 50 countries. Such cooperation demands new forms of modern management, the latest world technologies and promote the development of business and other types of tourism. The region is one of the most balanced ones with the potential for further diversification of the economy. There are great opportunities for further development within the framework of the Eurasian Economic Union, as well as the beneficial proximity to the major Russian industrial areas. The region witnesses dynamic development in petrochemical, machine-building, food and construction industries[2].

Priority directions in economy of Atyrau region are fuel-energy, processing, fish industry and production of building materials. The industrial sector accounts for half of the gross regional product. According to its volume per person Atyrau region is on the first place in the republic. Volume of gross output of products (services) of agriculture, forestry and fisheries in January-March 2018 amounted to 7772.3 million tenge, which is more by 1.8% than in the same period of 2017. The volume of gross regional product for January-September 2017 comprised 3842.1 billion tenge at current prices[3].

Table 1 - Index of the physical volume of industrial products

	Index of the physical volume, %		The share in the total volume of industrial production January –July, 2018.
	January –July, 2018 by January –July, 2017	July, 2018 By July, 2017	
Industry, in total	112,5	112,0	100,0
Mining and quarrying	114,2	112,8	91,3
Manufacturing	102,2	104,3	7,7
Power supply, gas, steam and air conditioning	112,9	114,5	0,6
Water supply, sewage system, waste collection and disposal control	90,4	93,8	0,4
Note: the data in Table based on materials by Committee of Statistics of the Republic of Kazakhstan [9].			

The main industrial production is located in the city of Atyrau, as well as in Zhylyoi and Makat districts. The largest oil enterprises of the republic such as NCOC, LLP Tengizchevroil, JSC NC KazMunayGas, JSC ANAKO, JV Matin, CJSC Atyrau Oil Company, JSC KazakhstanKaspiShelf, JSC NIPI Caspimunaigas and others are located in these districts. The oil refining industry is represented by Atyrau Oil Refinery.

Besides, a new central processing facility named Bolashak has been build on the territory of Makat district to exploit Kashagan offshore field oil and gas delivered via pipelines. The share of manufacturing in the total volume of industrial output is insignificant. The agriculture of this region is poorly developed due to difficult natural and climatic conditions, as well as deficient water supplies suitable for the needs of agriculture and livestock. The structure of industrial production by kinds of economic activity of Atyrau region is shown in figure (1).

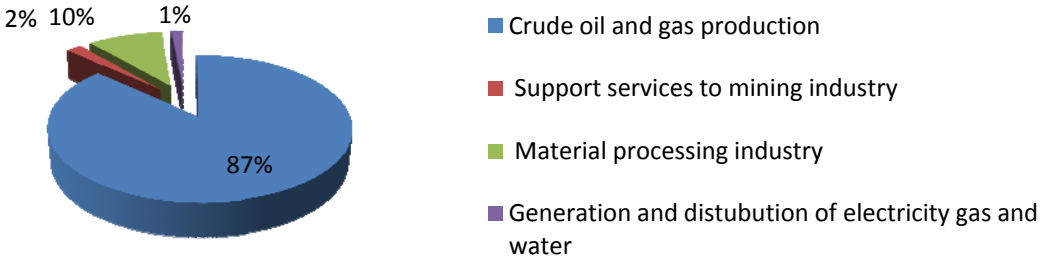

Figure 1 - Structure of industrial production in Atyrau region by January, 2018

Note:The diagram was created by the author on the basis of the materials of the Atyrau region statistics agency[9].

The volume of industrial production in January-March 2018 amounted to 1763811 million tenge in current prices, which is 12.2% more than in January-March, 2017. Physical volume index of industrial output was 114.5% in January 2018 compared with January 2017.

In the republican volume of produced oil products, the share of Atyrau Oblast comprised 65.30%. As part of state programs, the Government of the Republic of Kazakhstan has implemented a set of measures to develop the petrochemical industry by raw hydrocarbon deep conversion investment projects and high-tech industries for the production of petrochemical products with high added value[4].

The dynamics of socio-economic growth in the Atyrau region fully corresponds to the strategic guidelines of the President of the Republic of Kazakhstan, which creates the basis for the competitive development of the region. The largest share in the structure of industrial production is taken by crude oil and associated gas production, oil refining, electricity production and distribution[5].

Within the period of 2012-2017 oil production volume in the Atyrau region increased by 2.3 million tons while associated gas production increased by 1.6 billion per m3. At the same time in 2012 and 2014 there was a decline in oil production, which is associated with a major scheduled repair of production facilities of the second-generation plant, the injection of crude gas and the integrated processing line (KTL-2) of Tengizchevroil LLP. The dynamics of oil and associated gas production in the Atyrau region for 2013-2018period is shown in Figure 2.

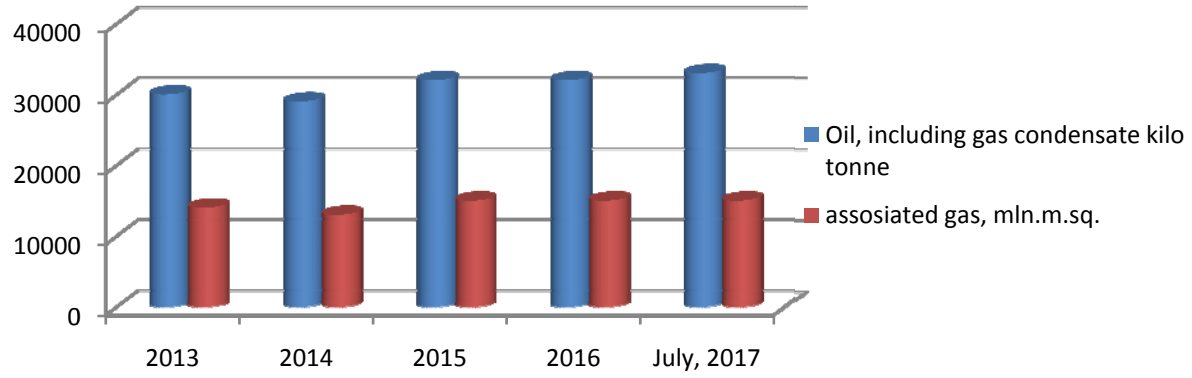

Figure 2- Dynamics of oil and associated gas production in Atyrau region
for 2012–2017 period (July)

Note: The diagram was created by the author on the basis of the materials of the Atyrau region statistics agency[9].

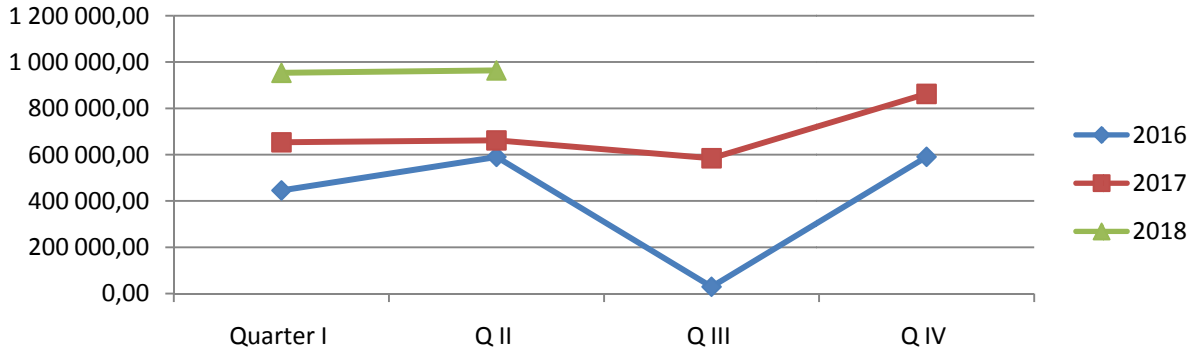

Figure 3 - Financial and economic activities of medium and large enterprises
* as of quarter-end
Note: The schedule was created by the author on the basis of materials of the department of ecology of Atyrau region[10].

As it is known, support of small and medium business is one of the main tasks targeted by our government. In fulfillment of the instructions by the Head of our State, voiced in the Address to the people of Kazakhstan, the Akimat of Atyrau region is carrying out work to provide comprehensive support to small and medium-sized businesses. There is an increase in the indicators of small and medium-sized

businesses, the number of employees in the region is growing steadily. Retail trade volume in January-March 2018 amounted to 63993,3 million tenge and increased in comparison with the corresponding period of 2017 (in comparable prices) by 2.8%. Sales turnover by private enterprises and individual entrepreneurs, including those trading in the markets, amounted to 60171.3 million KZT or 94% for the current year, property sales to foreign legal entities and citizens comprised 3822 million KZT or 6%.

As indicated above, the socio-economic development of Atyrau Oblast involves many sectors of the economy affecting all processes in the region, as well its stability and security. The efficiency of activities by economic entities and environmental safety is tightly interlinked. A high level of environmental safety can be ensured by a high level of production efficiency, contributing to establishment of enterprise resources channeled to finance environmental protection and human health protecting measures. On the other hand, a high level of environmental safety contributes to an increase in production efficiency by ensuring a reduction in morbidity and mortality rates, the growth of fertility and reproduction of resources of all kinds. There is a certain contradiction connected with the economic interests of business entities[6].

Along with the positive moments for the economy and social services, there are some negative aspects. Advanced level of industrial production and rapid growth of extractive industry have led to irreversible environmental consequences in the region. So, for example, exploitation of transport, plants and facilities using fuel and energy containing coal, oil or gas is the source air pollution in the region. The main pollutants of the atmosphere are automobile transport, thermal power plants, ferrous and non-ferrous metallurgy enterprises as well as oil and gas processing, chemical and other industries. Air pollution remains one of the leading environmental impact factors that have a negative impact on the natural environment. Emissions of local industrial enterprises to the atmosphere are more than one hundred thousand tons per year, 80-85% of which falls on the oil and gas sector. According to the reporting data of the oil and gas sector, from 9,053,923,507 m3 of associated gas was disposed 9 billion 226 million m3 produced by 12 enterprises in 2017.

Currently, 4 out of 15 oil and gas producing enterprises in the territory of Atyrau region, namely Tengizchevroil LLP, NCOC Company, Samek International LLP, Embamunaigas, flare associated gas, except using it for own needs[7].

Table 2 - General condition of atmospheric air in Atyrau, mg / m³

period	2016					2017				
	pollutants									
	H_2S	SO_2	NO_2	CO	NO	H_2S	SO_2	NO_2	CO	NO
overall	0,004	0,002	0,008	0,4	0,02	0,005	0,002	0,008	0,6	0,02
Threshold limit value.	0,008	0,05	0,04	3,0	0,06	0,008	0,05	0,04	3,0	0,06
Note: The Table was created by the author on the basis of materials of the department of ecology of Atyrau region[10].										

There is an increase in the concentration of H_2S by 0.75 times compared with last year. The total gross amount of pollutants in 2017 was 158.192 thousand tons, including 144.746 thousand tons of emissions from stationary sources and 13.446 thousand tons from mobile sources.

The analysis shows that of the total volume of emissions the main share in air contamination of the region is taken by the enterprises of the oil and gas production and oil refining.

Therefore, for today the problem of atmosphere contamination mainly depends on the activities of enterprises engaged in oil and gas production, its processing and transportation.

According to reporting data 4,556.578 thousand tons of waste were accumulated in 2017(, 4,298.475 in 2016), in the region including sulfuric of 154,226 thousand tons (in 2015 - 9,983), production waste of 776,207 thousand tons (in 2016 1,303,922) and solid domestic waste was 3,626.504 thousand tons (in 2016 2,957,570). Generally, production wastes are formed in the result of oil and gas development, storage and transportation of hydrocarbon raw materials and construction works. In general, production waste is the result of the development of oil and gas fields, storage and transportation of hydrocarbon raw materials, as well as construction works[8].

Table 3- Volume of emissions to the environment (2017) tenge

All enterprises of the region	Authorized volume, tons year	Actual volume, tons year	Excess, tons year
JSC KaztransOil ZF ANU	19542,710	10,487	
CPC-K	4,102829	1,471599	
ANPZ LLP	16574,0	6,035	0,5694
JSC Embamunaigas	5959,675	4940,0	8,954210
TCO LLP	77,296	33,277	0
NCOC	208667,2738	76407,8	
Sazankurak LLP	102,802	64,4	
Prikaspian Petroleum Company LLP	96,0795	56	
Embamunay LLP	37,173316	26,788	
AF TOO Kozhan	257,32353	192,836762	
JSC Caspian Oil	925,3333	411,0	
Embavedoil LLP	67,0123216826	54,686	
Tobearal Oil LLP	76,75505266	4,6324569	
AO Matin Petroleum	416,0094087	152,2899878	
Anako JSC	401,065	0,2	
AFC Alties Petroleum International B.V.	463,7652114	216,3387	
UMG Atyrau AO ICA	137,9905247	8,620866	
AOEC JSC	6446,9568	3970,0	
Svetland Oil LLP	40,199	28,8	
LLP CaspiPromStroyNedvijimost	361,38969051	32,816	
Sagiz Petroleum LLP	1106,75	240	
TOO Trans Oil Terminal	167,12003124792	0,05633346	
KGP Spetsavtobaza	8724,441837090	27,65390215	
JSC Kaztransoil PF LPDS Kigach	42,18	13,79	
Kaztransoil JSC ZFBPTO and KO Atyrau	12,933	12	
Caspian ecology LLP	160,2113215	52,79166	
Gural LLP	47,9283233	10,430	
Note: The Table was created by the author on the basis of materials of the department of ecology of Atyrau region[10].			

Thus, the uncontrolled activity of oil companies poses a potential danger for the development of the region and is one of the main environmental problems.

Conclusion. The environmental safety of the Atyrau region has been exposed to a number of serious threats, including the most basic ones such as: soil degradation, man-made desertification; depletion and pollution of water resources; air pollution; deforestation; irreversible reduction of biological diversity; destruction of the genetic fund of wildlife; activation of natural disasters and life-threatening industrial accidents; accumulation of toxic waste. Taking into account the increasing volumes of oil produced in the oil and gas fields of the Atyrau region and the Caspian shelf, and as a consequence, increasing the impact of the anthropogenic factor on the environment of the region, the problem of environmental safety of the Atyrau region becomes more and more important every year. Current funds allocated to the environmental activities of the region are included in the cost of production, and in terms of investments, are financed from enterprise profits. In any case, these costs lead to a decrease in the amount of profit that remains at the disposal of enterprise and in particular is supposed to be distributed among owners. This circumstance becomes a brake on the implementation of effective environmental projects. But on the other hand, cutting back on environmental measures ultimately leads to serious social and economic consequences, which reduce the efficiency of production, and hence the profit claimed by the owners[11].

To improve control over the state of environmental security, a set of legislative, regulatory and institutional measures are required. The following measures are proposed to be implemented:

-The international cooperation;

- Legal maintenance of ecological safety;
- Normative maintenance of ecological safety;
- Information support of ecological safety;

Thus, the solution of any environmental problems is practically inseparable from the economic ones; while irrational nature management leads to economic losses, and the lack of funds prevents to cope with environmental problems.

Despite the fact that environmental safety issues are the subject of attention of many scientists and

experts, the essence of environmental safety as an economic category remains insufficiently studied. It is necessary to emphasize the basic role of the economic component or economic basis in solving environmental problems and ensuring environmental safety, which is confirmed by a number of researches.

The ecological problem is a problem not of one state, but of the whole planet. The world is now striving for the principle of sustainable development, i.e., ensuring balance between solving social and economic problems and preserving the favorable state of the environment.

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АЙМАҚТАҒЫ ӘЛЕУМЕТТІК-ЭКОНОМИКАЛЫҚ ДАМУДЫ ЖӘНЕ ЭКОЛОГИЯЛЫҚ ҚАУІПСІЗДІКТІ ҚАМТАМАСЫЗ ЕТІЛУДІ БАҒАЛАУ (АТЫРАУ ОБЛЫСЫ МЫСАЛЫНДА)

Аннотация: Аймақтың әлеуметтік-экономикалық дамуы ұлттық экономиканың дамуының ажырамас бөлігі болып табылады. Экономикалық субъектілерді тиімді басқарудың түрлі үдерістерінің бейімделуі, әдетте, әлеуметтік-экономикалық жүйелердің төменгі деңгейлерінде орын алады. Аймақтар дамуының озық тәжірибесін зерттеу мәселелері қазіргі заманғы шаруашылық жағдайында өзекті және сұранысқа ие болып отыр. Мұндай экономикалық даму экологиялық мәселелердің туындауына алып келеді, аймақтың тұрақты дамуына кедергі келтіреді. Мәселелер Атырау облысы территорясында антропогендік жүктеме табиғи ресурстық әлеуетіне негізделген және техногендік жүктемелерге табиғи кешендердің жалпы тұрақтылығына байланысты экологиялық мүмкіндіктерінен асып түскен кезде туындайды. Экономиканың дамуы қоршаған

ортаға әсер етуімен байланысты, себебі жаңа өндіріс құру және өндірістің кеңеюі оң экономикалық және әлеуметтік нәтижелерге алып келеді, бірақ оның сондай-ақ теріс жақтары да бар, атап айтқанда, экологиялық ахуал нашарлауы мүмкін.Сондықтан маңызды ғылыми мәселе экономикалық дамудың қоршаған ортаға әсерін бағалау болып табылады. Мақалада әлеуметтік және экономикалық әлеует тұжырымдамасы қарастырылады. Мақалада әлеуметтік және экономикалық әлеует тұжырымдамасы қарастырылады. Аймақтың әлеуметтік-экономикалық дамуының өзектілігі анықталған. Жан басына шаққандағы жалпы өңірлік өнімнің өзгерісі, ЖӨӨ құрылымы және Атырау облысындағы өнеркәсіптік өндіріс көлемінің көрсеткіштері есептелген. Сондай-ақ, аймақтың экологиялық қауіпсіздігін құраушы негізгі элементтері анықталған, аймақтың экологиялық-экономикалық жағдайы бағаланған.

Түйін сөздер: Әлеуметтік – экономикалық әлеует, экономикалық даму, өнеркәсіптік өндіріс, экологиялық қауіпсіздік, экологиялық мәселе.

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ОЦЕНКА СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ И ОБЕСПЕЧЕНИЯ ЭКОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ РЕГИОНА (НА ПРИМЕРЕ АТЫРАУСКОЙ ОБЛАСТИ)

Аннотация: Социально-экономическое развитие региона является неотъемлемой частью развития национальной экономики. Адаптации различных процессов эффективного управления хозяйствующими субъектами происходят, как правило, на более низких уровнях социально-экономических систем. Исследование передового опыта развития регионов является актуальным и востребованным в современных условиях хозяйствования. Подобное экономическое развитие ведет к возникновению экологических проблем, препятствует устойчивому развитию региона. Проблемы возникают в том случае, когда антропогенная нагрузка на территорию Атырауской области превышает ее экологические возможности, обусловленные природно-ресурсным потенциалом и общей устойчивостью природных комплексов к техногенным нагрузкам. Развитие экономики связано с воздействием на окружающую среду, поскольку создание новых и расширение существующих производств ведет к положительным экономическим и социальным результатам, но имеет и отрицательные стороны, в частности может ухудшаться экологическая обстановка. Поэтому важной научной проблемой является оценка воздействия экономического развития на окружающую среду. В статье рассмотрено понятие социально - экономического потенциала. Определена актуальность оценки социально - экономического развития региона. Произведены расчеты изменения валового регионального продукта на душу населения, структура ВРП, показатели объема промышленного производства Атырауской области. А также выявлено основные составляющие элементы экологической безопасности региона, оценивается эколого-экономическое ситуация области.

Ключевые слова: Социально-экономический потенциал, экономическое развитие, промышленное производство, экологическая безопасность, экологическая проблема.

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STATE BUDGET AS THE LEADING LINK OF THE FINANCIAL SYSTEM OF THE STATE

Abstract. It is common knowledge that the efficiency and effectiveness of the state's functions are largely dependent on the construction of an appropriate public financial management system. One of the main tasks of public finance management is to contribute to the sustainable and efficient economic development of the country through the optimization of intergovernmental fiscal relations.

In the Republic of Kazakhstan, a cooperative model of inter-budgetary relations was adopted, characterized by the existence of own and regulated taxes for each level of the budget system, increased responsibility of the center for the state of local budgets and an allowable-justified restriction on the actual independence of local authorities in matters of external borrowing. Also, a developed mechanism for the redistribution of financial resources between the levels of the budget system through transfers.

Keywords: state budget, economy, finance, taxes, system, law.

INTRODUCTION

The state budget is an important link in the country's financial system. Reflecting the content of the processes of production and distribution of social product and national income, the budget is an economic form of education and use of the centralized centralized fund of state funds. The state budget actually embodied the principle of financial centralization, which is carried out by the state.

Centralized financial resources allow the state to ensure the planned rates and proportions of social reproduction, to seek improvement of its sectoral and territorial structure, to form the necessary means for the initial development of the progressive branches of the economy, and to carry out major social transformations. Thanks to financial centralization, monetary funds concentrate on decisive sectors of economic and social development, preparing the conditions for the successful implementation of the state's economic and social policy. Centralization of monetary funds is necessary for the organization of an uninterrupted circulation in the scale of the national economy in order to ensure the functioning of the economy as a whole.

MAIN PART

The existence of a specific budgetary sphere of value distribution is also conditioned by the nature and functions of the state. The state needs centralized funds to finance priority sectors, to carry out socio-cultural activities throughout the society, to solve problems of a defensive nature, to cover the general costs of state administration. Thus, the existence of the state budget is not the result of people's subjective desire, but an objective necessity conditioned by the needs of expanded reproduction, nature and functions of the state.

The budgetary system is a set of all types of budgets based on economic relations and legal norms. The Budget Code of the Republic of Kazakhstan includes the National Fund.

The composition and structure of income and expenditure depend on the direction of implementation of the budget and tax policy of the state, implemented in specific socio-economic and historical conditions. As a rule, the source of income is tax revenues, as well as received official transfers, that is, funds received from lower-level government bodies and funds from abroad on an irrevocable basis (grants).

The parliament as a whole and its individual members in this phase can influence the budget, taking into account public reports and recommendations on the past, present and future budgets, as well as through negotiations with political parties over the level of expenditures.

The parliament considers the budget proposals received from the government. Most parliaments have the authority to amend these proposals during the review. After this procedure, the budget is adopted as a law.

The law on the budget is implemented by the executive branch of the government, usually with little parliamentary participation, although the parliament can authorize additional deductions for certain operations.

Execution of the executive power of the budget is subject to careful evaluation by independent auditors, the Accounts Chamber and the Parliament.

In practice, there is a partial overlap of these phases, which sometimes results in the situation when it is necessary to simultaneously consider several budgets. For example, future budget expenditures can be prepared simultaneously with the implementation of the budget of the current fiscal year, which is an estimate of the previous fiscal year.

The budget legislation of the Republic of Kazakhstan is based on the Constitution of the Republic of Kazakhstan, consists of the Budget Code and other normative legal acts, the adoption of which is provided by the Budget Code.

If an international agreement ratified by the Republic of Kazakhstan establishes other rules than those contained in this Code, the rules of the international treaty.

Acts of the Government of the Republic of Kazakhstan and local executive bodies on the allocation of money respectively from the republican and local budgets for the next financial year shall cease to be effective after the end of the relevant fiscal year, with the exception of the provisions of these acts on the allocation of money on a returnable basis.

The actions of the annexes to the law on the republican budget (the decision of the maslikhat on the local budget) for the second and third years of the planning period become invalid with the enactment of the law on the republican budget (maslikhat decisions on the local budget) for the next planning period.

The law on the republican budget, the decision of the maslikhat on the local budget, acts of the Government of the Republic of Kazakhstan and local executive bodies on their implementation, as well as regulatory legal acts on introducing amendments and additions to them are introduced from January 1 of the corresponding fiscal year.

Draft laws that provide for reduction of revenues or increase in expenditures of the republican and local budgets may be submitted to the Majilis of the Parliament of the Republic of Kazakhstan only if there is a positive conclusion of the Government of the Republic of Kazakhstan. Conclusion of the Government of the Republic of Kazakhstan is formed taking into account the proposals of the Republican Budget Commission.

For draft laws submitted to the Majilis of the Parliament of the Republic of Kazakhstan as a legislative initiative of the President of the Republic of Kazakhstan, the existence of such a conclusion is not required.

The provisions of the draft decrees of the President of the Republic of Kazakhstan and the resolutions of the Government of the Republic of Kazakhstan providing for an increase in expenditures or a reduction in the incomes of the republican or local budgets are subject to mandatory review by the Republican Budget Commission.

The provisions of these acts may be put into effect not earlier than the next financial year, provided that the positive conclusions of the Government of the Republic of Kazakhstan, taking into account the proposals of the Republican Budget Commission, are given in the first half of this year.

If positive conclusions are given in the second half of this year, then these provisions can be put in

place not earlier than the fiscal year following the planned.

Draft decisions of local representative bodies that provide for increasing expenditures or reducing revenues of local budgets can be submitted for consideration to maslikhats only if there is a positive conclusion from the akim. The conclusion of the akim is formed taking into account the proposals of the appropriate budget commission.

In the Republic of Kazakhstan, state and consolidated budgets, the regional budget, used as analytical information and not subject to approval.

The state budget is the centralized money fund of the state, which unites the republican and local budgets without taking into account the mutually extensible transactions between them.

Consolidated budget is the centralized money fund of the state, which unites the republican budget, the budgets of the regions, cities of republican significance, the capital and receipts sent to the National Fund of the Republic of Kazakhstan, without taking into account the mutually extinguished transactions between them. The budget of the region is a centralized monetary fund that unites the regional budget, budgets of districts (cities of regional significance), without taking into account the mutual-ex- panded transactions between them.

In case of full use of the money provided for in the reserve, the Government of the Republic of Kazakhstan or the local executive body shall, if necessary, submit proposals to the Parliament of the Republic of Kazakhstan or the corresponding maslikhat to increase the reserves of the Government of the Republic of Kazakhstan or local executive body by introducing amendments and additions to the law on republican budget or decision maslikhat on the local budget.

To begin with, the main objective of intergovernmental fiscal relations within the framework of state regulation is to equalize the budgetary provision of all levels of budgets and provide the executive with the same level of public services throughout Kazakhstan.

Achievement of this goal is possible only through a centralized one, based on the subordination of the interests of a particular region or region to the interests of the state, the distribution of income and expenditure between the levels of budgets. And there is such a mechanism for regulating intergovernmental fiscal relations: the types of income that are enrolled in the republican and local budgets, and the costs incurred in all directions of public services, are legislatively determined. At the same time, the transfer of expenditures or types of revenues from one level of the budget to another is possible only through extra-¬ tion of changes and amendments to the budget legislation and regional (district) maslikhat does not have the authority to decide independently the issues of the qualitative change in the revenue and expenditure parts of the budget on the territory entrusted.

Further. If on the basis of tax and non-tax revenues, as well as proceeds from the sale of fixed capital, state regulation is limited by the establishment of a certain list without specifying amounts, then the amount of budgetary subventions and withdrawals is set in absolute terms for a three-year period. At the same time, the volumes of transfers between the republican budget and the regional budget are approved by the law of the Republic of Kazakhstan, and between the regional and district - by the decision of the regional maslikhat. The determining role and prevalence of the higher level of the budget over the lower.

As a consequence, bringing the volume of transfers to the districts of the region is directly dependent on the total volume of transfers established in the region. For the sake of completeness, it should be noted that the availability of a list of taxes and fees, the taxable base, the calculation methodology allows you to determine and for them the forecast indicators in absolute amounts.

That is, the total volume of local budgets, within which a standard set of public services is provided, is actually brought upward: from top to bottom. And the independence of subordinate budgets, as a rule, is to maximize the size of subventions at the stage of formation of the above-mentioned budget indicators, thus reducing the amount of withdrawals, as well as tax and non-tax revenues. And this depends, first of all, on the professional qualities of the heads of local budgets, their personal relationships with the administrators of higher budgets, the deputies of the Parliament representing a particular region.

The next point in intergovernmental fiscal relations that needs to be addressed is the timing of the consideration and approval of the respective budgets by various levels of government that confirm certain limited actions of lower-level budgets.

Thus, the draft of the republican budget is submitted to the Government no later than August 15; The government, in turn, to the Parliament - no later than September 15; the draft of the regional budget in the akimat of the region - no later than October 1; regional akimat in maslikhat of the region - no later than October 15; the draft of the district budget to the akimat of the district - no later than October 15; Akimat of the district in Maslikhat - no later than November 1. The district budget is approved by the maslikhat of the district no later than two weeks after the approval of the regional budget, the latter - no later than two weeks after the approval of the republican budget.

CONCLUSION

Non-confirmation of the regional or district budget, in the presence of the approved republican budget, is also unacceptable for technical reasons, since in this case the central authorized body for budget execution and its territorial units will not be able to distribute the amounts of revenues and expenditures between the levels of budgets and, as a consequence, in a timely manner execute the republican budget and serve the execution of local budgets.

Thus, the conclusion suggests: the regional budgets entirely depend on the indicators of the republican budget, as well as on the norms and provisions of normative legal acts approved by the Parliament and the Government, district ones, respectively, from the regional ones. The right, and rather the responsibility, of local budget management bodies is to ensure a fixed amount of revenues to budget revenue and the quality provision of public services through effective and targeted use of allocated budget funds.

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ГОСУДАРСТВЕННЫЙ БЮДЖЕТ КАК ВЕДУЩЕЕ ЗВЕНО ФИНАНСОВОЙ СИСТЕМЫ ГОСУДАРСТВА

Аннотация. Общеизвестно, что эффективность и результативность выполнения функции государства, в основном, зависит от построения соответствующей системы управления государственными финансами. Одной из главных задач управления государственными финансами - способствовать устойчивому и

эффективному экономическому развитию страны посредством оптимизации межбюджетных отношений.

В Республике Казахстан была принята кооперативная модель межбюджетных отношений, характеризующаяся наличием собственных и регулируемых налогов для каждого уровня бюджетной системы, повышенной ответственностью центра за состояние местных бюджетов и допустимо-оправданное ограничение фактической самостоятельности местных органов власти в вопросах внешних заимствований. Также, установлен развитой механизм перераспределения финансовых средств между уровнями бюджетной системы через трансферты.

Ключевые слова: государственный бюджет, экономика, финансы, налоги, система, закон

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МЕМЛЕКЕТТІҢ ҚАРЖЫЛЫҚ ЖҮЙЕСІНІҢ ҚҰРЫЛЫСЫ МЕМЛЕКЕТТІК БЮДЖЕТІ

Аннотация. Мемлекеттің функцияларының тиімділігі мен тиімділігі негізінен тиісті мемлекеттік қаржылық басқару жүйесін құрудан тәуелді екенін біледі. Мемлекеттік қаржыны басқарудың негізгі міндеттерінің бірі - мемлекетаралық фискалдық қарым-қатынастарды оңтайландыру арқылы елдің тұрақты және тиімді экономикалық дамуына үлес қосу.

Қазақстан Республикасында бюджетаралық қатынастардың кооперативтік үлгісі қабылданды, ол бюджеттің әрбір деңгейіне меншікті және реттелетін салықтардың бар болуы, жергілікті бюджеттердің мемлекет үшін жауаптылығын арттыру және сыртқы қарыз алу мәселелерінде жергілікті билік органдарының тәуелсіздігі туралы жол берілетін негізді шектеулер. Сондай-ақ, бюджет жүйесінің деңгейлері арасындағы қаржы ресурстарын қайта бөлу арқылы дамыған тетік.

Түйін сөздер: мемлекеттік бюджет, экономика, қаржы, салық, жүйе, заң

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FORMATION AND DEVELOPMENT OF INFORMATION SOCIETY IN THE CONTEXT OF ITS IMPACT ON QUALITY OF POPULATION LIFE

Abstract. The aim of the work is to study the issues of the influence of the information society on the quality of life of the population. The goal set in the article was implemented using a systematic approach, methods of scientific abstraction, analysis and synthesis, comparison. The article substantiates the concept of the formation of the information society on the basis of a critical analysis of the most significant works on the issue under study. The study of existing different definitions of the concept of "information society" allowed the authors of the article to highlight the universal characteristics of the information society, recognized by all scientists in a certain measure. Particular attention is paid to the issues of the influence of information technologies on various spheres of human life. There are also nine main trends in the development of the modern information society, which were supported by real examples.

Keywords: quality of life of the population, information society, information and computer technologies, Internet of things.

The work of the Austrian and American economist F. Machlup "The production and distribution of knowledge in the United States" [1] which was published in 1962 has contributed to the formation of the information society concept. In his work, Machlup justifying the role of knowledge in production, first used the term "knowledge industry". As a confirmation of his hypothesis, he cited the fact that in the US knowledge production provides 29% of GNP. Such a significant discovery of Machlup brought fame to his work around the world. In 1969 encouraged by the idea of Machlup, P. Drucker constructed the concept of "knowledge society", and a year later many researchers began to use the term "information society" .

Japanese scientists have made a certain contribution to the study of the concept of the information society on an equal basis with American scientists. The most interesting work was presented by I. Masuda ("Information society as a post-industrial society") [2], who described in detail the consequences of the information technology revolution for the economy and society as a wholeAccording to Masuda, information technology is created with the aim of replacing or strengthening the mental labor of a person. In the future, information technology will become a new production force, and subsequently mass production of information and new technologies will be established. Over time, existing boundaries will blur in such a society, classes will disappear. The main difference between the information society and the indus-trial Masuda outlined the highest value of time, not goods and anything else.

From the point of view of the influence of information technology on society, the work of M.McLuhan "The Gutenberg Galaxy" [3] is of particular interest. The paper analyzes the consequences of the creation of the print press, which consisted in the emergence of new communication strategies.

The latter, by the way,had an impact on the political, economic, social development of society and its institutions. Further, McLuhan, after studying the the impact of television on industrial society, came to

the following conclusion: "... television suppressing the printed culture has become an important element of the global information network and has transformed the world into a" global village ". In our view, this is McLuhan's prediction that is suitable for describing the idea of a global information society.

By the end of the last century, the use of the term "information society" began to go beyond the lexicon of computer science specialists, and politicians, economists, teachers and scientists began to use it more and more often. The latter associated this concept with the possibilities of information and telecommunication technologies, which would make it possible to carry out a new evolutionary leap towards a new type of civil society – the information society.

At present, there are many different approaches, concepts and theories describing the phenomenon of the information society. Thus, in modern social and humanitarian science, the information society is understood as the concept of post-industrial society; the historical phase of civilization development, in which the main products of production are information and knowledge [4].

O.N. Vershinskaya in her work cites a different formulation: "a step in the development of modern civilization, characterized by an increase in the role of information and knowledge in the life of society, an increase in the share of information goods and services in the gross domestic product, the emergence of a global information space that ensures effective interaction of people and access to global information resources and meet public and personal information needs " [5].

Professor J.Martin gave a more detailed formulation of the concept of "information society" for the first time: "this is a society, the most important indicators and prospects of which are directly related to the effective use of information. Standards of quality and living standards, production and consumption systems, education and leisure, social security, management and interaction of the main components of the social structure as a whole in a society of this type are closely dependent on the development of information and cognitive components "[6].

In the book "Virtual New World", prepared for the 1997 Parliamentary Assembly of the Council of Europe, the information society is interpreted as "information-based society". On the basis of this definition, virtually all defini-tions were built, expanded and refined. As a difficult and complex phenome-non, the information society can not be described in one sentence. In the in-formation society, quantitative indicators of computer and communication technologies do not play a special role, and qualitative indicators lie in the abil-ity to use these technologies in various spheres of life to facilitate, replace and enhance human labor and intelligence. In the information society, information becomes the main economic resource, and time is the main value.

Despite the existence of various definitions of the term "information society", it is possible to identify some universal characteristics that are recognized to a certain extent by all researchers.

First, the foundation of the information society is the accelerated development and dissemination of information and communication technologies in various spheres of human activity and society as a whole. Secondly, in the information society the role of knowledge in obtaining and using information is very great, because knowledge becomes the main competitive advantage in the information society.

Thirdly, the information society has a global character, where the information exchange does not interfere with either temporal or spatial or political barriers. BFourthly, the information society is experiencing the interpenetration of different cultures, as well as new opportunities for self-realization of citizens.

Thus, in brief, the term under study can be defined as follows: information society is a new type of society that functions with the accelerated and all – inclusive development, dissemination and convergence of information and communication technologies in the global environment.

Under the influence of accelerated development and dissemination of in-formation and communication technologies, the economic structure of the mass media, culture, graphic sector is being transformed. This transformation is closely linked to globalization, the main characteristics of which are the liberal-ization of international trade, the expansion of foreign direct investment and the emergence of massive cross-border financial flows that were caused by the impact of new technologies [7].

The economy is spontaneously transformed into a network, i.e. "contin-uously current space of flows", gaining the ability to generate continuous up-dates. Nonlinear forms of communication with erased spatial and temporal boundaries arise [8]. Mass online contacts nullify social distances, generating

huge flows of information and a situation of continuous change, often per-ceived as a tyranny of the moment [9].

Companies in the field of telephony, television, software, traditional publishing, etc.are increasingly forced to develop content in a convergent mul-timedia environment. There has been an increase in personalized services, such as "narrow broadcasting" over the Internet, paid views, subscriptions, access to newspaper publications and other archival services. There is an integration of the activities of various media. So, increasingly under a single label multi-national conglomerates offer services for the production of cinema, music, print publishing, commercials, etc.

Recently, consumers in many countries have been spending significant amounts of money on gadgets and entertainment based on the use of infor-mation technology. At present, there is an almost unlimited choice of digital quality images and sounds for those who can afford access to them. A signifi-cant increase in subscriber services for television has increased their revenues from advertising sources. New markets for films, television programmes and additional Internet services continue to be developed.

Despite the huge variety of media and entertainment products, they all have knowledge. Writers, editors, performers, designers, technicians, manufac-turers and others create the idea and realize it by investing in it the ingenuity and technological complexity that make each product or service unique. Syn-ergy of creative talents, diverse skills and knowledge of information technolo-gies - together increases the value of printed, broadcast, electronic products, films, disks and Internet services that consumers pay for.

Thus, the mental activity of a person using information technology is es-pecially important in the economic life of society. This point of view was shared by such scientists as D.Bell [10], M. Castells [8], E.Toffler [11], who among other things, studied the epochal significance of the emergence of the information society, the impact of information technology on social and politi-cal phenomena, etc.

The development of information technologies and informatization of society affects virtually all spheres of human life. Therefore, the consequences of informatization of society are diverse.

First, as a result of Informatization of society, the social structure of so-ciety is changing – the number of social groups is increasing and their number is decreasing, their ratios are changing. The number of people engaged in intel-lectual work is increasing. Information becomes the main subject of work, in-formation services appear.

Secondly, the information advantage that contributes to the redistribu-tion of economic, social and political resources leads not only to information differentiation of society, but also to social and economic imbalance. For this reason, with the introduction of new technologies, the primary objective of the state should be to ensure equal access to them for all citizens.

Information technologies allow socially vulnerable groups of people (people with disabilities, pensioners, single mothers) and people who do not have the opportunity to work outside the home, to continue their work activi-ties. At the same time, the rapid growth and widespread introduction of in-formation technology in almost all spheres of life, requires the mastery of skills to work with them, so that many workers are forced to undergo retraining and training, and in some cases, to change their profession in accordance with the new challenges of the labor market.

With the development of the knowledge economy and the information society, the share of intellectual work in the employment structure of the popu-lation is increasing. With an increase in the mental burden on a person, the demands placed on workers in terms of their professional, psychophysiologi-cal qualities are tightened every year.

In general, we can highlight the following modern trends in the develop-ment of the informatization of society:

1.Turning information into a valuable commodity. Currently, infor-mation flows resemble a river in business and private life. Google describes the result of all the information accessible at any time and from from any place, like the phenomenon "ZMOT - zero moment of truth". This means that the lev-el of transparency in decision-making about purchasing has increased to a high level due to the fact that complete information is becoming more accessible. Currently, there is a growing influence of start-up companies that bring de-structive innovations, making money on the exchange of information or, more precisely, on the direct connection of suppliers and buyers. Such a scheme is used by such companies as Airbnb, Uber, etc.

2. The development of the Internet of things. The Internet of things is the key technology on which digital information is based. At present, the number of physical objects (household appliances, etc.) increases every day, which can be connected to the Internet, thereby making a virtual copy of these things. A virtual copy can contain the parameters of an object and the characteristics of its environment (this is how information is collected). The data obtained allow to manage a physical object remotely via the Internet. Thus, the Internet of things creates a mass of data that turns into information on modern technolo-gies. This trend is based on the evolution provided by constant analysis. Such continuous development of products can generate innovations. Thus, data col-lection and processing allow using new ways of attracting value for business and private life. For example, fitness trackers that support a healthier lifestyle can make life easier for many people. Work and research are underway to de-velop mechanisms that allow things to interact with each other. Such mecha-nisms will allow to achieve automation of interaction on conveyor lines, in lo-gistics systems, in the field of technical repair and maintenance of equipment, etc. To date, there are already thermostats that allow you to regulate the tem-perature in the apartment through the smartphone, while being out of the house. There are also entire cities where the" Internet of things " is part of eve-ryday life. For example, Barcelona can be called Smart City.

3. Artificial Intelligence. Thanks to the capabilities of modern technolo-gies, today such services as language translations, speech recognition, algo-rithms for finding the right solutions - have often been used in everyday life. Progress in this area contributed to the emergence of computers with artificial intelligence. Artificial intelligence is already outperforms human in some areas of knowledge. For example, the Watson service from IBM, which plays chess professionally, makes medical diagnoses, and also replaces people in those ar-eas where the use of computers was previously unthinkable [12]. Google, Amazon and Microsoft offer assistants that can turn on and off lights, ventila-tion or music, report traffic situations, report the latest world news or advise a restaurant nearby on your preference.

4. Matter digitization or 3D modeling. Physical objects are "printed" from raw materials through additive or 3D printing, a process that transforms industrial production, allows the printing of products at home and creates a whole range of opportunities for human health. Today the digitization of mat-ter is carried out by companies in the sphere of service, construction, produc-tion of complex technological products, oil production. The possibilities of 3D modeling can be seen from two aspects: building object models; and filling models with data. The second option of 3D-modeling provides an opportunity to optimize management decision-making processes and establish the relation-ship of product design tools with the means of their production.

5. Augmented reality. This technology allows to add objects to the real world from the virtual world. Although more often used in games with ele-ments of augmented reality, recently it began to use online clothing stores – one can sit in front of the computer and try on clothes, glasses, swimsuits and then to go to the store to buy favorite or order delivery. Augmented reality opens up new opportunities for smartphones - maps filled with interactive da-ta around the world have become a universal tourist tool.

6.Synergy of technologies. The joint application of innovative digital technologies allows not only to change a particular business process, but com-pletely to restructure the industry, having deduced to it a product that was not available before. The most fascinating thing about digital transformation is the changes that are taking place and the possibility of using all these technologies together. Some kinds of technology synergy are so strong that they cause a qualitative change, setting the trajectory of future development [13]. The most productive innovative technologies will be achievable in the symbiosis of tech-nologies of the Internet of things with artificial intelligence. An example is the technology of face recognition and analysis of street cameras.

7. The disappearance and emergence of new professions. The technolog-ical changes have contributed to a significant shift in the employment structure in almost all sectors of the economy: in some areas, employment is declining, some professions are on the verge of extinction. New technologies are replac-ing traditional methods and tools, and skills. As an example, we can consider the impact of The Grid service on the labor market. This service offers to use the services of robot-assistant Molly, who develops sites on different platforms in a very short time without developers and engineers for just one hundred dol-lars a year. With the advent of similar robots, many companies no longer need to hire website

developers, since a robot is cheaper than a person's work, and works faster. In the new York stock exchange instead of hundreds of clerks work a little more than a dozen giant robots, their work is monitored by only a few engineers. It should be noted that those professions that are associated with monotonous, routine work with a lot of unrelated data are subject to dis-appearance. According to the research of the consulting company Boston Consulting Group, in the information society, the employment of the popula-tion will increase by 6% in the first ten years, in the development of mechanical and engineering solutions - by 10%. Specialists with knowledge in the field of programming and IT technologies will be especially in demand [14]. According to the latest foresight forecasts, a package of new breakthrough technologies in the world industry can emerge in ten years, which creates the need for funda-mentally new competencies of workers and consumers [15]. Already, the soci-ety lives in conditions of accelerating "inflation of qualifications," when the competencies that are needed now will lose their value in the future, and there will be a need for completely new ones.

8. Blurring the traditional employment model. The global technological and economic trends of recent years have contributed to the erosion of the tra-ditional employment model, which presupposes a specific employer, an indefi-nite employment contract, full-time employment, clearly defined professional positions and career prospects. Unstable economic environment increases the number of freelancers. According to the research of Upwork and the Union of Freelancers, 55 million Americans worked as freelancers in 2016, representing just over one-third of the American workforceLarge-scale global projects re-quire a flexible workforce. Gradually, the key concepts related to employment in the post-industrial society are replaced by new categories: mobile work-place, flexible schedule, fixed-term employment contract.

9. The predominance of English due to the growing world leadership of the USA in the media and entertainment industry. There is a growing demand for actors, substitutes, journalists with knowledge of English and translators. Today, English has become one of the key requirements for qualified work.

Thus, at present, business and society are faced with serious changes caused by information technologies. As we noted above, informatization will affect people's lives, destroying some old professions and creating many new ones. But the impact of informatization of society on the quality of life of the population is not limited to this and requires more detailed consideration.

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АҚПАРАТТЫҚ ҚОҒАМНЫҢ ТҰРҒЫНДАРДЫҢ ӨМІР СҮРУ САПАСЫНА ӘСЕРІ ТҰРҒЫСЫНАН ҚАЛЫПТАСУЫ МЕН ДАМУЫ

Аннотация.Жұмыстың мақсаты ақпараттық қоғамның тұрғындардың өмір сүру сапасына ықпал ету мәселелерін зерттеу болып табылады. Жұмыста қойылған мақсатқа қол жеткізу үшін жүйелік әдіс, ғылыми абстракциялау, анализ және синтез, салыстыру әдістері қолданылды. Мақалада қарастырылып отырған мәселе бойынша анағұрлым маңызы жоғары жұмыстар талданып, соған сүйене отырып, ақпараттық қоғамның қалыптасуының тұжырымдамасы негізделген. «Ақпараттық қоғам» түсінігінің түрлі дефиницияларын зерттеу арқылы авторлар барлық ғалымдармен нақты бір деңгейде мақұлданатын, ақпараттық қоғамның ерекше қасиеттерін бөліп көрсеткен. Жұмыста ақпараттық технологиялардың адамның өмір сүруінің барлық салаларына ықпал ету мәселелеріне аса назар аударылған. Сонымен бірге заманауи ақпараттық қоғамның тоғыз негізгі даму тенденциялары көрсетіліп, нақты шынайы мысалдармен бекітілген.

Түйін сөздер: тұрғындардың өмір сүру сапасы, ақпараттық қоғам, ақпараттық және компьютерлік технологиялар, заттар интернеті.

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ФОРМИРОВАНИЕ И РАЗВИТИЕ ИНФОРМАЦИОННОГО ОБЩЕСТВА В КОНТЕКСТЕ ЕГО ВЛИЯНИЯ НА КАЧЕСТВО ЖИЗНИ НАСЕЛЕНИЯ

Аннотация. Целью работы является исследование вопросов влияния информационного общества на качество жизни населения.Поставленная в статье цель реализовывалась с применением системного подхода, методов научной абстракции, анализа и синтеза, сравнения. В статье обоснована концепция формирования информационного общества на основе критического анализа наиболее значимых работ по исследуемому вопросу. Изучение существующих различных дефиниций понятия «информационное общество» позволило авторам статьи выделить универсальные характеристики информационного общества, признающиеся всеми учёными в определённой мере. Особое внимание в работе уделено вопросам влияния информационных технологий на различные сферы жизнедеятельности людей. Также выделены девять основных тенденций развития современного информационного общества, которые были подкреплены реальными примерами.

Ключевые слова: качество жизни населения, информационное общество, информационные и компьютерные технологии, интернет вещей.

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STATE BUDGET OF KAZAKHSTAN: PROBLEMS OF FINANCING AND USE

Abstract. The state budget for the purpose of reorienting the economy to large financial investments requires the search for sources of structural changes, the determination of the ratio between state funds in the form of budgetary appropriations and the own funds of enterprises. Despite the annual increase in state budget expenditures, their effectiveness is decreasing. In the authors' opinion, the budget classification of the Republic of Kazakhstan is used to compile and implement budgets and ensure comparability of budget indicators at all levels of the budget system of the Republic of Kazakhstan. Budget classification is a grouping of incomes and expenditures of budgets of all levels of the budgetary system and sources of financing of deficits of these budgets with assignment to classification objects of grouping codes.

Keywords: state budget, problems, finances, incomes, expenses, system.

INTRODUCTION

With a view to macroeconomic stabilization, the financing of the state budget deficit since 1998 was transferred to non-inflationary sources.

An important reform in the budget system of Kazakhstan was the creation of the National Fund and Budget Code of the Republic of Kazakhstan.

Since gaining independence in Kazakhstan, the foundations of a modern public financial management system.

A system of public finances has been created that meets the conditions and requirements of a market economy, the legislative framework for financial support for the activities of public authorities at the central and local levels. Implemented program budgeting and program classification of costs. Fixed income sources with their distribution between the republican and local budgets.

Thus, from the moment of gaining independence in Kazakhstan, the foundations of a modern budget management system have been formed. An integrated system for regulating budgetary legal relations was created, unified principles of the budget system were established, a mechanism for saving oil revenues was introduced, a system of interbudgetary relations.

Annually the current expenses and the volume of subsidies from the state budget for supporting the housing and communal services, transport, agriculture.

At the same time, the taxation policy, which is not accompanied by the growth of the revenue base, may in the long term be inadequate to increasing obligations. In the long run, this could lead to imbalances in public finances.

Effective management of budgetary resources is also hampered by a large number of programs, the implementation of which is assigned to various state bodies.

MAIN PART

In December 2012, in the Address of the Head of State, the people of the country were presented with the Development Strategy of the Republic of Kazakhstan until 2050. Its main goal is the creation of a welfare society on the basis of a strong state, developed economy and opportunities for universal labor, Kazakhstan's entry into the thirty most developed countries of the world.

President of the Republic of Kazakhstan Nazarbayev noted that: "... we should arm ourselves with the new principle of budgetary policy - spend only within our capabilities.

The revenue part of the republican budget is formed from revenues in the form of tax and non-tax revenues, proceeds from the sale of fixed capital and receipts of transfers.

The main part of the revenues of the republican budget is tax revenues: 2013. - 3.5 trillion. KZT - 67.8%, 2014. - 3.66 trillion. KZT - 62%, 2015. - 3.32 trillion. tenge - 54.3%, 2016. - 4.28 trillion tons. - 55.8% of all revenues of the republican budget (the share of tax revenues in the central budgets of developed countries is 80-90%). Despite the increase in the amount of tax revenues in 2017. (approved in the amount of 4.79 trillion KZT), the ratio is reduced to 50.2%. This change is due to an increase in the receipts of transfers, the share of which was: in 2013. - 30.1%, 2014 - 35.6%, 2015 - 42,9%, in 2016 - 40.2%, and in 2017. - 48.74% of all revenues of the republican budget. Non-tax revenues amount to about 2% of the total revenue of the republican budget, and revenues from the sale of fixed capital, as a rule, not more than 0.3%.

Expenditures of the budget are such expenditures of budgetary funds, which are directly related to their development, performance by the state bodies of the functions and powers assigned to them. The main indicator that determines the category of costs is the allocation of budget funds on a non-recurring basis. Comparing costs with other types of costs, such as budget lending, the acquisition of financial assets, repayment and servicing of loans, which, unlike costs, are recurrent, i.e. must be returned to the appropriate budget on certain conditions.

The main share in the expenditures of the state budget is provided by social assistance and social security (20%), healthcare (17%), industrial, agricultural development (15%) and administrative costs (10%).

If we rely on the analyzed data, we can conclude that the Current situation shows a still weak relationship between strategic and budgetary planning. In the case of a more detailed examination, it is necessary to carry out some studies, the main goals of which are:

-Examination of theoretical-methodological approaches, i.e. data analysis

-The identification of problems, as well as ways to solve them

-Development of scientific and practical recommendations

The main objectives of research are:

- To investigate the theoretical and methodological aspects of the content of state budget expenditures
- Conduct an analysis of the execution of the state budget's expenditure side
- Develop proposals on improving the state budget of the Republic of Kazakhstan.

In order to realize these goals and objectives, it is necessary to address the initial understanding of public spending.

Thus, Karl Marx viewed public spending as a method of primitive accumulation of capital. This is a historical process, during which conditions were created for capitalist production. The concept of "initial accumulation of capital" was first introduced in the writings of Adam Smith and developed by Marx in the form of the theory of primitive accumulation.

In turn, George Keynes considered public spending as an instrument of state intervention in the economy in conditions of unstable development.

In the opinion of the same authors I.N. Zhuk, E.F. Kireevoy expenses of the budget represent the costs arising in connection with the fulfillment by the state of its functions.

The budget classification is a systematized grouping of budget revenues and expenditures on homogeneous grounds, which is the basis for all budgetary activities of the state's financial authorities. The budget classification provides a close connection with the plans, forecasts and programs of the state's

economic and social development, with financial plans of the ministry and departments, organizations and institutions; allows to combine individual estimates and financial plans into free estimates and plans, provides a link between master plans and budget lists.

The budget classification provides an opportunity for economic and statistical analysis of revenues and expenditures of the budgets of the RK, ensures the targeting of financial resources.

Budget classification includes:

- classification of budget revenues of the Republic of Kazakhstan;
- functional classification of expenditures of the budgets of the Republic of Kazakhstan;
- economic classification of expenditures of the budgets of the Republic of Kazakhstan;
- classification of sources of domestic financing of budget deficits in the Republic of Kazakhstan;
- classification of sources of external financing of the deficit of the republican budget;
- classification of types of state internal debts of the Republic of Kazakhstan;
- classification of types of state external debt of the Republic of Kazakhstan and state external assets of the Republic of Kazakhstan;
- departmental classification of republican budget expenditures.

The budget classification is uniform for all levels of the budget system and is used in drawing up, approving and executing budgets of all levels and drawing up consolidated budgets of all levels. Legislative (representative) bodies of state power and bodies of local self-government have the right, by their regulatory enactments, to further detail the objects of budget classification, without violating the general principles of building and unifying the budget classification of the Republic of Kazakhstan.

The study of problems related to the organization and development trends and reform of the tax system of Kazakhstan has not only theoretical but also great practical importance. They have historical, social, legal, civil and territorial roots.

The study of the tax system problem is also necessary because in the economic literature there are very contradictory views on such issues as the concept of the tax system, its components (elements) and on a number of other issues, which leads to disagreements in the interpretation of the conceptual apparatus.

In fact, you need to understand everything in order to assess the effectiveness of the use of public resources. And I think that my long-term experience in economic structures, as akim of the city and the region, where I had to control the activity of local executive bodies.

More than 30% of violations were committed due to non-compliance with accounting, the Budget Code, more than 40% - of the branch legislation. At the same time, thanks to the measures taken in recent years, including the improvement of the regulatory framework, the number of violations of the legislation on public procurement and construction activities.

According to the results of audit activities, ineffective implementation of budgetary programs was noted, associated, as a rule, with poor-quality planning, which subsequently adversely affects their implementation, leading to a lack of funds.

Particular concern was the implementation of state and government programs. Last year, the programs "Salamatty Kazakhstan", "Information Kazakhstan-2020", "Road map of business-2020", Program for the development of the agro-industrial complex were checked. These are very important social programs, for which considerable budgetary resources are allocated. However, the state audit showed that there are system gaps in their implementation, including those associated with the selected mechanisms for their execution.

For example, according to the results of the evaluation of the implementation of the state program "Salamatty Kazakhstan" it is established that the measures taken so far do not sufficiently effectively contribute to an increase in the life expectancy of the population, a decrease in maternal, infant and general mortality, HIV and tuberculosis incidence, and an increase in the detection of cancer patients. The situation is complicated by the shortage of medical personnel, especially in rural areas.

Systemic deficiencies are established in such areas as education, state expertise, agriculture and water management, fuel and energy complex and the gas sector, transport. Numerous violations were identified during the conduct of audit activities in the regions. These are the violations allowed in the implementation of investment projects, program documents.

In the Message "The Third Modernization of Kazakhstan: Global Competitiveness", the Head of State stressed that it is necessary to radically improve the efficiency of using budget funds.

CONCLUSION

First of all, the President instructed to check the efficiency of using the funds allocated to the three ministries: labor and social protection of the population, health, education and science. And this is not accidental, since they account for more than 40% of the republican budget, and, most importantly, the activities of these state bodies affect the interests of the everyday life of the country's population.

The state budget is actively used by the state to manage the economy. It plays an important role in increasing the concentration of funds in the most important areas of social and economic development, in improving the sectoral and territorial structure of the economy in accordance with socio-economic development, in accelerating the intensification of production, in implementing a regime of economy in the use of all types of resources. At the same time, the state budget, in all its forms of manifestation and use, acts as a tool for managing the economy and has an integrated impact on social production and as a financial document, an economic lever, and as an incentive.

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ГОСУДАРСТВЕННЫЙ БЮДЖЕТ КАЗАХСТАНА: ПРОБЛЕМЫ ФИНАНСИРОВАНИЯ И ИСПОЛЬЗОВАНИЯ

Аннотация. Государственный бюджет с целью осуществления переориентации экономики на крупные финансовые вложения, требует изыскание источников структурных преобразований, определение соотношения между средствами государства в виде бюджетных ассигнований и собственными средствами предприятий. Несмотря на ежегодный рост расходов государственного бюджета, их результативность снижается. По мнению авторов для составления и исполнения бюджетов и обеспечения сопоставимости показателей бюджетов всех уровней бюджетной системы Республики Казахстан используется бюджетная классификация Республики Казахстан. Бюджетная классификация является группировкой доходов и расходов бюджетов всех уровней бюджетной системы и источников финансирования дефицитов этих бюджетов с присвоением объектам классификации группировочных кодов.

Ключевые слова: государственный бюджет, проблемы, финансы, доходы, расходы, система

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ҚАЗАҚСТАННЫҢ МЕМЛЕКЕТТІК БЮДЖЕТІ: ҚАРЖЫ ЖӘНЕ ПАЙДАЛАНУ МӘСЕЛЕЛЕРІ

Аннотация. Экономиканы ірі қаржы инвестицияларына қайта бағыттау мақсатында мемлекеттік бюджет құрылымдық өзгерістердің көздерін іздестіруді, бюджет қаражаты мен кәсіпорындардың меншікті қаражаты түріндегі мемлекеттік қаражаттың арақатынасын анықтауды талап етеді. Мемлекеттік бюджет шығыстарының жыл сайынғы өсуіне қарамастан олардың тиімділігі төмендейді. Авторлардың пікірі бойынша, Қазақстан Республикасының бюджеттік сыныптамасы республикалық бюджеттің барлық деңгейлерінде бюджеттердің бюджетін қалыптастыруға және іске асыруға және бюджет көрсеткіштерінің салыстырмалығын қамтамасыз етуге пайдаланылады. Бюджеттік сыныптау - бұл бюджет жүйесінің барлық деңгейлерінің бюджеттерінің кірістер мен шығыстарын топтастыру және осы бюджеттердің тапшылығын қаржыландыру көздері топтау кодекстерінің жіктеу объектілерін тағайындау.

Түйін сөздер: мемлекеттік бюджет, проблемалар, қаржы, кірістер, шығындар, жүйе.

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ECONOMY OF CENTRAL ASIAN COUNTRIES

Abstract. The modern world is characterized by instability, a change in balance sheets and a change in the system of international relations. After the collapse of the Soviet Union, Central Asia was at the center of attention of various external forces. The region was at the intersection of interests of both regional and global players. For the world economy, the Central Asian region is interesting, first of all, as a source of raw materials. Oil, gas, coal and metals are currently the most popular exported goods, in turn, agricultural products also provide dynamic growth for last years.

During the quarter century independence Central Asian countries has developed in different ways and trajectories. One has made big economic impulse and other one has slow down and face big crises. But all the time period Central Asian countries have common priorities in economy and development. Because those countries are connected not only by geographically, at the same time culturally, mentally even in some cases economic political issues.

Article is about economic development and tendencies of Central Asian states as whole and separately. Author gives from general to detailed analyses of GDP growth and its structure. On the other hand analyzes investment climate and investment attractiveness of countries. Which explains countries' and region's current economic situation.

Key words: Central Asia, Central Asian economy, economic development, economic growth, investment.

INTRODUCTION

In modern political understanding, Central Asia is Kyrgyzstan, Uzbekistan, Turkmenistan, Tajikistan and Kazakhstan. There are other definitions, in particular - according to the UNESCO version - the region includes Mongolia, Western China, northern India and northern Pakistan, northeastern Iran, Afghanistan, areas of Asian Russia to the south of the taiga zone and five former Soviet republics of Central Asia. We will use a narrower first interpretation of the region and consider the situation in the economies of these post-Soviet Asian republics. To some extent, the socio-economic situation, mentality and cultural background in these countries can be called similar [1].

The Central Asian region has a modest share in the global economy - about 0.3%. With a share in the world population of about 1%, the economy is about 3 times behind in terms of GDP.

The new economic role of this region is caused by a number of factors:

- the region has many valuable resources, primarily large hydrocarbon reserves;
- located in the center of the Eurasian continent, the region plays an important role in maintaining the security and stability of the mainland,
- as well as due to the presence of a wide transport and communication network, the countries of the region use their full potential as transit states.

MAIN PART

For the world economy, the Central Asian region is interesting, first of all, as a source of raw materials. Oil, gas, coal and metals are currently the most popular exported goods, in turn, agricultural products also provide dynamic growth.

According to confirmed data, the total volume of oil reserves in the countries of Central Asia reaches 15-31 billion barrels, and the total volume of natural gas reserves is 230-360 trillion. cubic meters, which

is 7.2% of the world's oil resources and 7% of gas resources. The region ranks 10th in the world in terms of coal mining, and the 19th generation of electricity. It accounts for the large reserves of ferrous, non-ferrous and rare metals, for the total gold production (Uzbekistan - 90 tons, Kyrgyzstan-24, Kazakhstan - 18.9), takes 9th place [2].

The states of Central Asia have a powerful mining, fuel and energy, metallurgical and chemical industries concentrated mainly in Kazakhstan, Uzbekistan and Turkmenistan. In terms of oil production, Kazakhstan ranks first (80 million tons); The second is Turkmenistan (6 million tons) and the third is Uzbekistan (5 million tons). The deposits of natural gas are rich in Turkmenistan, which by reserves ranks second in the CIS after Russia. Deposits of coal are available in all the republics, with the exception of Turkmenistan.

Electric power in the countries of Central Asia is developed relatively well. Kazakhstan produces up to 90 billion kW / h; Uzbekistan is 52-54 billion kW / hour.

Metallurgy is unevenly developed. Kazakhstan is singled out, smelting up to 2.0 million tons of steel per year, and Uzbekistan (0.6 million tons). The polymetallic products are diverse: lead, zinc, copper, chromium (Kazakhstan); lead, zinc, copper, gold, silver, etc. (Uzbekistan)[3].

The chemical industry is concentrated on the production of mineral fertilizers. The exception is Kyrgyzstan, where the chemical industry has not developed.

Mechanical engineering is developing rapidly. It is concentrated in Kazakhstan and Uzbekistan, where cars and trucks, buses are produced [4].

The light and food industries are more or less developed everywhere. Agriculture plays a significant role in the economy of Central Asia. The leading place belongs to agriculture. The main arrays of irrigated land are in Uzbekistan, Turkmenistan and Tajikistan, which specialize in the production of industrial crops and, mainly, cotton. In turn, Kazakhstan and Kyrgyzstan specialize in the production of grain crops. Grain growing is also developed in Uzbekistan.

Sheep breeding occupies a leading position in livestock breeding. This applies to a greater extent to Kazakhstan, Kyrgyzstan, Uzbekistan and Turkmenistan. Breeding cattle is characteristic of suburban areas and densely populated oases.

Table 1 - GDP 2012-2017 by countries, (USD billion)

	2012	2013	2014	2015	2016	2017
Kazakhstan	208	236,6	221,4	184,4	137,3	159,41
Uzbekstan	51,82	57,69	63,07	66,9	67,01	48,72
Turkmenistan	35,16	39,2	43,52	35,8	36,18	42,36
Kyrgyzstan	6,61	7,34	7,47	6,68	6,81	7,56
Tajikstan	7,63	8,51	9,24	7,85	6,95	7,15

The last 3 years, the leader of the region of Kazakhstan, the GDP in US dollars is falling. This is due to both the depreciation of the national currency and the problems in the economy of the republic. The second largest economy - Uzbekistan - on the contrary, is growing steadily.

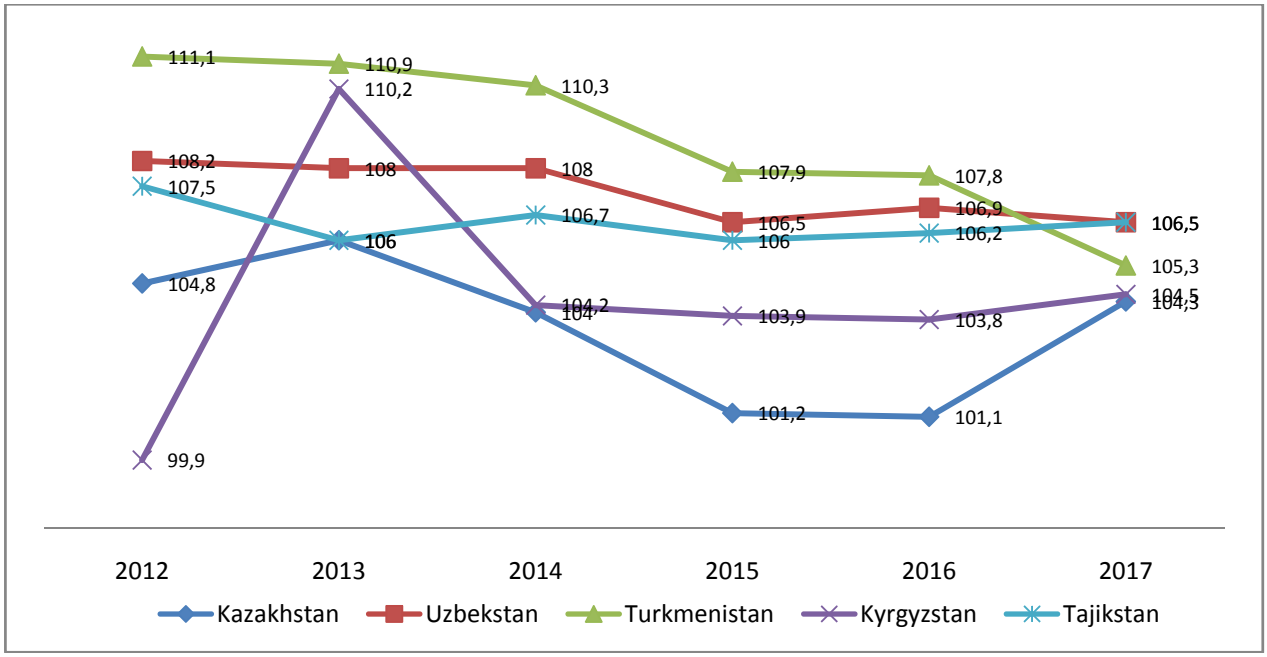
If you look at GDP growth, you can see that Kazakhstan has the smallest growth, which is associated with large volumes of this country, while small economies can more easily achieve high growth due to the "low base" [5].

GDP per capita, also show that the leaders are the exporters of Kazakhstan and Turkmenistan. Although Uzbekistan is also an oil exporter, its GDP per capita is lower both due to smaller production volumes and more population.

The level of inflation in the region is at a fairly high level. On average, by 6-7% in the period under review. It is also necessary to note the volatility of the price dynamics. So in 2016 there was a sharp jump in prices to Kazakhstan and in the same period a fall in prices in Uzbekistan and Kyrgyzstan.

The leader in terms of foreign trade is Kazakhstan. Although in 2014-2016 years the decline of this indicator was noted due to the depreciation of the national currency against the dollar and the fall in prices for Kazakhstan's main export commodity - oil. On the second place in terms of foreign trade are quite industrially developed Uzbekistan and Turkmenistan. At the same time in Uzbekistan this indicator is the most stable (about 25 billion US dollars). The least volumes of foreign trade are observed in countries with less developed industry and economies in the region: Kyrgyzstan and Tajikistan.

Graph 1 - GDP growth rate 2012-2017 by countries, (%)



KAZAKHSTAN. Kazakhstan is undoubtedly the leader among other countries in Central Asia in terms of the level of development and capacity of the economy. In 2016, Kazakhstan occupied 56th place among the 191 countries in terms of GDP. More than half of the total GDP of the Central Asian region is in Kazakhstan. At the same time, the dynamics of GDP growth is lower than in other countries of the region due to a higher comparison base. The Republic of Kazakhstan has significant deposits of mineral and energy resources - 99 of the 110 elements of the Mendeleyev table have been discovered in the bowels of the country, 70 have been explored, more than 60 have been used, including 8% of the world's iron ore reserves and about 25% of uranium. The country has one of the most powerful oil and gas potentials in the Caspian region: Kazakhstan accounts for about 3% of the world's oil reserves and 1.2% for natural gas, and the country continues to increase energy production and exports. Kazakhstan is also one of the main producers of wheat in the region.

UZBEKISTAN. Uzbekistan also has significant natural and production potential, based on natural gas reserves (7.8 trillion m3), oil (1 million tons), copper, uranium, phosphorites, rare earths and precious metals. The republic holds the fourth place in the world for gold reserves, and the seventh for its extraction.

Uzbekistan is one of the top three countries in the world for the production and export of cotton, in addition, also exports gold, uranium ore, mineral fertilizers, natural gas, textile and food products, metals, cars. The amount of exports in 2010 amounted to more than 13 billion dollars, imports (mainly industrial products) - 8.8 billion dollars. One of the main articles of foreign exchange earnings in the economy of Uzbekistan is a powerful mineral and raw materials base. In the city of Asaka there is a large plant "GM Uzbekistan" for the production of cars under the licenses of Daewoo and Chevrolet, in addition, the only aircraft plant in Central Asia was opened in the country.

Among modern priorities of development of Uzbekistan is to ensure stable and balanced growth rates, structuring and modernization of the economy, technical and technological renewal of its most important branches, further liberalization of the tax policy; creating a maximum of favorable conditions for private business and a gradual decrease in the state's presence in the economy; attraction of foreign investments; expansion of the scale of reforms in the banking and financial system and in the municipal economy. The focus is on fuel and energy and gas and petrochemical complexes, energy, gold mining and non-ferrous metallurgy, chemical and textile industries, and the sphere of information and communication technologies.

TURKMENISTAN. In Turkmenistan, oil, gas, sulfur and potassium are abundant. The main branches of industry in Turkmenistan include refining and processing of oil and natural gas; production of glass, fabrics (mainly cotton) and clothing; the food industry. Turkmenistan actively encourages interested foreign companies to participate in the development of gas fields on the Caspian Sea shelf - the current gas production figures in the republic should grow three times by 2030 [6]. Therefore, one of the most important events in Turkmenistan is the annual International Gas Congress demonstrating continued by the current leadership of Turkmenistan to reduce the level of foreign policy and external economic isolation of the country that took place during the presidency of Parmurat Niyazov.

This small country in terms of natural gas reserves ranks 4th in the world, having the second largest gas field. There are also rich oil reserves. In addition to oil and gas, Turkmenistan has significant reserves of sulfur, iodine, bromine, mirabilite, lead, various raw materials for the construction and finishing industry.

The basis of the economy of Turkmenistan at present is the fuel and energy complex, which includes oil and gas, as well as oil refining industries, they bring the main foreign exchange earnings and form the basis of external commodity turnover. According to various estimates (OPEC, the independent US agency EIA, the British oil giant BP), Turkmenistan produces about 200-260 thousand barrels of oil daily (28-36 thousand tons) and annually - about 70 billion cubic meters of gas, 11th place in the world.

Turkmenistan's plans for the further development of this industry are grandiose. Thus, according to the program of development of the oil and gas industry of Turkmenistan for the period up to 2030, it is planned to increase oil production to 110 million tons by 2030, and to 250 billion cubic meters of natural gas by 2030. To achieve these goals, the government of Turkmenistan is taking measures to attract foreign investments to this branch of the national economy. The official information is not available on the exact amount of foreign investment in the country's economy. According to some media reports, the amount of foreign investment in the oil and gas industry in 2014 was about 10 billion US dollars and continues to grow. Quite possibly, this is true, since Turkmenistan does increase oil and gas production from year to year.

In view of the widespread cotton production in Turkmenistan, the textile industry is well developed. There are enterprises of the chemical and metallurgical industry on the territory of the country, as well as the development of the Caspian shipbuilding industry. The agricultural branch of the economy is also developed in Turkmenistan. The leading agricultural sector is cotton growing, and grain growing is also highly developed - the production of wheat and rice. There are farms engaged in horticulture, melon growing, vegetable growing. Livestock breeding is represented mainly by horse breeding (Turkmenistan is the birthplace of Akhalteke horses), sheep breeding and camel breeding, the production of cattle is less developed.

KYRGYZSTAN. The economy of the republic consists mainly of industry, the agricultural sector of the service sector, and in the service sector employs less than half of the able-bodied population. In 2011, the volume of remittances made up 29% of the country's GDP. These are the dominant sectors that provide employment and economic growth in the country. The industry is represented by energy and mining. In the 1990s, the republic experienced de-industrialization and a large recession even by Central Asian standards: Kyrgyzstan's GDP in 1990-2001 declined 10.35 times (in neighboring Uzbekistan for the same time it was 3.45 times). A significant part of agricultural products is exported. An important part of Kyrgyzstan's income is tourism. In Kyrgyzstan, there are huge reserves of antimony, mercury, lead, zinc and other precious metals, as well as significant hydropower resources.

TAJIKISTAN. The economy of Tajikistan is oriented to agriculture, the country is rich in mineral resources (hard coal). In the structure of Tajikistan's exports, about 80% is occupied by raw materials and materials: aluminum, cotton, ready-made foods, precious and semiprecious metals and stones. Tajikistan possesses inexhaustible reserves of water resources, and also concentrated in itself more than 55% of all water resources of the region. During the years of independence the structure of employment has changed greatly, industrialization of the economy has taken place. Achievement of the status of the country, as an industrial-agrarian, will ensure the implementation of the National Development Strategy of the Republic of Tajikistan until 2030. Since 2000, there has been a steady economic growth of 5-7%. For the development of the economy, 4 free economic zone (FEZ) have been opened by the government and they are functioning well today. A number of economic privileges have been granted to FEZ subjects. They are

exempt from taxes and customs duties. All administrative barriers for the development of FEZ have been removed. In 1991 - 2013 the share of employed in agriculture decreased from 36% to 19%, while the share of employed in industry increased from 21% to 51%, in construction it decreased from 8% to 3%, in the service sector from 35% to 27% . The economy of Tajikistan is vulnerable to external shocks due to a narrow export structure and high import dependence. High level of labor migration. A fairly large proportion of the rural population lives in poverty.

The most significant sector of Tajikistan's economy is agriculture, its share in 2015 accounted for more than a quarter of GDP. Further (in descending order on the contribution to GDP) are: industry, trade, transport, communications, services, construction and other industries. The main agricultural crop of Tajikistan is cotton, up to ninety percent of the raw materials are exported. Also, Tajikistan grows grain, vegetables, fruits, tobacco, potatoes, developed cattle. On the territory of the country there are large reserves of silver, gold, iron, lead, antimony, coal, table salt, precious stones, oil and gas. Explored deposits provide raw materials for such industries as chemical, mining, metallurgical, engineering [7].

CONCLUSION

A very well-developed and promising industry is the electric power industry, Tajikistan is a major exporter of electricity, in terms of hydropower reserves the country is on the eighth place in the world. But still the largest and most significant industry is light industry. In Tajikistan, a lot of enterprises that process agricultural raw materials: cotton, silk, as well as carpet weaving, sewing and knitting factories. The main foreign trade partners of Tajikistan are Russia, China, Kazakhstan, Turkey. The share of partner countries in the CIS accounts for almost half of the total foreign trade turnover. As in many other countries of the former USSR, labor migration in Tajikistan is very common. The bulk of labor migrants, and their number is more than half a million, is on earnings in Russia. The money transferred by means of money transfers is a significant part of GDP. Despite the fact that Tajikistan is not a rich state, analysts give a very successful forecast for the further development of its economy. The main thing that can favorably affect the pace of economic growth is Tajikistan's integration into the global economy. One of the ways of such integration is its entry into the Customs Union. In addition, analysts give favorable forecasts regarding the growth of prices for aluminum and cotton, which are the main export items in Tajikistan, which will bring additional revenues to the budget.

As a conclusion we can say that Central Asian countries are abandon in natural recourses and agricultural industry. At the same time government of these states making strong economic policy to diversify economy and transforming the GDP structure steady.

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ЭКОНОМИКА ЦЕНТРАЛЬНО-АЗИАТСКИХ СТРАН

Аннотация. Современный мир характеризуется нестабильностью, изменением балансов и системы международных отношений. После распада Советского Союза Центральная Азия находилась в центре внимания различных внешних сил. Регион был на пересечении интересов как региональных, так и глобальных игроков. Для мировой экономики регион Центральной Азии интересен, прежде всего, как источник сырья. Нефть, газ, уголь и металлы в настоящее время являются наиболее популярными экспортируемыми товарами, в свою очередь, сельскохозяйственные продукты также обеспечивают динамичный рост за последние годы. В течении четверти век независимость стран Центральной Азии развивалась по разными путями и траекториями. Один из них сделал большой экономический импульс, а другой замедляется и сталкивается с большими кризисами. Но все время Центральные азиатские страны имеют общие приоритеты в экономике и в развитии. Потому что эти страны связаны не только географическим положением, еще и они связаны с культурой, мыслями и в некоторых случаях экономико-политическими проблемами.

Статья посвящена экономическому развитию и тенденциям Центрально-азиатских государств как целого, так и отдельно. Автор дает от общего подробный анализ роста ВВП и его структуры. С другой стороны, анализируются инвестиционный климат и инвестиционная привлекательность этих стран. Это объясняет нынешнее экономическое положение стран и регионов.

Ключевые слова: Центральная Азия, экономика Центральной Азии, экономическое развития, экономический рост, ВВП.

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ОРТАЛЫҚ АЗИЯ МЕМЛЕКЕТТЕРІНІҢ ЭКОНОМИКАСЫ

Аннотация. Халықаралық қатынастар жүйесі мен төлем баланстарының өзгеруінің нәтижесінде қазіргі заман тұрақсыздығымен сипатталады. Кеңес одағының ыдырауынан кейін орталық азия елдері көптеген сыртқы күштердің назарында қалды. Аймақ ретінде өңірлік және жаһандық саясат мүддесінің тоғылысы болды. Жаһандық экономика үшін Орталық Азия бәрінен бұрын шикізат көзі ретінде қызықтырды. Мұнай, газ, көмір және металлдар қазіргі кезде ең көп экспортталатын тауар болп табылады, өз кезегінде ауылшаруашылық өнімдері соңғы жылдары қарқынды өсу үстінде. Ширек ғасырлық тәуелсіздік ғұмырында Орталық Азия елдері әртүрлі жолдармен және траекториялармен дамыды. Бірі үлкен экономикалық импульс жасап жатса, келесі бірі бәсеңдеп әрі дағдарыстарға ұшырап жатты. Дегенмен, әрқашан Орталық Азия елдері экономикалық дамуды ортық мүддеде болды. Өйткені осы мемлекеттерді тек көршілес орналасу ғана емес, мәдени және рухани, тіпті кей жағдайларды экономикалық-саяси мәселелер де тығыз байланыстырады.

Мақала, Орталық Азия мемлекеттерінің біртұтас әрі жекелеген экономикалық дамуы мен тенденцияларына арналады. Автор ЖІӨ даму қарқыны мен құрылымында нақты талдаулар жасаған. Сонымен қатар, аталмыш елдердегі инвестициялық тартымдылық пен инвестициялық климатты да талдай кетеді. Бұл осы мемлекеттер мен аймақтың бүгінгі экономикалық даму жағдайын көрсетеді.

Түйін сөздер: Орталық Азия, Орталық Азия экономикасы, экономикалық даму, экономикалық өсім, ЖІӨ.

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FORMATION OF PATRIOTISM IN THE FRAMEWORK OF THE PROGRAM " RUHANI ZHANGYRU " AS A HISTORICAL FACTOR OF THE DEVELOPMENT OF KAZAKHSTAN

Abstract. In this article, the author examines Kazakhstan's patriotism, which is a new paradigm of state policy and ideology. Undoubtedly, its appearance and approval in the Republic of Kazakhstan was associated with the strengthening of the state's independence. Today, in the age of a rapidly changing picture of the world and new global challenges to mankind, the need to educate the true patriots of our country is growing: "We need to educate ourselves and our children with new Kazakhstan patriotism. This, above all, is the pride of the country and its achievements. " Very topical, this year the Kazakh language was given the status of the state language in Kazakhstan. The issue of preserving the symbol of our statehood - Kazakh language became one of the key from the first day of independence.

Keywords: patriotism, history, development, nation, education, customs, traditions, culture.

INTRODUCTION

There is no state on our planet that does not need the patriotism of its citizens. This personal characteristic of an individual is the source of strength, the unity of the people and the integrity of the state, mobilizes to solve the strategic tasks facing the society.

The President of the country in the "Strategy" Kazakhstan-2050 ": New political course of the state" stressed the importance of forming a new Kazakhstan patriotism as a cementing idea of statehood [1].

It contains the responsible responsibility of each citizen for the fate, security and future of our country, as well as the comprehension of all compatriots, regardless of nationality and confession, customs, traditions, history, culture and languages of the people of a multinational country. "To be a patriot is to carry Kazakhstan in your heart", - so vividly defined this value The head of our state.

«Ruhani Zhangyru» - a program article of the Head of State aimed at reviving the spiritual values of Kazakhstanis, taking into account all the contemporary risks and challenges of globalization. The article emphasizes the importance of modernizing public consciousness, developing competitiveness, pragmatism, preserving national identity, popularizing the cult of knowledge and openness of citizens' consciousness. These qualities should become the main reference points of a modern Kazakhstani citizen.

MAIN PART

Therefore, we, the teachers of the university, are faced with the task of pragmatically and realistically addressing issues of education of patriotism, understanding that young people will love the country, be proud of it if the state guarantees every citizen the quality of life, security, equal opportunities and prospects.

Patriotism is a moral and political principle, a social feeling, the content of which is love for the fatherland, pride in its past and present, its readiness to subordinate its interests to the interests of the country, the desire to protect the interests of the motherland and its people. Ensuring the national security of the country depends on the active opposition of true patriots to the information-psychological impact on the consciousness of man and the people through the language environment and through language. The question of knowledge of the Kazakh language is always associated with the formation of Kazakhstani

patriotism, since knowledge of the Kazakh language is primarily a knowledge of the state language of the country. According to Puhovich L., the issue of the state language, as part of national identification, poses a certain threat to the country's security and stability. At the same time, the successful solution of the language problem can give a powerful impetus to the further development of democracy and will create prerequisites for the country's entry into the list of the fifty most competitive states in the world [2]. Language, being a means of communication, communication, can also act, as the President of Kazakhstan, Nursultan Nazarbayev, "a powerful weapon capable of uniting the Kazakh people" [3]. Therefore, the active protection of the language environment is an important aspect of the country's national security and the formation of a new Kazakhstani patriotism.

According to the results of the sociological survey of the Foundation for the Development of the State Language, more than 70% of Kazakhstan's youth are fluent in the state language. The survey involved about 5 thousand respondents aged 18 to 30 years from different regions of Kazakhstan. Respondents were offered several answers regarding their level of knowledge of the state language. According to the data, 77.7% of respondents are fluent in the Kazakh language, 10.3% of the respondents know at the level of conversation, 5% answered "I understand, but do not speak", 3.7% - "I know a few words, I can understand simple sentences" 1.6% do not know the state language at all and 1.7% said "I do not know, but I'm going to start learning" [4].

In the Republic of Kazakhstan, a harmonious language policy is implemented, ensuring the full functioning of the state language as an important factor in strengthening national unity while preserving the languages of all ethnic groups living in Kazakhstan [5]. Within the framework of the State Program for the Development of Education of the Republic of Kazakhstan for 2011-2020. [6] before the higher school tasks of improving the teaching and educational process for the development of the state language, for which the universities of the republic established training centers for the Kazakh language, introduced mandatory training courses, office work in the Kazakh language.

A focus group was conducted to analyze the state of the implementation of the state language policy, and to identify the connection between the knowledge of the state language and the formation of Kazakhstani patriotism by teachers of the Department of Social Work and Socio-Political Disciplines. The participants of the focus group were the first-year students of various specialties of the Karaganda Economic University Kazpotrebsoyuz.

The focus group is a methodology that allows to penetrate deep layers of motivation of people's behavior, their expectations, hopes, experiences and personal experience. It allows you to find out what people think about the problem being discussed, why they think so, what motivates them, how they react to certain phenomena, what factors actually influence them, what determines their actions and what incentives they are guided by. Their group discussion, which takes place in the form of a discussion, is organized in such a way as to obtain from its participants "subjective information" on this or that issue. The focus group is a qualitative research method. Data obtained with this method have no statistical justification and do not reveal quantitative parameters of consumer behavior. They are subjective and characterize the psychology of people, and not the objective state of affairs in practice. They allow you to get feedback from real consumers, to hear their voice, to find out possible opinions and reactions to phenomena and actions, to discover new problems, to provide various options for the development of the phenomenon and to put forward hypotheses.

The first cluster of focus group questions was devoted to assessing the general idea of students about the legal bases for the functioning of languages in the Republic of Kazakhstan. To the question: "How do you know the normative documents regulating relations in the sphere of language development in the Republic of Kazakhstan?", Replies were received:

- "The main normative act regulating these relations in the society is the Constitution of the Republic of Kazakhstan, article 7, which states that the Kazakh language is the state language in the Republic of Kazakhstan."
- "Along with the Kazakh language, according to the Constitution, the Russian language is officially used."
- "The Law of the Republic of Kazakhstan" On Languages ".
- "The law of the RK on the media, according to which the media (TV programs, periodicals) must devote more airtime to broadcasts that are broadcast and published in the state language".

Respondents' answers, taking into account the first course of study at the university, indicate that they have certain ideas about the legislative documents functioning in the state. At the same time, it should be noted that the majority of respondents did not answer anything on the merits of the issue, much less they could not fully analyze the content of the laws. Participants in the focus group, as shown by the beginning of the discussion, are not sufficiently well-informed about the content of laws and program documents regulating relations in the sphere of language development. Unfortunately, no one mentioned the implementation of the cultural project "The Trinity of Languages" in Kazakhstan, which today can serve as an example for other countries of the world in terms of popularity in the society and the level of its effectiveness. Thanks to the realized language policy in the RK, the state language is gradually developing and conditions are being created for the development of the languages of all ethnic groups. This year marks the 25th anniversary of our first legislation on languages. The knowledge of all citizens in the future state language will make us even more equal, will strengthen unity. At us in 15 languages there are 60 mass-media, including 34 newspapers and 26 sites of the ethno cultural centers.

To get answers to the next question "Why did the President of Kazakhstan Nursultan Nazarbayev at the 21st session of the Assembly of the People of Kazakhstan" Strategy "Kazakhstan-2050": culture of peace, spirituality and harmony "demand the exact implementation of the norms of the law" On languages "in all corners of Kazakhstan?", Moderator quoted excerpts from the speech of the President of the Republic of Kazakhstan: "As for our capital Astana, it should become a worthy example of tolerant international relations, all norms of the law" On languages ", in particular, objects road infrastructure, public transport, streets, avenues, other city facilities should have indexes in full compliance with the requirements of the legislation, in Kazakh and Russian languages - and this applies to all regions and regions. " "Today it is not always painted, bus stops are announced only on one for some reason, the signs of the routes are also on one, this is a violation of the Constitution ...". After that, the following answers were received:

- "I completely agree with the President, you can not break the law."
- "The infringement of the rights of the Russian-speaking part of the population must not be tolerated."
- "Every nation has a right to language."
- "In the Soviet times tablets, signposts were only in Russian, now - in Kazakh, this is also an extreme."

At the same time, such remarks were made: "But you can understand these words differently, Russian speakers can interpret this statement as" it is not necessary to learn the Kazakh language, “This can push the mastery of the state language for more distant periods”.

In continuation of the discussion of the problem, the participants of the discussion were asked the following questions: "Do you think that the requirement to know the state language is coercion of the state or the duty and duty of every citizen of Kazakhstan?", "How do you think, what measures should be applied to a person who ignores the study of the state language? "and" Do you agree that the state language is one of the main factors in the consolidation of the people of Kazakhstan? ", which were followed by contradictory answers, namely:

"This is coercion. Russian language, native speakers of Russian predominate in Kazakhstan and therefore do not force them to teach Kazakh. "

- "I believe knowledge of the Kazakh language is a duty of every citizen of Kazakhstan."

"Personally, I do not want to learn the official language."

- "Why learn the state language, if on a par with it acts Russian."

"Adult people do not need to know the state language for 50 years, since it is difficult and even impossible to master a new language in adulthood."

"Everything depends on the field of activity. If professional activity requires knowledge of the Kazakh language, then it is necessary to teach. "

- "Requirements for knowledge of the state language when applying for a job should not be."

"There is a category of people who study the state language as a need for spiritual growth and practical necessity."

- "You can not use violent measures against a person who does not want to learn the state language, he must himself come to life in the process of vital activity".

"This is a" stick "about the two ends. Outside the country, knowledge of the Kazakh language can bring together, and within the country the requirement to know the state language for regions of compact residence of the Russian-speaking population can lead to strife with other regions. "

The atmosphere of the discussion, established in the focus group, allows us to say that modern youth understands the need to learn the state language, but so far there is no complete awareness of this need. The answers of freshmen, sounded like reflections, often could change the existing opinion of the participant in the discussion on the need to learn the state language. At the table there were answers and replicas that made young people take a different look at the content of the issues under discussion. Many participants realized that this is not a personal issue for everyone, but it is an objective today's reality "to know the state language". Analyzing the respondents' answers, we were convinced that it is necessary to hold a legal universal education with students explaining the provisions of the current Law of the Republic of Kazakhstan in the field of language development, which reads: "It is the duty of every citizen of the Republic of Kazakhstan to master the state language, which is the most important factor in the consolidation of the people of Kazakhstan" [7].

After listening to the previous answers of the respondents, a question was asked to them: "In the Republic of Kazakhstan, the infringement of the rights of citizens on a language basis is not allowed. Have you been in a situation where this provision of the law is not being implemented? ":

- "Yes, there are such cases. I myself did not encounter this, but my friends told me about this case. " (An example was given from the life of friends).
- "Everyone should determine for themselves whether the state language is necessary or not."
- "Experts need to know two languages, it's good."
- "If a person works in the sphere of providing services, then it is necessary to know the state language, this will have a good impact on the career and this is not an infringement of rights."
- "Modern companies require knowledge of the state language, based on the needs of their clients."
- "Ethnic Kazakh should know Russian at the domestic level, as well as Russian - know the spoken Kazakh".

CONCLUSION

The answers of the participants in the discussion allow us to say that young people do not experience discrimination and infringement of rights on the language principle. In all social spheres, the state language and the language of interethnic communication are used in parallel - Russian. In this case, there are special cases of misunderstanding on the part of representatives of the titular nation - Kazakhs, and representatives of the Russian-speaking part of the population of the state language policy. That allows us to talk about the need to focus the attention of the state and the public on the education of the people's tolerance, as the basis of state security.

Based on the content of the discussion, it can be concluded that the bulk of the respondents realize that without the knowledge of the state language, it is impossible to obtain educational grants, to make a career in government institutions, in the service sector, in law enforcement and the judiciary. It is encouraging that youth gathered at a round table understands that in the state the main criterion of professional growth is knowledge of the Kazakh language, rather than nationality.

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ФОРМИРОВАНИЕ ПАТРИОТИЗМА В РАМКАХ ПРОГРАММЫ «РУХАНИ ЖАҢҒЫРУ» КАК ИСТОРИЧЕСКИЙ ФАКТОР РАЗВИТИЯ КАЗАХСТАНА

Аннотация. В данной статье автором рассматривается Казахстанский патриотизм, который является новой парадигмой государственной политики и идеологии. Безусловно, его появление и утверждение в Республике Казахстан было связано с укреплением независимости государства. Именно сегодня, в век стремительно меняющейся картины мира и новых глобальных вызовов человечеству, возрастает необходимость воспитания истинных патриотов нашей страны: «Надо воспитывать в себе и в наших детях новый казахстанский патриотизм. Это, прежде всего, гордость за страну и ее достижения». Весьма актуально, этом году казахскому языку был придан статус государственного языка в Казахстане. Вопрос сохранения символа нашей государственности - казахского языка стал одним из ключевых с первого дня независимости.

Ключевые слова: патриотизм, история, развитие, нация, воспитание, обычаи, традиции, культура

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«РУХАНИ ЖАҢҒЫРУ» БАҒДАРЛАМАСЫНДАҒЫ ПАТРИОТИЗМНІ ҚАЗАҚСТАНДЫҚ ДАМУ ТАРИХЫ ФАКТОРЫ РЕТІНДЕ ҚАЛЫПТАСТЫРУ

Андатпа. Бұл мақалада автор қазақстандық саясат пен идеологияның парадигмасы болып табылатын қазақстандық патриотизмді зерттейді. Қазақстан Республикасындағы оның келбеті мен мақұлдауы мемлекеттің тәуелсіздігін нығайтумен байланысты болғаны сөзсіз. Бүгінде әлемдегі тез өзгеріп бара жатқан бейнені және адамзатқа жаңа жаһандық қауіп-қатерлерді туындаған кезде біздің еліміздің шынайы патриоттарын тәрбиелеу қажеттілігі артып келеді: «Біз өзімізді және балаларымызды жаңа қазақстандық патриотизммен тәрбиелеуіміз керек. Бұл, бірінші кезекте, елдің мақтанышы және оның жетістіктері ». Өте өзекті, биыл қазақ тіліне мемлекеттік тіл мәртебесі берілді. Біздің мемлекеттілігіміздің нышаны - қазақ тілін сақтау туралы мәселе тәуелсіздіктің алғашқы күнінен бастап жүзеге асырылды.

Түйінді сөздер: патриотизм, тарих, даму, ұлт, білім, салт-дәстүр, мәдениет

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МАЗМҰНЫ

СОДЕРЖАНИЕ

CONTENTS

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