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**ВЕСТНИК**

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РЕСПУБЛИКИ КАЗАХСТАН

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### **PROTECTION OF CENTRIFUGAL PUMPS FROM ABRASIVE WEAR USING A VACUUM HYDROCYCLONE**

**Abstract.** The design features of the existing design and technology for the protection of downhole pumps of the ECV type from abrasive wear during operation are considered and analyzed. Based on the analysis, a new method for capturing solid impurities on the suction line of a borehole pump of the ECV type using a pressure-vacuum hydrocyclone is proposed.

It is specified that at field tests of a prototype of new installation technological process is estimated on the pressure-expense characteristic and technological-operational indicators according to requirements of GOST 6134-81 " pumps dynamic. Test method. " In this case, the flow rate of the base pump on water is determined by means of a turbine water meter mounted on a water-lifting pipe with a valve. The performance of the hydraulic elevator is established by the volumetric method, and the head in front of the valve of the pump pressure pipe using an approximate pressure gauge.

It is established that the flow-pressure characteristics of the base submersible pump ECV are provided in full (water flow 60-70 m<sup>3</sup>/h, head - 110-118 m), overload on the electric motor is not detected (ammeter readings are within the permissible limits-68-71 amperes), the degree of water purification is 95-96%.

It is noted that the implementation of a flexible packer device with slots and the presence on the surface of the second minihydrocyclone-thickener significantly improves the functioning of the adopted scheme of water treatment. It turned out that with this technology, the overload of the pump motor is reduced by cooling with water without mechanical impurities.

**Keywords:** well, sanding, submersible pump, abrasive wear, vacuum hydrocyclone, test, degree of purification

**Introduction.** The relevance of the topic under consideration is that in most operated water wells on a global scale, depending on the state of the annulus, sanding of various degrees often takes place [1-5].

For example, in Kazakhstan at present about 60% of wells of municipal services work in the sand mode. This is due to the violation of the interaction mode of the system "well-pump" in use, the decrease in the efficiency of the filter and for other reasons of a hydrogeological nature. Therefore, in some wells, especially those located in the desert and semi-desert zones of the Republic, the content of solid particles can exceed the norm of solid particles for centrifugal pumps (less than 0.05 g/l) by 3-5 times [6-8].

As a result, sanding occurs intensive wear of the working elements of the used pump type ECV (figure 1) and their failure before the service life. Reduces the overhaul period of the well. Restoration of the base pump requires a lot of costs, because overhaul of the pump type ECB costs 70-80% of its base cost. Untimely provision of settlements with drinking water due to the pump stop prevents the solution of a social problem of great importance.

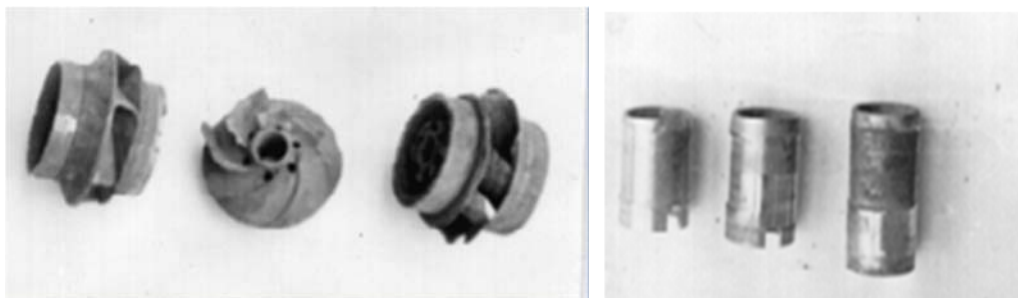


Figure 1 – Types of wear of impellers (a) and submersible pump bushings (b)

One of the effective solutions to this problem is to supply the submersible pump with a hydrocyclone receiving chamber (separator) for separating sand from water in the well [6-9]. The captured Sands are usually not left in the well, but are brought to the surface with the help of ejecting devices bypassing the working bodies of the pump.

In work [6] methodical instructions on maintenance of normal operation of borehole submersible pumps that can reduce level of sanding and abrasion of a surface of impellers of the pump by mechanical impurity are stated.

The main advantage of the LAKOS(R) separator, as in other devices of similar action, is to prevent the possibility of abrasion of the surfaces of the impellers and bearings of the submersible pump [7]. However, the presence of it leads to a loss of pressure from 2 to 7 pounds per square inch. The maximum particle size is 1/4". According to the authors of this work, after installation, the separators do not require daily maintenance.

The technical result of the invention described in [8] is achieved by the fact that in a downhole pumping unit, the chamber for collecting mechanical impurities of the hydrocyclone and the ejector are made together in one volume along the flow of the liquid, and the hydrocyclone is located with the cone part upwards.

The technical solution according to model No. 108104 [9] is aimed at increasing the efficiency of separation of mechanical impurities by reducing hydraulic head losses in the flow part of the separating unit. The dependences of the separator performance characteristics on the granulometric composition of mechanical impurities contained in the extracted fluid are revealed.

In studies conducted in LLC "PC "Borets" (Russia), it was found that the developed design of the separator with hydrocyclone separation of mechanical impurities with a density of 2000 mg/l provides cleaning efficiency in the range of 95-97% [10]. It differs from others in the absence of rotating parts.

The hydrocyclone separator described in [11,12] differs from the existing ones in that it has an inner diameter, which decreases as the fluid moves along the inner perimeter of the hydrocyclone. The design includes a pressure reducing device located near the inlet end of the discharge pipe to facilitate the movement of solid particles through the discharge pipe.

In General, the analysis of the above technical solutions and other submersible pumps with hydrocyclone separators used in practice shows the effectiveness of this technology for protecting the base pumps from abrasive wear.

Hydrocyclone method of fight against wear is justified also at water purification from mechanical impurity in systems of renewable energy sources, in particular at improvement of the technological scheme of mini hydroelectric power station [13-15].

However, further improvements are still required, taking into account the wide variety of construction and operation of water wells.

Based on this, we set the task of improving the action of the packer device for separating the hydrocyclone from the pump during its operation. This is necessary to force water with mechanical impurities into the hydrocyclone device and prevent sand from entering directly into the submersible pump. Another task was to obtain the maximum thickening of the ejected pulp after cleaning on the surface by additional installation of a minihydrocyclone. This significantly reduces the loss of water when the condensed mass is ejected into the dump.

**Description of the essence of development and testing methods.** The essence of the developed water intake technology, designed to improve the performance of a submersible pump with a hydro-cyclone-separator, is as follows [16-18].

The unit, unlike the existing ones, on the suction line is equipped with a vacuum hydrocyclone Hc with a packer device Pp in the form of an elastic cuff (figure 2). Next to the submersible pump Ps, lowered into the well Wl, there is a pulp suction pipe Pt, hydraulically connected to the hydraulic Elevator He, located at the pump outlet.

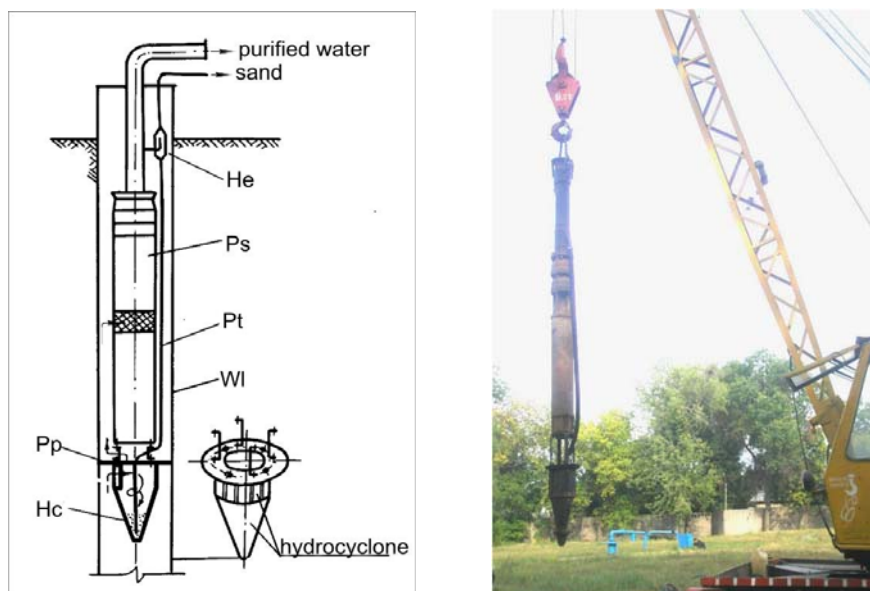


Figure 2 – A structural diagram (a) and the prototype pump of the ECW is provided with a vacuum hydrocyclone

*Principle of operation.* When starting the pump Ps liquid with mechanical impurities enters through the holes in the hydrocyclone Hc, because the wellbore Wl blocked packer device Pp. In the hydro-cyclone, the absorbed liquid, due to the strong rotational movement, is divided into liquid and solid phases. Solid particles are thrown to the top of the cone and accumulate in the condensation chamber.

The clarified part of the water through the drain neck of the hydrocyclone is sucked off by a submersible pump and fed to the surface to the consumer. In this case, a small part of the water, seeping through the slots of the flexible cuff, keeps it in a balanced state.

The condensed mass from the chamber is ejected through the pulp suction pipe Pt by the hydro-elevator He to the surface, bypassing the working bodies of the pump. On the surface of the pulp enters minimization and undergoes a secondary treatment.

To conduct the test, the base submersible pump installed in the well was first pulled out of the well. Then a hydrocyclone chamber and a hydraulic Elevator were connected to the pump. The finished installation with the help of a crane was lowered back into the well to a depth of 25-30 m and the water-lifting pipe was rigidly fixed with a special clamp on the head. The upper end of the water-lifting pipe was directed to the discharge tray for water removal, and the pulp-removing hose was directed to the mini-hydrocyclone. The static water level in the well was 3-4 m, and the dynamic decrease ranged from 10-13 m.

In order to more accurately determine the head at nominal supply, the analytical characteristic of the pump for the working section of the characteristic was calculated by the method of least squares.

During field tests of the plant, the technological process was evaluated by the pressure-flow characteristics and technological-operational indicators. The timing of the working time of the shift was considered by lifting (extraction) of the operated pump unit to the surface, assembling and mounting the hydrocyclone with a hydraulic Elevator, installing the unit in the well, starting the pump and pumping out the pulp.

The tests were carried out in accordance with the requirements of GOST 6134-81 "dynamic Pumps. Test method."



The flow rate of the base pump on water was determined by means of a turbine water meter mounted on a water-lifting pipe with a valve. The performance of the hydraulic Elevator on the pulp was set by the volumetric method, and the head before the valve of the pressure pipe of the pump with the help of an exemplary pressure gauge. The characteristic of the installation was removed during crane operation.

**Test results and discussion.** The purpose of the test is to clarify the pressure-flow characteristics of the submersible pump ECV10-65-110 when supplying it with a hydrocyclone and determine the degree of water purification.

The geometrical parameters of the unit with a hanging hydrocyclone and a cuff were as follows: the diameter of the cylindrical part of the hydrocyclone chamber was 300 mm (the diameter of the elastic cuff was taken on the basis of the inner diameter of the well), the diameters of the drain pipe and the sand hole were 240 mm and 50 mm. The dimensions of the last variant – 30x220 mm. The Specified parameters of the hydrocyclone apparatus were determined according to the method of calculation of centrifugal action units, based on the features of their application [19,20].

The results of the acceptance test in conjunction with the operated facility are shown in table 1.

Table 1 – Results of acceptance test of the pump with a hydrocyclone

Pressure at the outlet of the well (before the valve), NN, m	121,0	118,0	115,0	110,0	95,0
Flow rate of the base pump ECV10-65-110, Q, m <sup>3</sup> / h	55,0	60,0	65,0	70,0	75,0
Water flow through the mini-Elevator, q, l / s	0,60	0,55	0,50	0,45	0,40
The degree of purification of water (by pump),C,%	95,0	96,0	96,0	95,0	96,0

As can be seen from table 1, the developed installation fully corresponds to the initial parameters for raising water from sand wells. The achieved degree of water purification allows to preserve the passport service life and to carry out preliminary cleaning of the well from mechanical impurities.

Analysis of the composition of the removed part of the sand deposits shows that the degree of capture of mechanical impurities using hydrocyclone-thickener at the required level. The flow of water through minihydropower equal to 0,45-0,65 l/s.

After operation for 5500 hours and external inspection and removal of some basic parameters submersible pump with hydrocyclone was re-lowered into the well with the help of a crane for further testing and testing of the process of raising water from the sand wells.

At the same time, in order to more accurately determine the head H at the nominal supply Q, the analytical characteristic of the pump for the working section of the operating mode by the method of least squares was calculated, which was equal to:

$$H = 97,83 + 5,524 * Q - 0,2751 * Q/2 \quad (1)$$

Computing deviation values of the pressure of H<sub>wic</sub> from experienced H<sub>ad</sub> was calculated by the formula:

$$H_o = (H_{wic} - H_{ad}) / H_{ad} * 100\% \quad (2)$$

The calculated pressure of the pump made:

- 1) with a minimum feed (13.48 l/s) - 121.24 m;
- 2) at nominal feed (18.63 l/s) - 106.18 m;
- 3) at maximum feed (22.25 l/s) - 90.41 m.

The achieved values of deviations within the permissible limits (2-3,5%) indicates a high accuracy of measurements during the test of the pump.

The second stage of tests was carried out on the rise oversanded water with a significant concentration of sand (1.23-1.30 m<sup>3</sup>/t), ie, in the mode of cleaning the well with the help of the basic pump.

The technological process was worked out using the installation on the basis of the pump ECV 10-160-35G with the following main dimensions: the diameter of the cylindrical part of the hydrocyclone 245mm, the diameters of the drain pipe and the sand hole, respectively, 165mm and 36 mm. the Total height of the hydrocyclone was 610mm. The test results are shown in table 2.

As can be seen from the table, the presence of a hydrocyclone does not lead to a special deviation of the parameters of the base pump and they vary within acceptable limits.

Table 2 – Test results of the installation for raising water from sand wells on the basis of the pump ECV 10-63-110G

The time of filing water, T, s	Pressure gauge reading, R, m	Pump flow, Q, l/s	The pump head, H, m	Note
0	138	0,00	138,45	The valve is closed
94,2	129	9,59	130,02	
69,5	121	13,28	120,88	
57,6	108	18,05	109,00	
57,6	108	18,26	108,25	
52,5	99,8	19,32	100,02	
45,1	91	20,27	91,05	
42,5	79	21,95	80,10	
39,6	67	23,41	68,25	The valve is open
39,9	67	23,25	68,26	
41,6	73	21,42	74,10	
43,4	83	21,00	84,11	
47,1	92	19,17	93,12	
51,7	103	17,25	104,23	
62,0	113	14,62	114,25	
79,1	122	12,52	123,80	
135,1	133	7,55	134,75	
0	138	0,00	138,15	The valve is closed

It was found that the performance of the minihydroelevator on the ground varies within 0.75...1.08 m<sup>3</sup>/h. the Volume concentration of the raised pulp (14.3...15.0 %) is within the permissible limits for transportation, which allowed to ensure uninterrupted supply of the mixture to the surface. This once again confirms the need for a hydrocyclone-thickener (figure 3).



Figure 3 – The types of the end walls of the well with minimization – thickener (a) and work well with purified water (b)

The continuity of pulp transportation, which is associated with the unhindered suction of solid particles from the mouth of the hydrocyclone, contributed to an increase in the degree of water purification on the suction line of the pump. Due to this, only dusty Sands with dimensions of 0.005...0.05 mm, having the least abrasiveness, pass through the working body of the pump. The main components and parts of the pump unit are practically not subjected to mechanical wear.

Increasing the pressure head after the displacement chamber of the minihydroelevator is achieved by overlapping the water-lifting pipe of the pump with the help of a valve. Then the flow rate of the base pump for clean water is reduced by the volume of pulp transported through the sand hole of the minihydroelevator (5.5...6.0 m<sup>3</sup>/h). Reduction of the pump flow rate on water during cleaning does not affect the mode of

pumping groundwater from wells, because it is short-term and is restored after the completion of cleaning works.

During the tests, it was found that there is also a decrease in the overload of the motor. The specific consumption of electricity per 1 m<sup>3</sup> of water ranged from 0.11 ... 0.12 kW/m<sup>3</sup>, which does not exceed the indicator of the pump unit without a hydrocyclone.

No less important point is also the fact that the additional supply of pumping units with hydro-cyclones does not prevent their connection to the scheme of contactless automatic control of the PUMP.

The granulometric composition of the sand deposits brought to the surface by the hydraulic Elevator from the well consists of medium-grained (31.2 %) and coarse-grained (48.6 %) Sands.

During the testing period, due to the improvement of working conditions (protection against mechanical impurities, removal of overload of the electric motor), there was an improvement in the operation of submersible pumps.

During operation, the base pump was not subjected to noticeable overload, because it operates on purified water. Readings of the ammeter and voltmeter corresponded to the nominal values of the motor current and operating voltage specified in the passport.

It turned out that during the cleaning of the well, the installation can be serviced by two people – the operator and the driver of the crane. After cleaning, the unit is operated as a submersible water lifting unit.

Experiments in production conditions generally confirmed the possibility and feasibility of using submersible water-lifting pumps of the ECV type. The economic effect of the use of a new submersible pump unit with a hydrocyclone is achieved by reducing operating costs and increasing the service life of the pump while maintaining its quality characteristics (annual operating time, durability, etc.). Commercialization of the project results at this stage is carried out by the developers and Technopark.

#### **Conclusion:**

1. Flow and pressure characteristics of the basic submersible pump ECV provided in full (the water flow rate is 60-70 m<sup>3</sup>/h, head – 110-118 M.);

2. Overload on the electric motor is not detected (ammeter readings are within the permissible limits - 68-71 amperes);

3. The degree of water purification is 95-96%. Undetectable parts in the form of clay particles (less than 50.0 microns) do not cause abrasive wear of pump elements;

4. The presence of a rubber packer on the cylindrical part of the hydrocyclone allows to reduce vibration especially at the time of starting the submersible pump in operation.

5. The pump head in the entire working area of the pump corresponds to GOST 10428-89E "downhole electric pump Units for water".

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#### **ВАКУУМДЫҚ ГИДРОЦИКЛОН КӨМЕГІМЕН ОРТАДАН ТЕПКІШ СОРАПТЫ АБРАЗИВТІ ҚАЖАЛУДАН САҚТАУ**

**Аннотация.** Мақалада ЭЦВ типтес ұңғыма сораптарын абразивті қажалудан сақтаудың белгілі құрылғылары мен технологияларының құрылымдық ерекшеліктері қарастырылып, талданған.

Мұндай жағдайға басты себеп – Қазақстан Республикасының сумен жабдықтау нысандарында жыл сайын су ұңғымаларының құмдануына байланысты, онда орнатылған ЭЦВ-6 және ЭЦВ-8 маркалы сораптардың 40-50%-на дейін істен шығады, ал олардың 4 мыңға жуығы жаңаларына ауыстырылады және осы шамада жөндеуге беріледі. Бұзылған ұңғыманы және су көтеретін қондырғыларды қалпына келтіру аса көп шығындарды талап етеді. Мысалы, ЭЦВ типті ұңғыма сорабын күрделі жөндеуден өткеру оның базалық құнының 70-80%-ын құрайды.

Осы талдаулардың негізінде вакуумды гидроциклонды қолдана отырып, ЭЦВ типтес ұңғымалық сораптың сору желісінде қатты қоспаларды ұстап қалудың жаңа әдісі ұсынылған.

Жаңа қондырғының тәжірибелік үлгісін өндірістік жағдайда сынау кезінде технологиялық процестің тегеуріні және су беру мүмкіндіктері, технологиялық және пайдалану көрсеткіштері келтірілген және ГОСТ 6134-81 «Динамикалық сораптар. Сынақ әдістері» талаптарына сәйкес бағаланған. Осы жағдайда базалық

сораптың су шығыны турбиналы су есептегіштің көмегімен есептелген. Гидроэлеватордың қойыртпақ көтеру өнімділігі көлемдік анықтау әдісімен, ал қысым – сынақтан өткен манометр көмегімен анықталған.

Сынақтан өткеру нәтижесінде базалық сораптың ағынды – қысым сипаттамалары толық сақталатын-дығы (су өтімі 60-70 м<sup>3</sup>/сағ, тегеурін 110-118 м аралығында), электр қозғалтқышына артық жүктеме болмайтындығы (амперметр көрсеткіштері рұқсат етілген диапазонда 68-71) ампер), суды тазарту деңгейі 95-96% құрайтыны анықталған. Сорап қозғалтқышының шамадан тыс жүктемесін азайту негізінен оның негізгі бөліктерін механикалық қоспасыз сумен салқындатуға байланысты екендігі көрсетілген.

Саңылау бекітетін пакердің майда тесіктермен жасалғаны және жоғарғы жақта екінші минициклоны қосумен тәрізді қоюлатқыштың қосымша орнатылуы су тазарту сұлбасының жұмысын едәуір жақсартқан.

Өндіріс жағдайындағы сынақ нәтижелері, негізінен, гидроциклонды қабылдау камерасымен жабдықталған ЭЦВ типтегі сораптардың жұмыс сипаттамаларының жақсаратындығын растайды.

Жаңа сорап қондырғысының экономикалық тиімділігіне, пайдалану шығындарын азайту және сораптың сапалық сипаттамаларын (жылдық жұмыс уақыты, ұзақтылығы және т.б.) сақтау жағдайында, оның қызмет ету мерзімін арттыру арқылы қол жеткізіледі.

**Түйін сөздер:** ұңғыма, құмдану, ұңғыма сорабы, абразивті қажалу, вакуумды гидроциклон, сынақтан өткеру, тазалау деңгейі.

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### **ЗАЩИТА СКВАЖИННЫХ ЦЕНТРОБЕЖНЫХ НАСОСОВ ОТ АБРАЗИВНОГО ИЗНОСА С ПОМОЩЬЮ ВАКУУМНОГО ГИДРОЦИКЛОНА**

**Аннотация.** Рассмотрены и проанализированы конструктивные особенности существующих конструкций и технологии по защите скважинных насосов типа ЭЦВ от абразивного износа при эксплуатации.

Это связано с тем, что на объектах водоснабжения РК по причине пескования водозаборных скважин ежегодно выходят из строя до 40...50% установленных насосов ЭЦВ-6 и ЭЦВ-8, из которых до 4 тыс. штук заменяется на новые и примерно такое же количество ремонтируется. Восстановление работоспособности скважины и водоподъемного устройства связано с большими затратами на ремонтные работы. Например, капитальный ремонт погружного насоса типа ЭЦВ обходится 70...80% его базовой стоимости.

На основе проведенного анализа предложен новый способ улавливания твердых примесей на всасывающей линии скважинного насоса типа ЭЦВ с помощью гидроциклона напорно-вакуумного действия.

Указано, что при полевых испытаниях опытного образца новой установки технологический процесс оценен по напорно-расходной характеристике и технологическо-эксплуатационными показателями в соответствии с требованиями ГОСТ 6134-81 "Насосы динамические. Методы испытаний".

При этом расход базового насоса по воде определен при помощи турбинного водомера, установленного на водоподъемной трубе с задвижкой. Производительность гидроэлеватора по пульпе определена объемным способом, а напор перед задвижкой напорного патрубка насоса – с помощью образцового манометра.

Установлено, что расходно-напорные характеристики испытуемого базового погружного насоса ЭЦВ обеспечиваются в полной мере (расход воды 60-70 м<sup>3</sup>/ч, напор – 110-118 м), перегрузки на электродвигатель не обнаружены (показания амперметра находятся в допустимых пределах - 68-71 ампер), степень очистки воды составляет 95-96%. Снижение перегрузки электродвигателя насоса преимущественно происходит за счет охлаждения его основных частей водой без механических примесей.

Отмечено, что выполнение гибкого пакерного устройства с прорезами и наличие на поверхности второго минициклона – сгустителя значительно улучшает функционирование принятой схемы водоподготовки.

Результаты испытаний в производственных условиях в целом подтверждают возможность и целесообразность использования погружных водоподъемных насосов типа ЭЦВ с гидроциклонной приемной камерой.

Экономический эффект от применения нового погружного насосного агрегата с гидроциклоном достигается за счет снижения эксплуатационных затрат и увеличения срока службы насоса с сохранением его качественных характеристик (годовая наработка, долговечность и т.д.).

**Ключевые слова:** скважина, пескование, погружной насос, абразивный износ, напорно-вакуумный гидроциклон, испытание, степень очистки.

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## HYDRAZIDE OF *o*-HYDROXYBENZOIC ACID AND ITS ERIVATIVES. SYNTHESIS AND PROPERTIES

**Abstract.** The article presents the results of a study by the authors of the article on the development of new ways of synthesis and study of the biological activity of hydrazone derivatives of *o*-hydroxybenzoic acid. Methods for the preparation of hydrazone, oxadiazole, thiosemicarbazide, 1,2,4-triazole-3-thionic derivatives and methods for their further modification are described. The condensation reaction of hydroxybenzoic acid hydrazides with 1-deoxy-2,3,4,6-tetra-O-acetyl-D-glucopyranosyl isothiocyanate synthesized their corresponding acetylated glycosyl-containing thiosemicarbazide derivatives. The structures of the synthesized compounds were studied by <sup>1</sup>H and <sup>13</sup>C NMR spectroscopy, as well as by the data of two-dimensional spectra of COSY (<sup>1</sup>H-<sup>1</sup>H) and HMQC (<sup>1</sup>H-<sup>13</sup>C). The values of chemical shifts, multiplicity, and integrated intensity of <sup>1</sup>H and <sup>13</sup>C signals in one-dimensional NMR spectra were determined. Using spectra in the formats COSY (<sup>1</sup>H-<sup>1</sup>H) and HMQC (<sup>1</sup>H-<sup>13</sup>C), homo- and heteronuclear interactions were established, confirming the structure of the compounds under study. The results of evaluating their antimicrobial, anti-inflammatory and cytotoxic activity (*in vitro*) on cultures of human monocytic cell lines *MonoMac-6* and *THP-1Blue* are described.

**Key words:** *o*-hydroxybenzoic acid hydrazone, thiosemicarbazide, hydrazone, oxadiazole

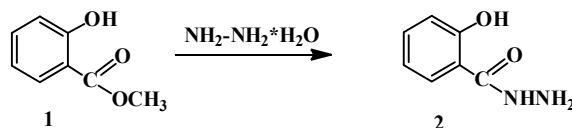
**Introduction.** Modification of the structure of known bioactive substances widely used in medical practice is still one of the main approaches in the search for new drugs. One of the promising substrates for the modification of substrates is the molecule of *o*-hydroxybenzoic acid (salicylic acid (SA)). Many derivatives of *o*-hydroxybenzoic acid (salicylates) have been used in medical practice as non-steroidal anti-inflammatory drugs since the middle of the last century (since 1876) [1-5]. They combine this action with an analgesic and antipyretic effect. Derivatives such as acetylsalicylic acid (ASA, aspirin), sodium salicylate, salicylamide (SAM), methyl salicylate are used in medicine as analgesics (analgesic), antipyretics (antipyretic) and antiplatelet agents (antithrombotic) [1-4]. *p*-hydroxybenzoic acid methyl ester (methylparaben, nipagin, methyl-4-hydroxybenzoate) has been used as a preservative and antiseptic [3-5].

Most drugs of the salicylate group also have similar side effects: a damaging effect on the mucous membrane of the gastrointestinal tract, impaired renal function, and some others [2-6]. In the scientific literature there is evidence of antimicrobial, antifungal [6-9], psychotropic, antitumor, antipyretic, anti-inflammatory and cytotoxic properties of various hydroxybenzoic acid derivatives [10-14].

According to recent data, derivatives of SA can be considered as bioregulators, which are synthesized by the body itself and perform protective functions. And this allows us to rethink the role of SA in the pathophysiology of humans and animals. In recent years, interest in derivatives of *o*- and *p*-hydroxybenzoic acids has increased again [6-12], due to the relevance of the search for new antibacterial drugs. In this regard, an important task is the development of new and improvement of known methods for the synthesis of new derivatives of SC. In this regard, we found it interesting to study hydrazone, oxadiazole, thiosemicarbazide,

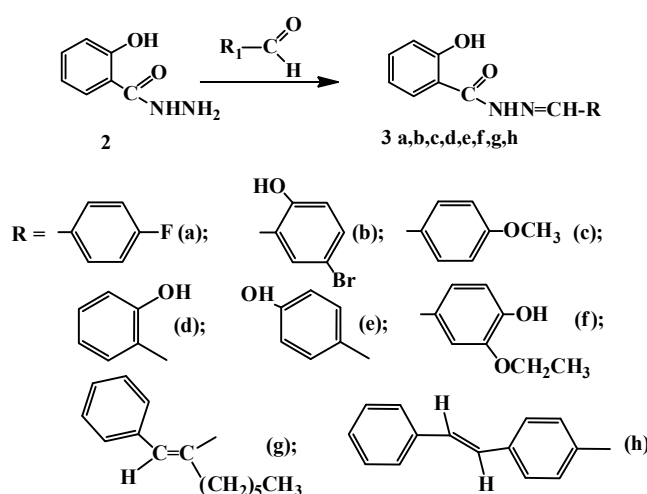
1,2,4-triazole-3-thionic, and other derivatives of these synthons. New derivatives of SC should be characterized by increased biological activity in combination with low toxicity and less pronounced side effects.

In this work, we generalized some of our own results of the synthesis of *o*-hydroxybenzoic acid hydrazide derivatives (salicylic acid (SA)). These studies are aimed at searching for new antimicrobial derivatives and ways for their further modification. The initial *o*-hydroxybenzoic acid hydrazide (**2**) was obtained by the interaction of methyl salicylate (**1**) with hydrazine hydrate [15-17].



The obtained **2** was subsequently reacted with various functionally substituted aromatic aldehydes to produce new *N*-arylidenehydrazones (**3**).

The condensation reaction was carried out by heating equimolar amounts of aldehydes and (**2**) in ethanol at 60–70°C for 3-5 hours [15-17].



The products of reaction **3** are white crystallizable substances that are soluble in many organic solvents; the yield of compounds is 70-90%.

The structure of all the obtained *N*-arylidenehydrazones of *o*-hydroxybenzoic acid was proved using IR and <sup>1</sup>H, <sup>13</sup>C NMR spectroscopy, and the composition was determined by elemental analysis. Spin-spin interactions in these substances, carried out between H-H and H-C atoms through one or more bonds, were established using the two-dimensional spectra of COSY (<sup>1</sup>H-<sup>1</sup>H) and HMQC (<sup>1</sup>H-<sup>13</sup>C) (figures 1 and 2) [15,16].

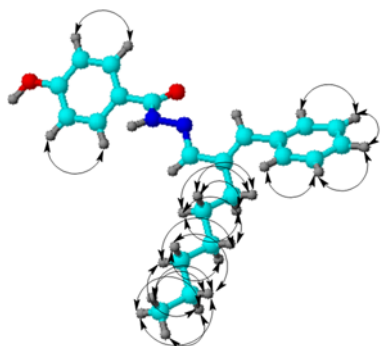


Figure 1 – Correlation of COZY (<sup>1</sup>H-<sup>1</sup>H) of compound **3f**

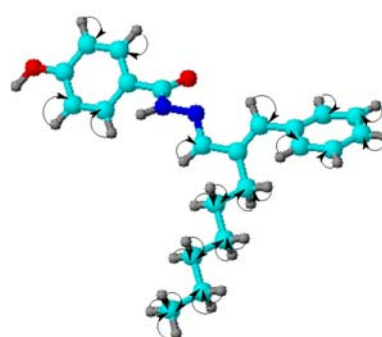


Figure 2 – Correlation of HMQC (<sup>1</sup>H-<sup>13</sup>C) of compound **3f**

To prove the spatial structure of the derivatives of *N*-arylidenehydrazones of *p*-hydroxybenzoic acid, an X-ray diffraction study of *N*-(5-bromo-2-hydroxybenzylidene)-4-hydroxybenzohydrazide (**3b**) was performed (figure 3).

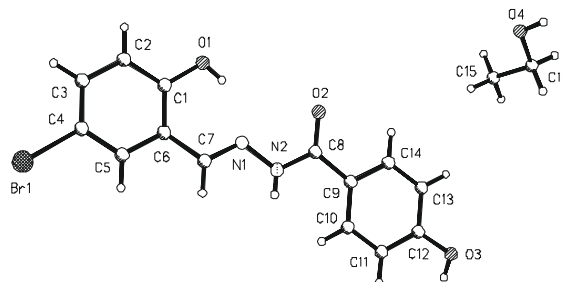
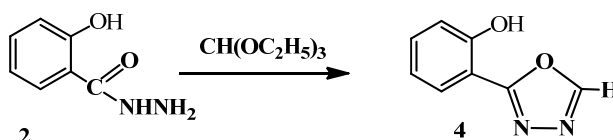


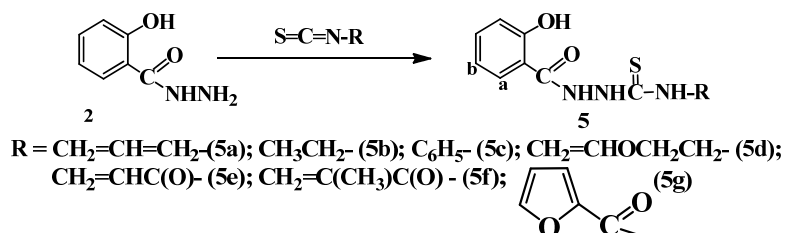
Figure 3 – The spatial structure of the molecule. N-(5-bromo-2-hydroxybenzylidene)-4-hydroxybenzohydrazide (**3b**)

The carbonyl group and the hydrazide fragment are convenient synthons for heterocyclization. The study of the scintillation efficiency of a large number of various organic substances has led to the discovery of new, very promising classes of compounds, one of which is the class of oxadiazoles [2-5]. In this regard, it was of interest to us to synthesize new oxadiazole derivatives based on **2** and orthoformate. Orthoform ether is widely used in organic chemistry for the synthesis of various heterocyclic systems [9-13]. The interaction of **2** with a triple amount of orthoformate ester while boiling the reaction mixture led to the formation of 2-substituted 1,3,4-oxadiazole (**4**) [17]:



The synthesized compound **4** is a crystalline substance soluble in many organic solvents. In the  $^1\text{H}$  NMR spectrum of compound **4**, the signals of  $\alpha$  and  $\beta$  protons of the aromatic ring are recorded in the field of weak fields:  $\text{H}_\alpha$  doublet at 7.98 ppm. and  $\text{H}_\beta$  6.98 ppm. The proton of aromatic hydroxyl appears singlet at 10.53 ppm. The methylene proton signal appears in the region of 9.22 ppm. narrow singlet.

The addition of hydrazides to various isothiocyanates is one of the convenient methods for the synthesis of substituted thiosemicarbazides [4,10-12], which are interesting substrates for the formation of various heterocycles, including heterocyclic ensembles. We carried out a series of nucleophilic addition reactions of *o*-hydroxybenzoic acid hydrazide to various isothiocyanates. The reactions were carried out in an alcohol medium at equimolar ratios of the reactants. The synthesized compounds **5** are white crystalline substances that are readily soluble in polar organic solvents [18,19].

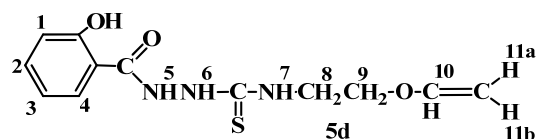


In the IR spectra of synthesized compounds **5**, an absorption band appears in the region of 1330–1310  $\text{cm}^{-1}$ , which is characteristic of the -NH-CS group of the thiosemicarbazide fragment, and absorption bands of the amide group  $\text{C}(\text{O})\text{NH}$  appear in the region of 1690–1675  $\text{cm}^{-1}$  and -NH- groups in the region of 3390–3360  $\text{cm}^{-1}$ .

In the  $^1\text{H}$  NMR spectrum of allylthiosemicarbazide *o*-hydroxybenzoic acid (**5a**), signals and protons of the aromatic ring are recorded in the field of weak fields: doublet H at 7.78 ppm. ( $J_{\text{HH}}=8.7$  Hz) and doublet H at 6.81 ppm. The proton of aromatic hydroxyl manifests itself as a singlet at 10.09 ppm. Amide and thioamide N-H protons are also written out in the field of weak fields in the form of three singlets in the region of 10.06 ppm. ( $\text{H}_1$ ), 9.25 ppm. ( $\text{H}_2$ ) and 8.2 ppm. ( $\text{H}_3$ ). The methine proton  $\text{H}_5$  of the vinyl fragment appears as a complex multiplet in the region of 5.82 ppm. The methylene protons  $\text{H}_{6a}$  and  $\text{H}_{6b}$  of the same vinyl fragment are manifested by two doublets in the region of 5.04 ppm. and 5.14 ppm with the spin-spin interaction constant  $J_{\text{H}_{6a}\text{H}_{6b}}=17.27$  Hz. Methylene protons of the  $\text{NCH}_2$ -fragment manifest themselves in the



region of 4.09 ppm. in the form of an expanded triplet. The ratio of integrated intensities corresponds to structure 10a.



When analyzing the  $^1\text{H}$  NMR spectrum of compound **5d**, characteristic signals of protons of the aromatic ring are observed. So, signals of aromatic protons  $\text{H}_1$  -  $\text{H}_4$  are registered in the field of weak fields: doublet  $\text{H}_1$  at 6.97 ppm, triplet  $\text{H}_2$  at 7.45 ppm, triplet  $\text{H}_3$  at 6.92 ppm, doublet  $\text{H}_4$  at 7.87 ppm. The signals of the four methylene protons  $\text{H}_8$ ,  $\text{H}_9$  of the oxyethyl moiety appear as two triplets in the region of 3.70 ppm. and 3.80 ppm. The methine proton  $\text{H}_{10}$  of the vinyl residue is written out as a doublet of doublets in the region of 6.50 ppm. The methylene protons  $\text{H}_{11a}$  and  $\text{H}_{11b}$  of the same vinyl fragment are manifested by two doublets in the region of 4.00 ppm. and 4.21 ppm. The proton of aromatic hydroxyl appears singlet at 8.30 ppm. Amide and thioamide N-H protons are written out as three singlets in the region of 11.92 ppm. ( $\text{H}_5$ ), 10.58 ppm. ( $\text{H}_6$ ) and 9.55 ppm. ( $\text{H}_7$ ) [15-19].

In order to study the spatial structure and stereochemistry of salicylic acid hydrazide derivatives, an X-ray diffraction study of salicylic acid N-furanoylthiosemicarbazide (**5g**) was carried out. A general view of the 9g molecule is shown in figure 4.

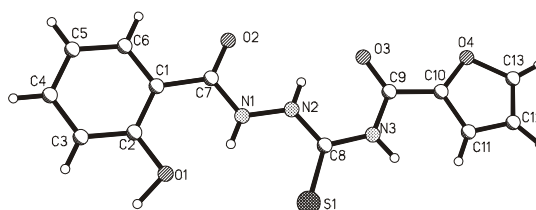
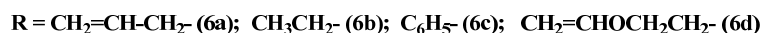
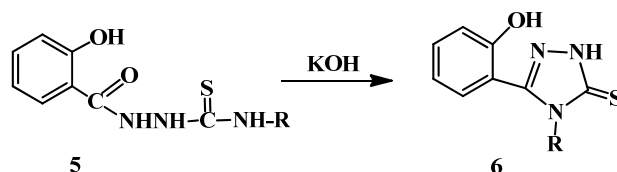


Figure 4 – The spatial structure of the molecule. Salicylic Acid N-Furanoylthiosemicarbazide (**5g**)

The phenolic cycle is flat with an accuracy of  $\pm 0.003 \text{ \AA}$ . The furan ring is flat with an accuracy of  $\pm 0.002 \text{ \AA}$ . The phenolic cycle, relative to the main skeleton of the molecule, is slightly developed, almost lying in the plane of the remaining atoms. This position of the phenolic cycle is explained by the presence of a strong intramolecular hydrogen bond  $\text{N1H} \dots \text{O1}$ , which holds the hydroxyl group and does not allow the cycle to take an energetically favorable position, i.e. turn around  $90^\circ$ . Also, the molecules in the package are connected by another intermolecular H-bond, which forms endless ribbons along the crystallographic axis b.

In order to study the properties of new potentially bioactive substances, we [19-21] carried out a number of preparatively convenient chemical transformations with the obtained thiosemicarbazides, which led to the production of 1,2,4-triazole-3-thions (**6**).



The thiosemicarbazides (**5**) of o-hydroxybenzoic acid were cyclized in **6** by boiling for 2–3 hours in an aqueous solution of caustic potassium followed by acidification with acetic acid.

In the IR spectra of the obtained new triazoles **6b** there is no absorption band characteristic of the amide carbonyl ( $\text{C} = \text{O}$ ) and in the region of  $1272 \text{ cm}^{-1}$  there is an absorption band for the thiocarbonyl group ( $\text{C} = \text{S}$ ).

When analyzing the  $^1\text{H}$  NMR spectrum of compound **6b**, characteristic signals of the protons of the aromatic ring are observed. So, signals and protons of the aromatic ring are registered at 7.48 ppm. ( $J_{\text{H}\square\text{H}\square} = 8.6 \text{ Hz}$ ) and 6.93 ppm. in the form of two doublets, respectively. In a weak field, signals of proton aromatic

hydroxyl are recorded at 10.09 ppm. and thioamide N-H proton at 13.79 ppm. in the form of two small broadened singlets. Signals of methyl group protons resonate at 1.15 ppm. ( $J_{HH} = 7.1$  Hz) as a triplet and a methylene group at 4.01 ppm. ( $J_{HH} = 7.2$  Hz) as a quartet.

In order to establish the spatial structure of the synthesized triazoles **6**, an X-ray diffraction study of the 4-ethyl-5-(2-hydroxyphenyl)-1,2,4-triazole-3-thione (**6b**), 4-(2-hydroxyethyl)-5- molecule was carried out (2-hydroxyphenyl)-2H-1,2,4-triazolo-3(4H)-thione (**6d**) and crystalline hydrate 4-allyl-3-(4-hydroxyphenyl)-1H-1,2,4-triazole-5(4H)-thione (**6a**), a general view of them is shown in figures 5-7 [20-22].

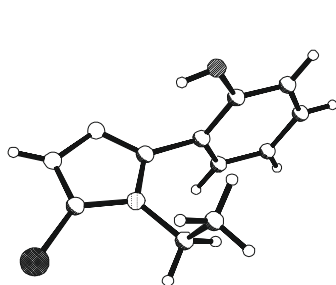


Figure 5 – Molecule structure. 4-ethyl-5-(2-hydroxyphenyl)-1,2,4-triazole-3-thione (**6b**)

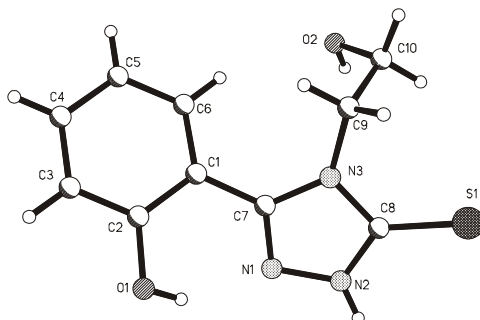


Figure 6 – The spatial structure of the molecule. 4-(2-hydroxyethyl)-5-(2-hydroxyphenyl)-2H-1,2,4-triazolo-3(4H)-thione (**6d**)

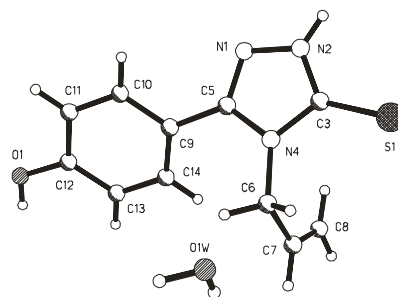
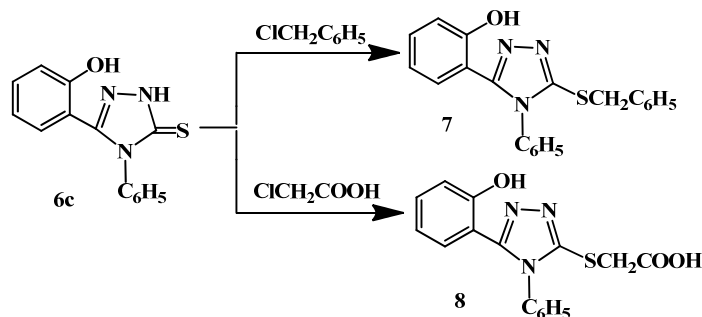


Figure 7 – Molecule structure. 4-allyl-3-(4-hydroxyphenyl)-1H-1,2,4-triazole-5(4H)-thione (**6a**)

The five-membered triazole cycle  $N_1N_2N_3C_7C_8$  of compound **6d** is flat with an accuracy of  $\pm 0.0028$  Å. The sulfur atom leaves the plane of these atoms at  $+0.079$  Å. The flattening of this cycle occurs in our opinion due to the conjugation of the electron densities of double bonds  $N_1=N_2$  and  $C_8=S_1$ . The atoms of the phenolic cycle are coplanar with an accuracy of  $\pm 0.0012$  Å, the output of the O1 atom is  $-0.074$  Å from the plane of the remaining atoms. The phenolic cycle is in equatorial orientation relative to the triazole cycle (torsion angle  $N_1C_7C_1C_2 = 32,84^\circ$ ). An intramolecular hydrogen bond  $O_1H O_1 \dots N_1$  is observed in the molecule, which significantly affects the rotation of the phenolic ring relative to the five-membered ring. The bulky substituent at the  $N_3$  atom is oriented equatorially.

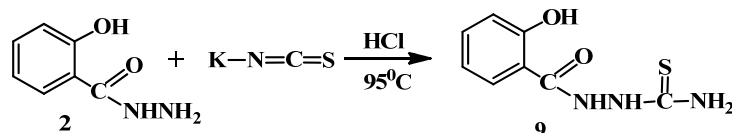
The triazole ring is flat of compounds **6a** with an accuracy of  $\pm 0.005$  Å, the allyl group is rotated perpendicular to it, the p-hydroxyphenyl substituent at  $-42.7^\circ$ . A similar reversal of the phenyl cycle is observed in the molecule of 4-amino-3-(4-ethoxyphenyl)-1,2,4-triazole-3-thione (torsion angle  $N_1C_5C_9C_{10} = 41,5^\circ$ ) [23]. However, it should be noted that the turn of the phenyl substituent from the packing of molecules in the crystal can vary significantly. For example, in the 3-phenyl-4,5-di-hydro-1,2,4-triazole-3-thione molecule, the torsion angle is  $N_1C_5C_9C_{10} = 7,9^\circ$  [24], and in the 4-allyl-5-(2-hydroxyphenyl)-2,4-dihydro-1,2,4-triazole-3-thione torsion angle  $N_1C_5C_9C_{10} = 78,8^\circ$  [25]. In the crystal, the molecules are connected by intermolecular hydrogen bonds, forming flat ribbons along the c axis, which, in turn, are crosslinked by hydrogen bonds.

The above described triazole reaction allowed us to synthesize a number of interesting compounds for screening for biological activity [26]. The alkylation of triazole **11c** with benzyl chloride in an alcohol solution and monochloroacetic acid in an aqueous medium in the presence of potassium hydroxide gave 5-S-substituted triazoles **7**, **8**, **13**, **14**.



In the  $^1\text{H}$  NMR spectrum of compound **8**, along with the proton signals of two aromatic rings, 6.79–7.49 ppm. and two hydroxyl groups of 10.16 and 12.95 ppm. there is an intense singlet at 4.07 ppm related to the methylene group  $\text{CH}_2$ .

In order to obtain new thiosemicarbazide derivatives, we [17, 26] also synthesized monosubstituted thiosemicarbazide derivatives by the reaction of *o*-hydroxybenzoic acid hydrazide (**2**) with potassium thiocyanate. The reaction was carried out in a dilute solution of hydrochloric acid at  $95^\circ\text{C}$  for 4 hours.

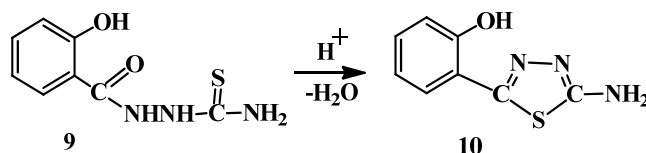


The IR spectrum of thiosemicarbazide *o*-hydroxybenzoic acid (**9**) contains absorption bands of stretching vibrations of the  $\text{NH}_2$  group in the region of  $3305\text{--}3240\text{ cm}^{-1}$ . In the region of  $1660$  and  $1270\text{ cm}^{-1}$ , absorption bands of carbonyl  $\text{C}=\text{O}$  and thiocarbonyl  $\text{C}=\text{S}$  groups are present, respectively.

When analyzing the NMR spectrum of compound **9**, characteristic signals of the protons of the aromatic ring are observed. So, signals of aromatic protons  $\text{H}_1\text{--H}_4$  are recorded in the field of weak fields: doublet  $\text{H}_1$  at 6.89 ppm, triplet  $\text{H}_2$  at 7.42 ppm, doublet  $\text{H}_3$  at 6.93 ppm, doublet  $\text{H}_4$  at 7.81 ppm. The proton of aromatic hydroxyl appears singlet at 9.42 ppm. Amide and thioamide  $\text{N-H}$  protons are written out as three singlets in the region of 11.89 ppm. ( $\text{H}_5$ ), 10.52 ppm. ( $\text{H}_6$ ) and 7.9 ppm. ( $\text{H}_7$ ).

In organic chemistry, the synthesis of cyclic sulfur-containing compounds is given great importance in view of the presence of valuable biological properties. Derivatives of the cyclic system of 1,3,4-thiadiazole are widely used as medicines, oxidation inhibitors, cyanine dyes and complexing agents with metals. The main method for the synthesis of the thiadiazole system is the cyclization of thiosemicarbazide in a strongly acidic medium [27].

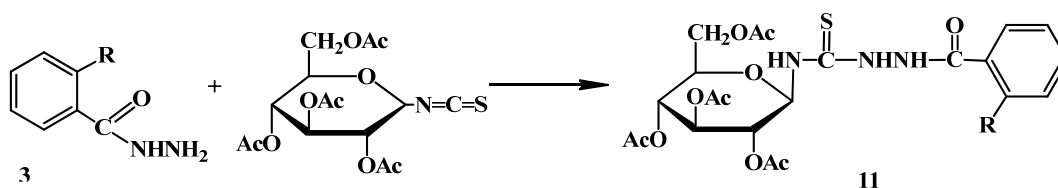
To obtain 5-(*o*-hydroxyphenyl)-2-(amino)-1,3,4-thiadiazole (**10**), we [26] cyclized the thiosemicarbazide of *o*-hydroxybenzoic acid (**9**) in an acidic medium ( $\text{H}_2\text{SO}_4$ ) for 20 hours. As a result of the corresponding treatment, 5-(2-hydroxyphenyl)-2-(amino)-1,3,4-thiadiazole (**10**) was isolated in 75.6% yield, and so on.  $265\text{--}266^\circ\text{C}$ .



In the IR spectrum of 5-(2-hydroxyphenyl)-2-(amino)-1,3,4-thiadiazole (**10**) there are no absorption bands of the  $\text{C}=\text{S}$  group. Absorption bands: at  $3305\text{--}3255\text{ cm}^{-1}$  are caused by stretching vibrations of the  $\text{NH}_2$  group,  $1605\text{ cm}^{-1}$  are characteristic of the  $\text{C}=\text{N}$  bond. Absorption bands are also observed in the regions of  $1515$ ,  $1480$ ,  $1390$ ,  $1235$ ,  $1040$ , and  $860\text{ cm}^{-1}$ , characteristic of vibrations of the 1,3,4-thiadiazole ring [28], and absorption bands at  $1320\text{--}1300\text{ cm}^{-1}$  are valence  $\text{C-N}$  bond vibrations in aromatic amines.

As is known, glycosyl isothiocyanates play a large role in the chemistry of carbohydrates, being synthons in the synthesis of various biologically active compounds [30]. In addition, it is known that the introduction of carbohydrate residues into the structure of biologically active substances leads to an increase in their solubility in water, a sharp decrease in toxicity [31] and prolonged action of drugs [32].

In connection with this condensation of hydrazides **3**, **4** with 1-deoxy-2,3,4,6-tetra-*O*-acetyl-*D*-glucopyranosyl isothiocyanate, the corresponding acetylated glycosyl-containing thiosemicarbazide derivatives of *o*-hydroxybenzoic acid were synthesized (**11**) [16,33,34].



It was found that 1-isothiocyano-1-deoxy-2,3,4,6-tetra-O-acetyl-D-glucopyranose quite readily reacts with o-hydroxybenzoic acid hydrazide in an o-xylene solution at room temperature. The synthesized compound **11** was obtained with a yield of 57.8% and after recrystallization from a mixture of isopropanol-hexane is a white crystalline substance, readily soluble in many organic solvents, except saturated hydrocarbons.

All compounds **3** were tested to evaluate their anti-inflammatory activity (in vitro) on cultures of human MonoMac-6 monocytic cell lines. The anti-inflammatory effect was evaluated as the ability of a compound to inhibit lipopolysaccharide (LPS)-induced production of pro-inflammatory cytokines interleukin-6 (IL-6) and tumor necrosis factor (TNF) in MonoMac-6 cells. The cells were treated with the compound for 30 min, then LPS (0.5 µg / ml) was added to the cell culture. Cytokine levels were evaluated after 24-hour incubation. Cytokines were measured in cell supernatants using an enzyme immunoassay (ELISA). The effective concentration, which suppresses the response by 50% (IC50), was found using regression analysis using dose-dependent curves. As a result, it was found that all the studied hydrazones do not suppress LPS-induced production of IL-6 and TNF in MonoMac-6 cells.

Compounds **3** were studied to evaluate their effect on the activity of the neutrophil elastase enzyme (EC 3.4.21.37) (table 1). Elastase activity was evaluated as the ability of a compound to hydrolyze a synthetic substrate N-methylsuccinyl-Ala-Ala-Pro-Val-7-amino-4-methylcoumarin (*Calbiochem*). The formation of a fluorescent product was measured with excitation of 355 nm and emission of 460 nm on a *Fluoroskan Ascent FL* instrument. An effective concentration causing a 50% inhibition of enzyme activity (IC50) was found by regression analysis.

Table 1 – The inhibitory activity of hydrazones against human neutrophil elastase

No	Compound	IC <sub>50</sub> , µM
3a	N-(4-fluorobenzylidene)-2-hydroxybenzohydrazide	N.D. <sup>a</sup>
3b	N-(5-bromo-2-hydroxybenzylidene)-2-hydroxybenzohydrazide	33,3
3c	2-hydroxy-N-(4-methoxybenzylidene)benzohydrazide	N.A.
3d	2-hydroxy-N-(2-hydroxybenzylidene)benzohydrazide	N.A.
3e	2-hydroxy-N-(4-hydroxybenzylidene)benzohydrazide	97,8
3g	N-(3-ethoxy-4-hydroxybenzylidene)-2-hydroxybenzohydrazide	78,8
3f	N-(2-benzylidene-ethyl styrene)-2-hydroxybenzohydrazide	N.D. <sup>a</sup>
3h	2-hydroxy-N-(4-((E)styryl)benzylidene)benzohydrazide	N.D. <sup>6</sup>

<sup>a</sup>, the compounds are rapidly hydrolyzed, which is accompanied by either a decrease or an increase in intrinsic fluorescence at 460 nm; <sup>6</sup> the compound has a high level of intrinsic fluorescence.

As a result, it was shown that some hydrazones, in particular N-(5-bromo-2-hydroxybenzylidene)-2-hydroxybenzohydrazide (**3b**), N-(3-ethoxy-4-hydroxybenzylidene)-2-hydroxybenzohydrazide (**3g**), 2-hydroxy-N-(4-hydroxybenzylidene) benzohydrazide (**3e**) inhibits neutrophil elastase activity.

Study of the fluorescence spectra of the compounds N-(2-benzylidene-octylene)-2-hydroxybenzohydroside (**3f**) and 2-hydroxy-N-(4-((E)styryl) benzylidene)benzohydrazide (**3h**) during their spontaneous hydrolysis, were recorded on a Perkin Elmer LS50B instrument at  $\lambda_{\text{ex}}=355$  nm. N-(2-Benzylidene-ethylstyrene)-2-hydroxybenzohydroside (**3f**) has a specific fluorescence peak ( $\lambda_{\text{ex}}=355$  nm;  $\lambda_{\text{em}}=475$  nm). In an aqueous medium, **3f** is almost completely hydrolyzed in 10 min, which is accompanied by the disappearance of fluorescence in the region of 460–475 nm and the appearance of a peak of weaker fluorescence at  $\lambda=395$  nm (fig. 8A). 2-Hydroxy-N-(4-((E)styryl)benzylidene)benzohydrazide (**3h**) has a specific fluorescence peak ( $\lambda_{\text{ex}}=355$  nm;  $\lambda_{\text{em}}=460$  nm). In an aqueous medium, **3h** is almost completely hydrolyzed in 20 min, which is accompanied by an increase in fluorescence at  $\lambda=460$  nm (figure 8B).

As a result, it was found that spontaneous hydrolysis of hydrazone **3f** and **3h**, proceeding presumably in the imino group  $>C=N-$ , is accompanied by a change in the fluorescence spectra of the solution. The synthesized compounds underwent biological tests for the presence of antimicrobial activity under the supervision of PhD. Akhmetova S.B. on the basis of the Department of Microbiology of the Karaganda State Medical University.

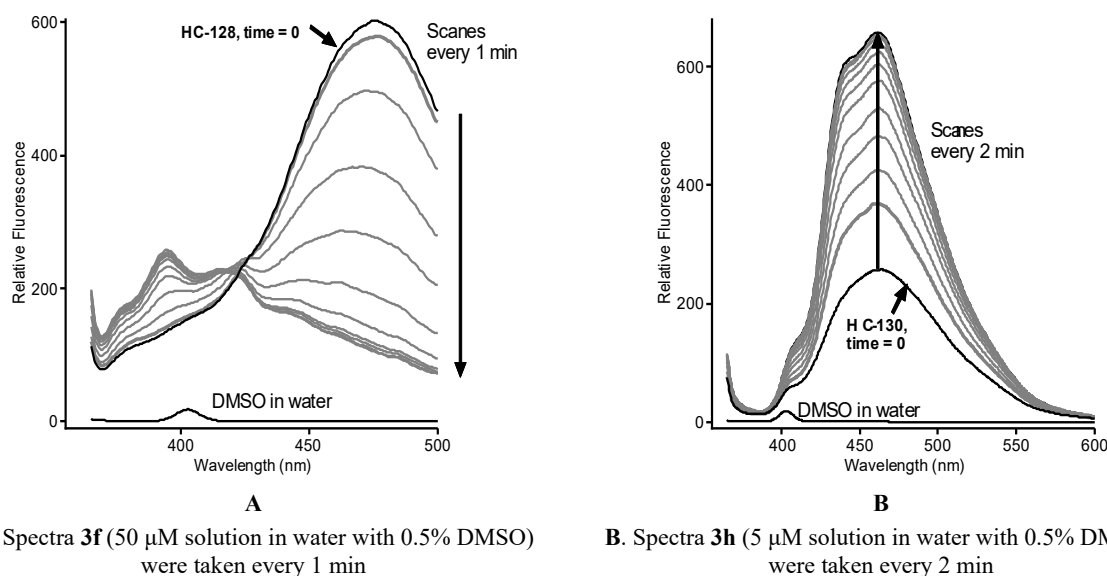


Figure 8 – Kinetics of the fluorescence spectra of hydrazides **3f** and **3h** at  $\lambda_{\text{ex}}=355$  nm (gap width 5 nm)

The obtained experimental data allow us to conclude that substances **3a** and **3b** exhibit weak antibacterial activity against strains of gram-positive bacteria *Staphylococcus aureus*, *Bacillus subtilis*, gram-negative strains of *Escherichia coli*, *Pseudomonas aeruginosa* and to yeast *Candida albicans* (for comparison, bacteria and nystatin for the yeast *C.albicans*).

The synthesized compounds **5a**, **5g**, **6d** passed biological tests for antimicrobial activity [16]. As a result of the bioscreening, it was found that the compound N-allyl-2-(2-hydroxybenzoyl)-hydrazinocarbothioamide (**5a**) exhibits pronounced activity against gram-positive strains (*Staphylococcus aureus*, *Bacillus subtilis*). Substances **5g** and **6d** exhibit moderate antibacterial activity against gram-positive (*Staphylococcus aureus*, *Bacillus subtilis*). Compounds **5a**, **5g**, **6d** show a moderately pronounced activity against the gram-negative strain of *Escherichia coli* and *Pseudomonas aeruginosa* with a pronounced antifungal effect against yeast *Candida albicans*.

Compound **6d** was tested for growth-promoting properties in the biotechnology laboratory of Kazakh Research Institute of fruit growing and viticulture (Almaty). The test was carried out on the processes of common beans, a verified concentration of rhizogenesis regulators -10, 50 and 100 mg/l. An analysis of the data showed that the test growth regulator at different concentrations contributes to better root formation of beans compared to water. The greatest effect on the root formation of the test compound compared to the standard preparation (akpinol) was obtained at a concentration of 50 mg/l. The tested preparation showed rhizogenic activity on bean processes, but it depended on the concentration of the growth regulator. Compounds **5a-d** and **6a-d** were tested to evaluate their anti-inflammatory and cytotoxic activity (*in vitro*) on cultures of human monocytic *MonoMac-6* and *THP-1Blue* cell lines.

The anti-inflammatory effect was evaluated as the ability of the compound to suppress lipopolysaccharide (LPS)-induced production of pro-inflammatory cytokines interleukin-6 (IL-6) and tumor necrosis factor (TNF) in *MonoMac-6* cells, as well as NF- $\kappa$ B-dependent production of alkaline phosphatase (ALP) in transfected *THP-1Blue* cells. The cells were treated with the compound for 30 minutes, then LPS (0.5  $\mu\text{g}/\text{ml}$ ) was added to the cell culture. Cytokine or alkaline phosphatase levels were evaluated after 24-hour incubation. Cytokines were measured in cell supernatants using an enzyme immunoassay (ELISA). AP production was measured using a specific Quanti-Blue<sup>TM</sup> substrate. The level of cytotoxicity was evaluated using the chemiluminescent *CellTiter-Glo* kit. The effective concentration, which suppresses the response by 50% (IC<sub>50</sub>), was found using regression analysis using dose-dependent curves (at least 5 concentrations). As a result, the investigated thiosemicarbazides **5a-d** and 1,2,4-triazolthione **6a-d** were non-cytotoxic and inactive in the anti-inflammatory test *in vitro* at concentrations <100  $\mu\text{M}$ .

Compounds **5a-c** were tested for antioxidant (antiradical) activity. The antiradical effect of the samples was carried out against the DPPH radical. Under the conditions of this test system, sample **5c** showed

pronounced antiradical activity, for which a concentration was determined that could reduce the optical density of a 100  $\mu\text{M}$  solution of the DPPH radical by 50%. For N-phenyl-2-(2-hydroxybenzoyl)hydrazine-carbothioamide (**5c**), the IC<sub>50</sub> (DPPH) was 15.5  $\mu\text{M}$ .

The compound N-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-glucopyranosyl)-2-(2-hydroxybenzoyl)hydrazinocarbothioamide (**11**) passed a screening test for antimicrobial activity. It was found that this compound exhibits moderate antibacterial activity against gram-positive (*Staphylococcus aureus*, *Bacillus subtilis*) and gram-negative *Escherichia coli* strain, as well as yeast *Candida albicans*.

Thus, the above material demonstrates the feasibility and prospects of the search for highly effective biologically active substances among the new multifunctional derivatives of o-hydroxybenzoic acid hydrazides. The functionality of o-hydroxybenzoic acid hydrazide and its derivatives emphasize the need to continue work in the field of synthesis of biologically active substances, which may ultimately lead to the identification of new biologically active drugs.

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#### o-ГИДРОКСИБЕНЗОЙ ҚЫШҚЫЛ ГИДРАЗИДІ МЕН ОНЫҢ ТУЫНДЫЛАРЫ. СИНТЕЗ ЖӘНЕ ҚАСИЕТТЕРІ

**Аннотация.** Мақалада авторлардың o-гидроксилбензой қышқыл гидразид туындыларының биологиялық белсенділігін синтездеудің және зерттеудің жаңа тәсілдерін жасау нәтижелері ұсынылған. o-Гидроксилбензой қышқылының гидразидтерінің құрылысының өте үлкен синтетикалық және биологиялық потенциалы бар екені, олар оның жаңа биологиялық белсенді қосыларын синтездеу әдістемелерін жасауға мүмкіндік беретіні көрсетілді. Оларға келесідей ұқсас қосалқы зиянды әсерлердің тән екені көрсетілді: адамның іш-құрылысының жұқа қабатына, бүйректің дұрыс жұмысты істеу қызметіне және тағы басқаларға. Ғылыми әдебиетте оксibenзой қышқылының әр түрлі туындыларының микробқа қарсы, ісікке қарсы, антипиретті, антифломаторлы және цитотоксикалық әсерлері туралы деректер бар екені анықталды. Әдебиеттердегі салицил қышқылының әртүрлі туындыларының қасиеттері туралы мәліметтері бойынша қышқылдық топтар негізінде орын алмасулар олардың жоғары температураны төмендететін, анальгетикалық, қабынуға қарсылық қасиеттерінің сақталатынын және олардың құрылысында жаңа биологиялық белсенділіктердің пайда болатынын анықталды. Ал салицил қышқылының фенилді тобы бойынша орыналмасулар оларда туберкулезге қарсылық, фунгицидтік, микробтарға қарсылық, антидепрессанттық әкелетіні көрсетілді. Осы тұрғыда олардың көптеген туындыларында, бастапқы субстратқа тән, ауруды қойдыратын, дене ыстығын төмендеткізетін қасиеттердің сақталатыны анықталды ( $R'' = \text{NH}_2, \text{Cl}, \text{Br}, \text{NO}_2$  және басқалар). Осы қатардағы көптеген биологиялық белсенді заттар негізінен молекуланың бастапқы құрылысымен сутектік байланыстарды түзетін аминді және амидті топтардан, және молекулалардың әр түрлі рецепторлармен қажетті конформациялық пен сәйкестілікті қамтамасыз ететін ароматты топтардан тұратыны көрсетіледі. Гидразонды, оксадиазолды, тиосемикарбазидті, 1,2,4-триазол-3-тионды туындыларды дайындау әдістері және оларды әрі қарай өзгерту әдістері сипатталған. Гидразон туындыларына альдегид ретінде әртүрлі ароматтық альдегидтер қолданылған: 4-фторбензальдегид, 5-бром-2-гидроксibenзальдегид, 4-метоксibenзальдегид, 2- и 4-гидроксibenзальдегидтер. o-Гидроксibenзой қышқыл гидразидінің тиосемикарбазидті туындылары аллил-, этил-, фенил-, акрилоил-, фураноилизотиоцианаттарды қолдана отырып синтездеген. 1-дезоксiben-2,3,4,6-тетра-O-ацетил- $\beta$ -D-глюкопиранозил изотиоцианаты бар гидроксibenзой қышқылы гидразидтерінің конденсация реакциясы олардың сәйкес ацетилденген гликозилі бар тиосемикарбазид туындылары синтезделді. 1-Изотиоциано-1-дезоксiben-2,3,4,6-тетра-O-ацетил- $\beta$ -D-глюкопираноздың o-гидроксibenзой қышқыл гидразидімен бөлме температурасында және o-ксилол еріткісінде реакцияға жеңіл түсетіні анықталды. Синтезделген қосылыстардың құрылымы <sup>1</sup>H және <sup>13</sup>C ЯМР спектроскопиясымен, сонымен қатар COZY (<sup>1</sup>H-<sup>1</sup>H) және HMQC (<sup>1</sup>H-<sup>13</sup>C) екі өлшемді спектрлерінің мәліметтерімен зерттелінді. Бірөлшемді ЯМР спектрлеріндегі <sup>1</sup>H және <sup>13</sup>C сигналдарының химиялық ығысуының, көбейтуінің және интегралды қарқындылығының мәні анықталды. Спектрлерді COZY (<sup>1</sup>H-<sup>1</sup>H) және HMQC (<sup>1</sup>H-<sup>13</sup>C) форматында қолдану, гомо- және гетеронуклеарлық әрекеттесулер құрылды, бұл зерттелетін қосы-

лыстардың құрылымын растайды. Синтезделген қосылыстардың ішіндегі бесеуінің: N-(5-бром-2-гидроксибензилиден)-4-гидроксибензогидразидтің, N-фураноилтиосемикарбазидтің, 4-этил-5-(2-гидроксифенил)-1,2,4-триазол-3-тионның, 4-(2-гидроксиэтил)-5-(2-гидроксифенил)-2H-1,2,4-триазоло-3(4H)-тионның (6d), 4-аллил-3-(4-гидроксифенил)-1H-1,2,4-триазол-5(4H)-тионның кеңістіктік құрылымы рентгенқұрылымды анализ арқылы дәлелденген. Моно микробқа қарсы, қабынуға қарсы және цитотоксикалық белсенділігін (*in vitro*) адамның моноцитарлық Mono Mac-6 және THP-1Blue жасушалық желілері культураларында бағалау нәтижелері сипатталған. Қабынуға қарсы белсенділік нәтижесінде барлық зерттелген гидразондар MonoMac-6 жасушаларында IL-6 және TNF өнімдерін жоймайтыны анықталды. Гидразон туындыларының нейтрофил эластаза ферментінің белсенділігіне әсерін бағалау нәтижесінде (ЕС 3.4.21.37) кейбір туындылар, атап айтқанда N-(5-бromo-2-гидроксибензилиден)-2-гидроксибензогидразид (3b), N-(3-этокси-4-гидроксибензилиден)-2-гидрокси-бензогидразид, 2-гидрокси-N-(4-гидроксибензилиден)бензогидразид нейтрофил эластазасының белсенділігін тежейтіндігі анықталған. Микробқа қарсы жүргізілген биоскрининг нәтижесі бірнеше қосылыстардың айқын және орташа белсенділіктерінің бар екендігін көрсеткен. N-Фенил-2-(2-гидроксибензоил)-гидразинкарботиоамид ДФПГ-радикалына қарсы айқын антирадикалды белсенділікті көрсетті.

**Түйін сөздер:** *o*-гидроксибензой қышқылы гидразиді, тиосемикарбазид, гидразон, оксидиазол.

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## ГИДРАЗИД *o*-ГИДРОКСИБЕНЗОЙНОЙ КИСЛОТЫ И ЕГО ПРОИЗВОДНЫЕ. СИНТЕЗ И СВОЙСТВА

**Аннотация.** В статье представлены результаты исследования по разработке новых путей синтеза и исследования биологической активности гидразидных производных *o*-гидроксибензойной кислоты. Показано, что структура гидразидов *n*-гидроксибензойной кислоты обладает большим синтетическим и биологическим потенциалом, что дает возможность разработки методов синтеза новых биологически активных веществ. Им присущи и сходные побочные эффекты: повреждающее действие на слизистую оболочку желудочно-кишечного тракта, нарушение функции почек и некоторые другие. В научной литературе имеются данные об антимикробных, антифунгальных, противоопухолевых, антипиретических, антифламоторных и цитотоксических свойствах различных производных оксibenзойной кислоты. Из анализа литературных данных по различным производным салициловой кислоты многие замещения по кислотным группам обеспечивали сохранение жаропонижающих, анальгезирующих, противовоспалительных свойств и появлению новых видов активности. Замещения по фенильному кольцу молекулы салициловой кислоты приводили к появлению противотуберкулезных, фунгицидных, противогрибковых, антидепрессантных и др. свойств. При этом во многих препаратах также сохраняется обезболивающее, жаропонижающее свойства исходного субстрата (R'' = NH<sub>2</sub>, Cl, Br, NO<sub>2</sub> и др). Установлено, что большинство биологически активных структур этого ряда включают в себя аминную или амидную группы, обеспечивающие образование водородных связей с целевой природной молекулой, а также ароматический фрагмент, отвечающий за необходимую конформацию и комплементарность молекулы тому или иному рецептору. Описаны методы получения гидразоновых, оксидиазоловых, тиосемикарбазидных, 1,2,4-триазол-3-тионовых производных и пути их дальнейшей модификации. Для гидразоновых производных в качестве альдегидов были использованы различные ароматические альдегиды как 4-фторбензальдегид, 5-бром-2-гидроксибензальдегид, 4-метоксибензальдегид, 2- и 4-гидроксибензальдегиды. Тиосемикарбазидные производные гидразида *o*-гидроксибензойной кислоты синтезированы с использованием аллил-, этил-, фенил-, акрилоил-, фураноилизотиоцианатов. Реакцией конденсации гидразидов гидроксибензойных кислот с 1-дезоксид-2,3,4,6-тетра-*O*-ацетил-β-D-глюкопиранозилизотиоцианатом были синтезированы их соответствующие ацетилированные гликозилсодержащие тиосемикарбазидные производные. Установлено, что 1-изотиоциано-1-дезоксид-2,3,4,6-тетра-*O*-ацетил-β-D-глюкопиранозид довольно легко реагирует с гидразидом *o*-гидроксибензойной кислоты при комнатной температуре в растворе *o*-ксилола. Исследованы строения синтезированных соединений методами ЯМР <sup>1</sup>H и <sup>13</sup>C спектроскопии, а также данными двумерных спектров COSY (<sup>1</sup>H-<sup>1</sup>H) и HMQC (<sup>1</sup>H-<sup>13</sup>C). Определены значения химических сдвигов, мультиплетность и интегральная интенсивность сигналов <sup>1</sup>H и <sup>13</sup>C в одномерных спектрах ЯМР. С помощью спектров

в форматах COSY ( $^1\text{H}$ - $^1\text{H}$ ) и HMQC ( $^1\text{H}$ - $^{13}\text{C}$ ) установлены гомо- и гетероядерные взаимодействия, подтверждающие структуру исследуемых соединений. Пространственное строение 5-ти соединений: N-(5-бром-2-гидроксибензилиден)-4-гидроксибензогидразида, N-фураноилтиосемикарбазида, 4-этил-5-(2-гидроксибензил)-1,2,4-триазол-3-тиона, 4-(2-гидроксиэтил)-5-(2-гидроксибензил)-2H-1,2,4-триазоло-3(4H)-тиона, 4-аллил-3-(4-гидроксибензил)-1H-1,2,4-триазол-5(4H)-тиона доказаны с помощью рентгеноструктурного анализа. Описаны результаты оценки их антимикробной, противовоспалительной и цитотоксической активности (*in vitro*) на культурах человеческих моноцитарных линий клеток MonoMac-6 и THP-1Blue. В результате противовоспалительной активности выявлено, что все изученные гидразоны не подавляют ЛПС-индуцированную продукцию IL-6 и TNF в клетках MonoMac-6. В результате оценки влияния гидразоновых производных на активность фермента эластазы нейтрофилов (ЕС 3.4.21.37) показано, что некоторые производные, в частности N-(5-бром-2-гидроксибензилиден)-2-гидроксибензогидразид, N-(3-этокси-4-гидроксибензилиден)-2-гидроксибензогидразид, 2-гидрокси-N-(4-гидроксибензилиден)-бензогидразид подавляют активность эластазы нейтрофилов. Проведенный биоскрининг на антимикробную активность выявил несколько соединений с выраженной и умеренно-выраженной активностью. Соединение N-фенил-2-(2-гидроксибензоил)гидразин-карботиоамид показал выраженную антирадикальную активность в отношении ДФПГ-радикала.

**Ключевые слова:** гидразид *o*-гидроксибензойной кислоты, тиосемикарбазид, гидразон, оксодиазол.

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## **EFFECT OF PROBIOTIC "LACTOBACTERIN-TK<sup>2</sup>" ON IMMUNOBIOLOGICAL STATUS OF NEWBORN CALVES IN THE THERAPEUTIC AND PROPHYLACTIC OF GASTROINTESTINAL DISEASES**

**Abstract.** In recent decades, the loss of newborn calves occurs mainly from non-infectious diseases. It is established that in the process of growth and development, especially after birth, the animal has to experience the action of anthropogenic environmental factors that cause various kinds of adaptive reactions of the body. Currently, probiotic drugs are increasingly evaluated not only for their antimicrobial action but also for the characteristics of the impact on the body and its microbiota in the development of the need to strengthen the immune response, in the treatment and treatment of calf diarrhoea. It should be noted that in the modern world, a special place is occupied by studies of lactic acid bacteria associated with the development of biological products with probiotic function. The article presents the results of studying the therapeutic and prophylactic effect of the probiotic drug "Lactobacterin-TK<sup>2</sup>" in gastrointestinal diseases of newborn calves and its effect on the immune and biological status. According to the results of the study, it was found that daily feeding of the probiotic drug "Lactobacterin-TK<sup>2</sup>" to newborn calves from the moment of birth 2 times a day for 10 days increases the nonspecific resistance of the body and the safety of calves. Haematological and biochemical analysis of experimental groups of calves showed a faster normalisation of the level of alkaline phosphatase, glucose, urea, magnesium, iron, potassium, calcium, and phosphorus, which also indicates a complete recovery.

**Keywords:** calves, probiotic, Lactobacterin-TK<sup>2</sup>, diarrhoea, blood test.

**Introduction.** It is known that the state of metabolic processes in animals is the main factor of the physiological state of the organism, which affects the productive performance and reproductive function. Various endogenous and exogenous factors affecting the body of calves in the industrial content, often contribute to the emergence of various metabolic disorders in magnitude, which in the future can lead to a decrease in the immunobiological status, the emergence of diseases causing significant economic losses [1].

In modern animal husbandry, an important and unsolved problem is the problem of ensuring high safety of young animals in the early postnatal period. In recent decades, the loss of newborn calves occurs mainly from non-communicable diseases. It is established that in the process of growth and development, especially after birth, the animal has to experience the action of anthropogenic environmental factors that cause various kinds of adaptive reactions of the organism [2].

One of the components of ecological physiology is the study of the adaptation of the organism as a set of physiological phenomena and functions in their mutual relationship and regulation [3].

The most common non-infectious diseases of young cattle in Almaty region is diarrhoea of newborn calves. This disease causes significant economic damage to the farms of the region, reducing the safety of young animals [4].

Diarrhoea is one of the most common diseases affecting newborn calves in intensive care systems [5]. These systems, increasing in number, cause an imbalance in the intestinal microbiota, which leads to inefficient absorption of nutrients and a slow adaptation in the transition from liquid to solid nutrition [6].

Diarrhoea is one of the most common health problems in young dairy calves [7]. The latest national review of the animal health monitoring system (NAHMS), which represented ~80% of U.S. dairy operations, reported a mortality rate for heifers before feeding of 7.8%. 56.5% of this mortality is due to diarrhoea or other digestive problems. The incidence of intestinal diseases is still too high [8,9].

In recent years, antibiotic therapy for diarrhoea has been applied to specific pathogens and is only related to the severity and duration of the disease. The prophylactic use of 76 antibiotics as growth promoters has been banned in many European Union countries mainly because of the acquired resistance of local microbiota and residues contained in animal products. The use of probiotics has been proposed as a new alternative for the prevention of intestinal disorders, as well as immunomodulators [6]. Probiotics are defined as living microorganisms that, when administered in sufficient quantities, provide health benefits to the host [10]. Various scientists have reported on the effectiveness of probiotics in calves, pigs and poultry. The beneficial effects of probiotics are not limited to improvement [11].

Despite numerous studies of domestic and foreign authors concerning diarrhoea of newborn calves, the issues of therapeutic and prophylactic effectiveness and immune and biochemical status in the application of probiotics to newborn calves have not been studied enough.

In this regard, the improvement of therapeutic and preventive measures, as well as the search for new, effective drugs of immune-corrective action is important.

#### **Materials and methods.**

**Animals and treatment and preventive action.** Experiments on animals were conducted by the head of the Kazakh National Agrarian University and the Director of LLP "Baiserke-agro" Talgar area of Almaty region. The Protocol of the study was approved by the head of the Department of "Biological safety" and head the care and use of laboratory animals in the Department number №1 Dairy Farm in LLP "Baiserke-agro".

**Composition of microbial cells of probiotic preparation and its use.** Dry probiotic preparation "Lactobacterin-TK<sup>2</sup>" contains  $10^6$ - $10^7$  microbial cells of the strain *Lactobacillus acidophilus* B-RKM-0511 in 1 cm<sup>3</sup>, according to the instructions for use diluted in saline sodium chloride in the ratio 1:10 such a way that 1,0 cm<sup>3</sup> of the suspension contained  $10^6$ - $10^7$  microbial cells.

**Application of probiotic preparation to calves.** The use of probiotics to calves was performed using drinking in a mixture with warm milk in order to colonize the intestine with lactobacilli. Animal experiments were conducted on twenty newborn calves were divided into two groups: control (C) and treated group (T). The first control group of newborn calves received only colostrum; the second experimental group received additionally the preparation "Lactobacillus-TK<sup>2</sup>" at a dose of 2 g per ration, 3 times a day within 10 days.

**Sampling and evaluation of animals.** Blood samples for laboratory studies conducted from the jugular vein in vacutainers VACUETTE EDTA from 20 calves. Biochemical and haematological properties of blood were determined in the Kazakh-Japanese Innovation Center (KJIC), in the laboratory, "Green biotechnology and cellular engineering" at the Kazakh National agrarian University on the automatic haematological analyser MS 4/5 (production France, 2010) and biochemical analysis of blood serum on the analyser Screen Master (production Italy, 2010). In the blood serum was determined: alanine aminotransferase, aspartate aminotransferase, albumins, iron in the blood, potassium, calcium, phosphorus, magnesium, sodium. In the blood the counted of leukocytes, lymphocytes, monocytes, hematocrit, thrombocytes, erythrocytes, haemoglobin, thrombocytes were counted in the blood using biochemical profiles "Vital Development Corporation", Russia, 2018-2020. Health and nutritional parameters (performance status, stool consistency, body temperature), if the body temperature is higher than 40 °C was considered as fever. Rectal temperature was determined, and digestive and/or respiratory symptoms were registered. Intestinal symptoms such as liquid stool and respiratory symptoms like coughing and nasal secretion were registered. According to the severity of the diarrhoea symptoms, control animals were treated with antibiotics.

**Research results.** From the first day after birth, the calves daily recorded clinical signs for 10 days before the end of the experiment. During the experiment, biochemical and haematological studies were carried out. As a result of the conducted experiment, it was established that the obtained data on the effectiveness of the probiotic preparation in diarrhoea of calves confirms (table 1, graph 1) biochemical and haematological changes in the blood.



Figure 1 –  
Calf with diarrhoea



Figure 2 –  
Milk evaporation with probiotic  
preparation «Lactobacterin-TK2»

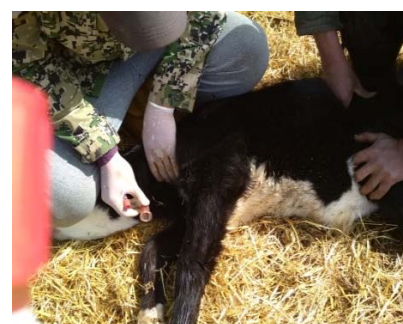


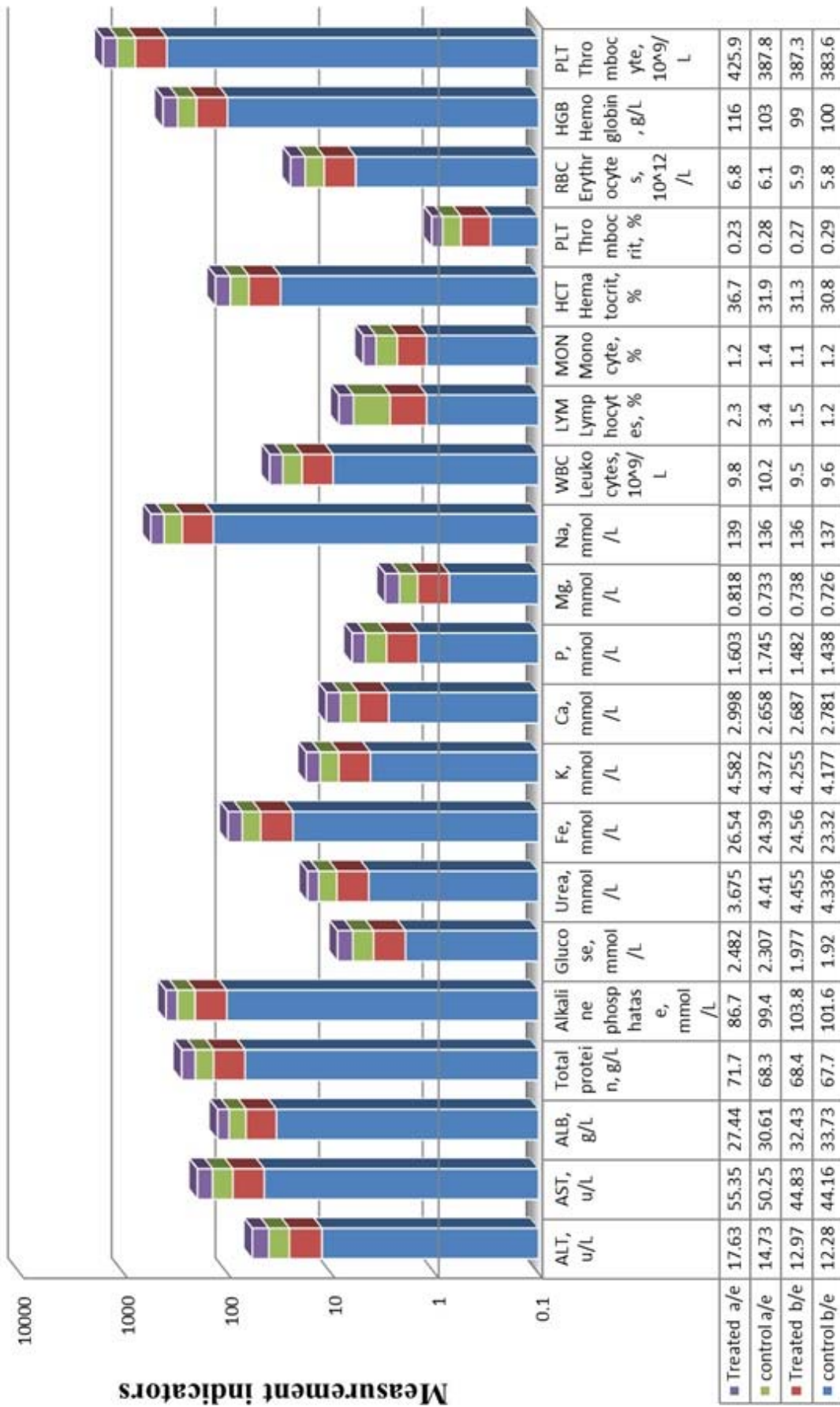
Figure 3 –  
The taking of blood for analysis

Table 1 – Biochemical and haematological parameters of serum in calves

Name of indicators, units of measurement	Groups			
	At the beginning of the experiment		After the end of the experience	
	Control	Treated	Control	Treated
ALT, u/L	12.28±0.03	12.97±0.02	14.73±0.05	17.63±0.02
AST, u/L	44.16±0.05	44.83±0.01	50.25±0.02	55.35±0.04
ALB, g/L	33.73±0.05	32.43±0.01	30.61±0.05	27.44±0.05
Total protein, g/L	67.7±0.11	68.4±0.10	68.3±0.11	71.7±0.11
Alkaline phosphatase, mmol/L	101.6±0.23	103.8±0.17	99.4±0.05	86.7±0.17
Glucose, mmol/L	1.920±0.07	1.977±0.03	2.307±0.001	2.482±0.01
Urea, mmol/L	4.336±0.02	4.455±0.05	4.410±0.05	3.675±0.02
Fe, mmol/L	23.32±0.01	24.56±0.09	24.39±0.01	26.54±0.11
K, mmol/L	4.177±0.01	4.255±0.05	4.372±0.07	4.582±0.02
Ca, mmol/L	2.781±0.01	2.687±0.02	2.658±0.05	2.998±0.01
P, mmol/L	1.438±0.01	1.482±0.01	1.745±0.02	1.603±0.02
Mg, mmol/L	0.726±0.001	0.738±0.005	0.733±0.001	0.818±0.005
Na, mmol/L	137±0.57	136±0.57	136±0.57	139±0.57
WBC Leukocytes, 10 <sup>9</sup> /L	9.6±0.16	9.5±0.12	10.2±0.1	9.8±0.05
LYM Lymphocytes, %	1.2±0.17	1.5±0.01	3.4±0.05	2.3±0.11
MON Monocyte, %	1.2±0.06	1.1±0.03	1.4±0.15	1.2±0.05
HCT Hematocrit, %	30.8±0.63	31.3±0.95	31.9±0.11	36.7±0.17
PLTT hrombocrit, %	0.29±0.01	0.27±0.01	0.28±0.04	0.23±0.01
RBCE rythrocytes, 10 <sup>12</sup> /L	5.8±0.06	5.9±0.45	6.1±0.01	6.8±0.23
HGB Hemoglobin, g/L	100±0.68	99±0.69	103±0.57	126±0.57
PLT Thrombocyte, 10 <sup>9</sup> /L	383.6±0.15	387.3±0.11	387.8±0.43	425.9±0.17

ALT, u/L – Alanine-aminotransferase; AST, u/L – Aspartate-aminotransferases; ALB, g/L – Albumin; Fe mmol/L – iron in the blood; K mmol/L – potassium; Ca, mmol/L – calcium; P, mmol/L – phosphorus; Mg, mmol/L – magnesium; Na, mmol/L – sodium.

When analysing the data obtained, it was found that the total protein content in the calves of the treated groups at the end of the experiment was 35% higher than in the control groups, which is explained by the improvement in the quality of the total protein. The health index of each animal considering faeces consistency (diarrhoea), body condition, hair coat condition showed higher values in calves with probiotic preparation " Lactobacterin-TK2». Treated animals were healthier, with solid consistency of faeces and no diarrhoea, and glossy hair coat showed during the experiment.



b/e – the beginning of the experience; a/e – after the experience.

Graph 1 – Biochemical and haematological parameters of calves blood serum

The experimental group had a higher normalisation of the level of alkaline phosphatase, glucose, urea, magnesium, iron, potassium, calcium, phosphorus, which indicates a complete recovery.

The average volume of erythrocytes cells is one of the most important indicators characterising red blood cells in humans and animals. The results of its evaluation in conjunction with other erythrocyte indices are used to clarify the causes of insufficient haemoglobin and diagnosis. If the erythrocyte index is lowered, it means that red blood cells contain insufficient haemoglobin or mature erythrocytes are destroyed. Among the causes of this blood condition, the most common - iron deficiency anaemia or violation of haemoglobin synthesis. The analysis of the obtained data on the change of erythrocyte index in experimental calves indicates that it was at a reduced level at the beginning of the experiment of all groups, compared with typical values. After the end of the experiment, the indications differed in animals receiving the probiotic drug, in control groups of calves, the change in the erythrocyte index was not established.

The level of haemoglobin in the blood of experimental calves was during the experiment increased by 12 % higher than in the control groups. In General, there were marked trends in haemoglobin levels over 10 days of the experiment. Thus, the use of the preparation "Lactobacterin-TK<sup>2</sup>" affected changes in the level of haemoglobin in the blood of experimental animals. The platelet level in the blood of experimental calves during the entire period of observation changed as follows at the beginning of the study in experimental calves, the indication of the platelet level in the blood was 387, 3x10<sup>9</sup>/L, and the control group was 383.6x10<sup>9</sup>/L. In both groups at the beginning of the experiment, this indicator was at a reduced level of the norm. It was found that the calves of the experimental group on the 10th day after the use of probiotic drug platelet level were significantly higher than in control animals.

Analysis of thrombocyte in experimental calves indicates an increased frequency of its increase in individual animals. So the level of thrombocyte above normal may indicate the following conditions- myeloproliferative conditions, conditions associated with iron deficiency in the body, increased thyroid function. Differences in this indicator in experimental and control animals have not been established.

**Conclusion.** As a result, it is established, it was found that daily feeding for 10 days of the probiotic preparation "Lactobacillus-TK<sup>2</sup>" normalises hemolytic bacteria in the gastrointestinal tract, increases nonspecific resistance of the organism of newborn calves and their safety.

According to the results of the analysis, the most excellent efficiency of probiotic when used from birth depends on the adhesive and antagonistic properties of lactic acid bacteria of the probiotic preparation, which do not allow to multiply pathogenic and conditionally pathogenic, putrid microflora and in addition, lactic acid bacteria of the drug contribute to better absorption of nutrients and feed.

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#### **«ЛАКТОБАКТЕРИН-ТК<sup>2</sup>» ПРОБИОТИГИНИҢ АСҚАЗАН-ШЕК АУРУЛАРЫН ЕМДЕУ ЖӘНЕ АЛДЫН АЛУ КЕЗІНДЕ ЖАҢА ТУҒАН БҰЗАУЛАРДЫҢ ИММУНОБИОЛОГИЯЛЫҚ СТАТУСЫНА ӘСЕРІ**

**Аннотация.** Соңғы онжылдықта жаңа туған бұзаулардың өлімі көбіне жұқпалы емес аурулардан туындауда. Жаңа туған жануарлардың өсуі және дамуы процесі кезінде туындайтын экологиялық антропогендік факторлардың әсеріне қарсы ағзаның бейімділігі әртүрлі сынақтардан өтетіні анықталған. Қазіргі таңда пробиотикалық препараттар көбіне олардың микробқа қарсы әсері арқылы ғана емес, сонымен қатар иммундық реакцияны күшейту қажеттілігін дамытумен организмге және ондағы микробиоталарға әсер ету ерекшеліктерімен, бұзау диареясын емдеу және алдын алу ерекшеліктерімен жиі бағаланады. Қазіргі дамыған кезеңде пробиотикалық қасиетке ие биопрепараттарды әзірлеу үшін сүт қышқылды бактерияларды зерттеу ерекше орын алады.

Қазіргі заманғы мал шаруашылығында маңызды және шешілмеген мәселенің бірі болып – жаңа туған жас жануарлардың қауіпсіздігін қамтамасыз ету мәселесі табылады. Экологиялық физиологияның құрамдас бөліктерінің бірі ағзаның физиологиялық құбылыстары мен функцияларының жиынтығы ретінде олардың өзара байланысы мен реттелуіндегі бейімделуін зерттеу болып табылады. Алматы облысында жас малдар арасында жұқпалы емес аурулардың ең көп тарағаны – жаңа туған бұзаулардың диареясы. Бұл ауру облыс шаруашылықтарына айтарлықтай экономикалық зиян келтіріп, жас малдардың қауіпсіздігін төмендетеді.

Диарея – бұл интенсивті терапия жүйесіндегі жаңа туылған бұзауларға әсер ететін кең таралған аурулардың бірі. Бұл жүйелердің санының ұлғаюы ішек микробиотында теңгерімсіздікті тудырады, бұл қоректік заттардың тиімсіз игерілуіне және сұйықпен қоректенуден жем шөпке көшкенде бейімделудің баяулауына әкеп соғады. Соңғы жылдары диареяға арналған антибиотикалық терапия белгілі бір аурудың ауырлығы мен ұзақтығына байланысты қоздырғыштарға ғана қолданылады. Негізінен Еуропалық Одақтың бірқатар елдерінде өсуді ынталандырушы ретінде қолданылатын 76 антибиотикті профилактикалық пайдалануға тыйым салынған. Осы себептерге байланысты, пробиотиктерді және иммуномодуляторларды қолдану ішектің бұзылуының алдын-алуға арналған жаңа антибиотиктерге балама ретінде ұсынылды. Пробиотиктер жеткілікті мөлшерде қолданылған жағдайда иесінің денсаулығы үшін оң әсер ететін тірі микроорганизмдер ретінде анықталады. Әртүрлі ғалымдар пробиотиктердің бұзау, шошқа және құс денсаулығына тиімділігі туралы мәлімдеген. Пробиотиктердің пайдалы әсерлері тек денсаулықты жақсартумен ғана шектелмейді. Жаңа туылған бұзаулардың диареясына қатысты отандық және шетелдік авторлардың көптеген зерттеулеріне қарамастан, пробиотиктерді жаңа туылған бұзауларға қолдану кезіндегі терапевтік және профилактикалық тиімділік пен иммундық-биохимиялық статус мәселелері жеткіліксіз зерттелген. Осыған байланысты емдеу және профилактикалық шараларды жақсарту, сондай-ақ иммундық жүйені реттейтін әсері бар заманауи, тиімді препараттарды іздеу маңызды болып табылады.

Мақалада жаңа туған бұзаулардың асқазан-ішек аурулары кезіндегі «Лактобактерин-ТК2» пробиотикалық препаратының емдік-профилактикалық әсері және оның иммунобиологиялық статусқа әсері көрсетілген.

Ішекті лактобактериялармен отарлау мақсатында бұзауларға пробиотиктерді қолдану жылы сүтке қосып ішкізу арқылы жүзеге асырылды. Эксперимент әрқайсысы 10 бастан құралған екі топ жаңа туған бұзауларға жүргізілді. Бұзаулардың бірінші бақылау тобы тек молозива ғана алды, ал екінші тәжірибелі топ – қосымша "Лактобактерин-ТК2" препаратын 10 күн бойы күндігіне 3 рет 2 г дозада алды.

Зерттеу нәтижесі бойынша "Лактобактерин-ТК2" пробиотикалық препаратын жаңа туған бұзауларға туған сәттен бастап беру арқылы ағзаның спецификалық емес резистенттілігін жоғарылататыны және бұзау өлімін азайтатыны анықталды. Гематологиялық және биохимиялық талдау кезінде бұзаудың тәжірибелі топтарында сілтілі фосфатаза, глюкоза, несепнәр, магний, темір, калий, кальций және фосфор деңгейінің тез қалыпқа келуі байқалды, бұл бұзаулардың толық сауығуын айқындайды.

**Түйін сөздер:** бұзаулар, пробиотик, Лактобактерин-ТК<sup>2</sup>, диарея, қан талдауы.

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### **ВЛИЯНИЕ ПРОБИОТИКА «ЛАКТОБАКТЕРИН-ТК<sup>2</sup>» НА ИММУНОБИОЛОГИЧЕСКИЙ СТАТУС НОВОРОЖДЕННЫХ ТЕЛЯТ ПРИ ЛЕЧЕНИИ И ПРОФИЛАКТИКЕ ЖЕЛУДОЧНО-КИШЕЧНЫХ БОЛЕЗНЕЙ**

**Аннотация.** В последние десятилетия потери новорожденных телят происходят преимущественно от незаразных заболеваний. Установлено, что в процессе роста и развития, особенно после рождения, животному приходится испытывать действие экологических антропогенных факторов, которые вызывают различного рода приспособительные реакции организма. В настоящее время пробиотические препараты все чаще оцениваются не только по их антимикробному действию, но и по особенностям воздействия на организм и его микробиоту при развитии необходимости усиления иммунного ответа, при терапии и лечении диареи телят. Следует отметить, что в современном мире особое место занимают исследования молочнокислых бактерий, связанные с разработкой биопрепаратов с пробиотической функцией.

В современном животноводстве важной и нерешенной задачей является проблема обеспечения высокой сохранности молодняка в ранний постнатальный период.

Одной из составляющих экологической физиологии является исследование адаптации организма как совокупности физиологических явлений и функций в их взаимной связи и регуляции.

Наиболее часто из незаразных заболеваний молодняка крупного рогатого скота в Алматинском области встречается диарея новорожденных телят. Данное заболевание наносит значительный экономический ущерб хозяйствам области, снижая сохранность молодняка.

Диарея является одним из наиболее частых заболеваний, поражающих новорожденных телят в системах интенсивного ведения. Эти системы, увеличиваясь в количестве, вызывают дисбаланс в кишечной микробиоте, что приводит к неэффективному усвоению питательных веществ и замедлению адаптации при переходе от жидкого питания к твердому.

В последние годы антибактериальная терапия диареи применяется к конкретным патогенам и связана только с тяжестью и длительностью заболевания. Профилактическое использование 76 антибиотиков в качест-

ве стимуляторов роста было запрещено в ряде стран Европейского Союза главным образом из-за приобретенной устойчивости местной микробиоты и остатков, содержащихся в продуктах животного происхождения. Использование пробиотиков было предложено в качестве новой альтернативы для профилактики кишечных расстройств, а также в качестве иммуномодуляторов. Пробиотики определяются как живые микроорганизмы, которые при введении в достаточном количестве дают пользу для здоровья хозяина. Различные ученые сообщали об эффективности пробиотиков у телят, свиней и домашней птицы. Благотворное влияние пробиотиков не ограничивается улучшением. Несмотря на многочисленные исследования отечественных и зарубежных авторов, касающиеся диарей новорожденных телят, вопросы лечебно-профилактической эффективности и иммуно-биохимического статуса при применении пробиотиков новорожденным телятам изучены недостаточно. В связи с этим, усовершенствование лечебно-профилактических мероприятий, а также поиск новых, эффективных препаратов иммуно-корректирующего действия имеет важное значение.

В статье приведены результаты изучения лечебно-профилактического эффекта пробиотического препарата «Лактобактерин-ТК<sup>2</sup>» при желудочно-кишечных болезнях новорожденных телят и его влияние на иммунно-биологический статус. Применение пробиотика телятам осуществляли путем выпаивания в смеси с теплым молоком с целью колонизации кишечника лактобактериями. Эксперимент проводили в двух группах новорожденных телят, по 10 голов в каждой. Первая контрольная группа телят получала только молозиво, вторая опытная группа – дополнительно препарат «Лактобактерин-ТК<sup>2</sup>» в дозе 2 г на одну пойку, 3 раза в день в течение 10 дней. По результатам исследования установлено, что ежедневное скармливание пробиотического препарата «Лактобактерин-ТК<sup>2</sup>» повышает неспецифическую резистентность организма и сохранность телят. При гематологическом и биохимическом анализе у опытных групп телят отмечалась более быстрая нормализация уровня щелочной фосфатазы, глюкозы, мочевины, магния, железа, калия, кальция, фосфора, что также свидетельствует о полном выздоровлении.

**Ключевые слова:** телята, пробиотик, Лактобактерин-ТК<sup>2</sup>, диарея, анализ крови.

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**COENOFLORA OF *ADONIS VERNALIS* L.  
IN NORTHERN KAZAKHSTAN**

**Abstract.** The current article presents the results of the study made on *Adonis vernalis* L. coenoflora of Northern Kazakhstan. The materials have been obtained in the course of field research considering the literary data. The list of *Adonis vernalis* L. flora discovered in Northern Kazakhstan is based on detailed route studies. The coenoflora of *Adonis vernalis* L. in Northern Kazakhstan includes 140 species belonging to 31 families and 96 genera. The leading families are *Artemisia*, *Veronica*, *Achillea*, *Galatella*, *Lathyrus*, *Potentilla*, *Seseli*, *Silene*. The majority of species belongs to perennial species, annuals and biennials are represented by six species, and there is only one ephemeral species. Woody and semi-woody plants are represented by three trees, five shrubs and one semishrub. Among the herbaceous plants there are more long-rooted and stem-rooted species. The coenoflora mainly consists of mesophytes (68 species) and xeromesophytes (57 species). There are 15 species of xerophytes, which makes 10,7%. A little number of xerophytes proves meadow and meadow-steppe nature of the coenoflora.

**Key words:** *Adonis vernalis* L., coenopopulation, Northern Kazakhstan, systematic structure, ecological and coenotic groups.

**Introduction.** *Adonis vernalis* L. is a perennial herbaceous plant with a branched and longitudinally grooved stem. It covers a fairly wide area in the forest-steppe zone of Eastern Europe [1,2], the Ural Mountains and the Southern Ural [3,4], Western, Middle, and Eastern Siberia [5]. Poshkurlat A.P. (2000) provides information on the location of *A. vernalis* in Northern Kazakhstan [1]. Semenov V.F. (1929) documented the Kazakh Lowlands for *A. vernalis* in Central Kazakhstan [6]. Gorchakovskiy P.L. [7] marked *A. vernalis* in the Imantav and Borov forests. Olovyannikova I.N. (1948) estimated the number of *Adonis vernalis* within the Borovoy Natural Park in 1943 [8]. The author provides 14 locations of this species. Many locations are attributed to the Zolotoborsk-Lysogorsk hill district. Sultangazina G.J. marks Zolotoborsk and Bulandy forestries [9].

The coeno-areals of *A. vernalis* (according to Kuvaev V.B. (1965) [10] are very diverse in Kazakhstan: in the Bukhtormin Mountains (Altai) it is found in steppes, on steppe slopes, in the thickets of shrubs [11], within the territory of the “Burabay” State National Natural Park it grows in sparse birch and birch-pine forests [12,13,14], on the gentle slopes of eastern steppe hills and in the thickets of spirea [8]. In Western Kazakhstan the plant was found in sparse birch forests [15].

The main threats to the existence of species is the destruction of natural habitats due to plowing of meadow steppes, which has brought *A. vernalis* into the Red Book of Kazakhstan [16] and into Appendix II of the CITES Convention (Convention of International Trade in Endangered Species of Wild Fauna and Flora) [17].

Studies of the local populations' current state, their ecological and coenotic characteristics are important and necessary to develop an ecologically competent strategy to protect this rare species.

**Material and research methods.** The studies were conducted in the Akmola and North Kazakhstan regions during the flowering season of *A. vernalis* in May and June, 2018–2019, on the area of 100 m<sup>2</sup>. The

areas with a high *Adonis vernalis* density were selected for floristic descriptions. All in all, there were examined 8 population loci (table 1).

To process floristic descriptions we employed the IBIS program developed by Zverev A.A. (2007) [18]. The analysis of the coenoflora life forms was carried out using the approaches of Serebryakov I.G. (1962) [19]. Evaluation of species in their relation to moisture was carried out on the ecological scale of Shennikov A.P. (1950) [20].

Table 1 – Characteristics of *Adonis vernalis* L. coenopopulations (CP)

№	Location of CP	Habitat
CP 1	Akmola region, Burabay district, territory of the "Burabay" State National Natural Park, Zolotobor Forestry	Sparse birch forest. The volume is 0,4.
CP 2	Akmola region, Burabay district, territory of the "Burabay" State National Natural Park	Sparse birch forest. The volume is 0,5-0,6.
CP 3	Akmola region, Burabay district, the territory of the "Burabay" State National Natural Park, 53.05280° N., 70.48577° W., 383 m above the sea level	A meadow among the sparse birch forest. The volume is 0,3, 9B1C.
CP 4	Akmola region, Burabay district, the territory of the "Burabay" State National Natural Park, 53.05295° N., 70.48938° W., 390 m above the sea level	A grass-reed meadow on the edge of a birch forest
CP 5	Akmola region, Burabay district, the territory of the "Burabay" State National Natural Park, 53.08902° N., 70.47668° W., 383 m above the sea level	A dry meadow on the edge of a birch forest
CP 6	Akmola region, Burabay district, the territory of the "Burabay" State National Natural Park, 53.09319° N., 70.47671° W., 375 m above the sea level	A dry meadow with very rare pines. The volume is 0,2.
CP 7	North Kazakhstan region, 7 km N-W from the Sergeyevka town, 54.71898° N., 69.80614° W.	Grivno-Zapadinny, Ozerny-Alluvial Plain
CP 8	Akmola region, 10 km from the Yasenovka village, 53.97222° N., 68.16158° W.	A plain with cavities, inter-forest space

Names of the species are given by the summary of Abdulina S.A. (1999) taking into account modern data [21]. The families of flowering plants are arranged according to the system of Takhtajyan A.L. [22]. The species in genera and the genera in families are arranged in an alphabetical order.

**Results and discussion.** The cenoflora of communities involving *A. vernalis* includes 140 species belonging to 31 families and 96 genera (table 2).

Table 2 – Composition of *Adonis vernalis* L. coenoflora

Plant species	1	2	3	4
The <i>Equisetaceae</i> Rich. ex DC. family				
<i>Equisetum hyemale</i> L.	P	E	M	Forest
The <i>Pinaceae</i> Spreng. ex Rudolphi family				
<i>Pinus sylvestris</i> L.	P	T	XM	Forest
The <i>Ranunculaceae</i> Juss. family				
<i>Adonis vernalis</i> L., <i>Ranunculus polyanthemus</i> L.	P	BR	M	Meadow
<i>Adonis wolgensis</i> Steven	P	BR	M	Steppe
<i>Anemone sylvestris</i> L.	P	LR	M	Meadow
<i>Pulsatilla flavescens</i> (Zucc.) Juz.	P	ShR	XM	
<i>Thalictrum minus</i> L., <i>Thalictrum simplex</i> L.	P	BR	M	Meadow
The <i>Betulaceae</i> S.F. Gray family				
<i>Betula pendula</i> Roth.	P	T	M	Forest
The <i>Caryophyllaceae</i> Juss. family				
<i>Cerastium arvense</i> L., <i>Eremogone longifolia</i> (M.Bieb.) Fenzl, <i>Gypsophila altissima</i> L.	P	LR	XM	Meadow
<i>Dianthus versicolor</i> Fisch. ex Link	P	ShR	XM	Meadow
<i>Eremogone koriniana</i> Fisch. ex F	P	SR	X	Steppe
<i>Gypsophila paniculata</i> L.	P	LR	XM	Steppe
<i>Otites wolgensis</i> (Hornem.) Grossh.	A-B	SR	XM	Steppe

<i>Silene chlorantha</i> (Willd.) Ehrh., <i>Silene multiflora</i> (Ehrh.) Pers., <i>Silene nutans</i> L.	P	SR	M	Meadow
<i>Stellaria graminea</i> L.	P	LR	M	Meadow
<i>Stellaria media</i> (L.) Vill.	A-B	SR	M	Weed
<i>Table continuation</i>				
Plant species	1	2	3	4
The <i>Chenopodiaceae</i> Vent family				
<i>Chenopodium album</i> L.	A-B	SR	XM	Weed
The <i>Polygonaceae</i> Juss. family				
<i>Rumex thyrsoiflorus</i> Fingerh.	P	SR	M	Meadow
The <i>Salicaceae</i> Mirb. family				
<i>Populus tremula</i> L.	P	LR	M	Forest
The <i>Brassicaceae</i> Burnett family				
<i>Draba nemorosa</i> L.	Eph	SR	M	Steppe
<i>Clausia aprica</i> (Stephan) Korn-Tr.	P	LR	X	Steppe
The <i>Crassulaceae</i> J. St.-Hil. family				
<i>Sedum telephium</i> L.	P	LR	M	Meadow
The <i>Urticaceae</i> Juss. family				
<i>Urtica dioica</i> L.	P	LR	M	Weed
The <i>Euphorbiaceae</i> Juss. family				
<i>Euphorbia microcarpa</i> Prokh., <i>Euphorbia uralensis</i> Fisch. ex Link	P	LR	XM	Weed
The <i>Rosaceae</i> Juss. family				
<i>Cerasus fruticosa</i> Pall.	P	Sh	XM	Forest
<i>Filipendula ulmaria</i> (L.) Maxim.	P	LR	M	Meadow
<i>Filipendula vulgaris</i> Moench	P	Tub	XM	Steppe
<i>Fragaria vesca</i> L., <i>Rubus saxatilis</i> L.	P	St	M	Forest
<i>Fragaria viridis</i> (Duchesne) Weston	P	St	XM	Meadow
<i>Potentilla canescens</i> Besser, <i>Potentilla humifusa</i> Willd. ex Schtdl.	P	ShR	XM	Steppe
<i>Potentilla chrysantha</i> Trevir., <i>Sanguisorba officinalis</i> L.	P	ShR	M	Meadow
<i>Rosa acicularis</i> Lindl., <i>Spiraea hypericifolia</i> L.	P	Sh	XM	Steppe
<i>Rosa majalis</i> Herm.	P	Sh	M	Forest
The <i>Onagraceae</i> Juss. family				
<i>Chamaenerion angustifolium</i> (L.) Scop.	P	LR	M	Forest
The <i>Fabaceae</i> Lindl. family				
<i>Astragalus danicus</i> Retz., <i>Vicia sepium</i> L.	P	LR	M	Meadow
<i>Astragalus onobrychis</i> L., <i>Medicago falcata</i> L., <i>Onobrychis arenaria</i> (Kit.) DC.	P	SR	XM	Steppe
<i>Caragana arborescens</i> Lam.	P	Sh	M	Forest
<i>Lathyrus pisiformis</i> L.	P	SR	M	Forest
<i>Lathyrus pratensis</i> L., <i>tuberosus</i> L.	P	ShR	M	Meadow
<i>Oxytropis pilosa</i> (L.) DC.	P	SR	M	Steppe
<i>Vicia cracca</i> L.	P	LR	M	Weed
The <i>Polygalaceae</i> Hoffmanns. et Link family				
<i>Polygala comosa</i> Schkuhr	P	SR	M	Meadow
The <i>Geraniaceae</i> Juss. family				
<i>Geranium pratense</i> L.	P	ShR	M	Meadow
<i>Geranium sylvaticum</i> L.	P	ShR	M	Forest
The <i>Apiaceae</i> Lindl. family				
<i>Conioselinum tataricum</i> Hoffm., <i>Seseli libanotis</i> (L.) W.D.J.Koch, <i>Seseli strictum</i> Ledeb	P	SR	M	Meadow
<i>Eryngium planum</i> L., <i>Falcaria vulgaris</i> Bernh.	P	SR	XM	Steppe
<i>Kadenia dubia</i> (Schkuhr) Lavrova & V.N.Tikhom., <i>Pleurospermum uralense</i> Hoffm.	P	SR	M	Forest
<i>Peucedanum morisonii</i> Besser ex Spreng., <i>Silaum silaus</i> (L.) Schinz & Thell.	P	ShR	M	Meadow
<i>Seseli ledebourii</i> G.Don	P	ShR	XM	Steppe
<i>Xanthoselinum alsaticum</i> (L.) Schur	P	ShR	M	Meadow
The <i>Santalaceae</i> R. Br. family				
<i>Thesium arvense</i> Horv.	P	SR	XM	Steppe

The <i>Dipsacaceae</i> Juss. family				
<i>Scabiosa ochroleuca</i> L.	P	SR	XM	Steppe
The <i>Plantaginaceae</i> Juss. family				
<i>Plantago media</i> L.	P	BR	XM	Meadow
The <i>Campanulaceae</i> Juss. family				
<i>Table continuation</i>				
Plant species	1	2	3	4
<i>Campanula wolgensis</i> P.A.Smirn.	P	SR	M	Forest
The <i>Asteraceae</i> Bercht. et J. Presl family				
<i>Achillea asiatica</i> Serg., <i>Artemisia glauca</i> Pall. ex Wil, <i>Galatella biflora</i> (L.) Nees	P	LR	XM	Meadow
<i>Achillea millefolium</i> L., <i>Artemisia latifolia</i> Ledeb., <i>Art. rupestris</i> L., <i>Inula salicina</i> L.	P	LR	M	Meadow
<i>Achillea nobilis</i> L.	A-B	ShR	XM	Steppe
<i>Artemisia dracunculus</i> L.	P	ShR	M	Meadow
<i>Artemisia frigida</i> Willd.	P	DSH	XM	Steppe
<i>Artemisia macrantha</i> Ledeb.	P	LR	M	Forest
<i>Artemisia pontica</i> L., <i>Artemisia sericea</i> Weber ex Ste, <i>Galatella villosula</i> Novopokr.	P	LR	X	Steppe
<i>Aster alpinus</i> L., <i>Galatella angustissima</i> (Tausch) Novopokr., <i>Inula aspera</i> Poir.	P	LR	XM	Steppe
<i>Centaurea scabiosa</i> L.	P	SR	XM	Weed
<i>Cirsium setosum</i> (Willd.) Bes	P	LR	XM	Weed
<i>Hieracium virosum</i> Pall.	P	ShR	XM	Steppe
<i>Hieracium umbellatum</i> L.	P	ShR	XM	Forest
<i>Jurinea multiflora</i> (L.) B.Fedtsch.	P	LR	X	Steppe
<i>Pilosella echioides</i> (Lumn.) F.Schultz & Sch.Bip.	P	BR	X	Steppe
<i>Scorzonera purpurea</i> L.	P	SR	XM	Steppe
<i>Serratula coronata</i> L., <i>Tanacetum vulgare</i> L.	P	LR	M	Meadow
<i>Solidago virgaurea</i> L.	P	ShR	M	Forest
<i>Taraxacum officinale</i> F.H.Wigg.	A-B	SR	M	Weed
<i>Tephrosieris integrifolia</i> (L.) Holub.	P	SR	M	Meadow
<i>Trommsdorffia maculata</i> (L.) Bernh.	P	SR	XM	Meadow
The <i>Rubiaceae</i> Juss. family				
<i>Galium boreale</i> L.	P	LR	M	Forest
<i>Galium verum</i> L.	P	ShR	XM	Steppe
The <i>Boraginaceae</i> Juss. family				
<i>Cynoglossum officinale</i> L.	A-B	SR	XM	Weed
<i>Lithospermum officinale</i> L.	P	SR	XM	Meadow
<i>Onosma simplicissima</i> L.	P	LR	XM	Steppe
The <i>Scrophulariaceae</i> Juss. family				
<i>Linaria ruthenica</i> Blonski, <i>Veronica longifolia</i> L.	P	LR	M	Meadow
<i>Veronica incana</i> L.	P	LR	X	Steppe
<i>Veronica krylovii</i> Schischk.	P	SR	M	Meadow
<i>Veronica spicata</i> L., <i>Veronica spuria</i> L.	P	LR	XM	Steppe
The <i>Lamiaceae</i> Martinov family				
<i>Dracocephalum ruyschiana</i> L.	P	LR	XM	Meadow
<i>Phlomoides tuberosa</i> (L.) Moench	P	Tub	XM	Steppe
<i>Salvia stepposa</i> Des.-Shost.	P	ShR	X	Steppe
<i>Thymus marschallianus</i> Willd.	P	LR	XM	Steppe
<i>Verbascum phoeniceum</i> L.	P	SR	XM	Steppe
The <i>Alliaceae</i> Borkh. family				
<i>Allium strictum</i> Schrad., <i>Allium rubens</i> Schrad. ex Willd.	P	B	XM	Steppe
The <i>Asparagaceae</i> Juss. family				
<i>Asparagus officinalis</i> L.	P	ShR	M	Meadow
The <i>Iridaceae</i> Juss. family				
<i>Iris sibirica</i> L.	P	ShR	M	Forest
The <i>Cyperaceae</i> Juss family				
<i>Carex ericetorum</i> Poll.	P	LSh	XM	Steppe
<i>Carex supina</i> Willd. ex Wahlenb.	P	LR	X	Steppe

The <i>Poaceae</i> Barnhart family				
<i>Brachypodium pinnatum</i> (L.) Beauv., <i>Melica nutans</i> L.	P	LR	M	Forest
<i>Bromopsis inermis</i> (Leyss.) Holub., <i>Festuca rubra</i> L.,	P	LR	M	Meadow
<i>Calamagrostis epigeios</i> (L.) Roth.	P	LR	XM	Meadow
<i>Calamagrostis neglecta</i> (Ehrh.) Gaertner, Meyer et Schreber	P	ShR	M	Forest
<i>Festuca valesiaca</i> Gaudin, <i>Helictotrichon desertorum</i> (Less.) Nevs., <i>Stipa pennata</i> L.	P	S-Sh	X	Steppe
Table continuation				
Plant species	1	2	3	4
<i>Helictotrichon schellianum</i> (Hack.) Kitag., <i>Poa pratensis</i> L.	P	LR	M	Meadow
<i>Koeleria cristata</i> (L.) Pers.	P	LSh	X	Steppe
<i>Phleum phleoides</i> (L.) H.Karst.	P	LSh	XM	Steppe
<i>Poa angustifolia</i> L.	P	LR	XM	Steppe
Note: Column 1 shows the lifespan of species: P - perennial; A-B - long-vegetating annuals-biennials; Eph - ephemeras, short-vegetating annuals.				
Column 2 shows life forms. Wood plants: T - tree; Sh - shrub; S-Sh - semishrub. Ground grasses: E - equisetum; herbaceous polycarpics; SR - stem-rooted, LR - long-rooted; ShR - short-rooted; BR - brush-rooted; DSh - dense shrub grasses; LSh - loose shrub grasses; Tub - tuberous; St - stolon-forming and creeping; L - bulbous;				
Column 3 shows ecological groups of plants in relation to moisture supply of their habitats: X - Xerophytes, XM - Xeromesophytes, M - Mesophytes.				
Column 4 shows ecological and coenotic groups.				

The top ten families comprise 112 species, representing 80% of the total number of coenoflora species (table 3). The richest families in species are *Asteraceae* (30 species), *Poaceae* (14 species), *Rosaceae* (13 species), *Caryophyllaceae* (12 species), *Fabaceae* and *Apiaceae* (11 species each). The leading genera are *Artemisia* - 8 species, *Veronica* - 5 species, *Achillea*, *Galatella*, *Lathyrus*, *Potentilla*, *Seseli*, *Silene* - 3 species each. A number of the families corresponds to holarctic flora. Compared to the Southern Ural's flora [3], which is closest to the flora of Northern Kazakhstan and to the northern part of Central Kazakh Lowlands, the portion of *Rosaceae*, *Caryophyllaceae*, and partly *Ranunculaceae*, increases significantly due to a large number of boreal (forest mesophytic meadow) as well as steppe species, widely represented in these families. The share of *Brassicaceae* and *Chenopodiaceae* is extremely small and these families are not in the top ten species, while in the Southern Ural they occupy positions V and IX. Obviously, this fact refers to a little number of weed-ruderal species, as well as to a little spread of saline lands.

Table 3 – Leading families of *Adonis vernalis* ranked by number of species

Family	Coenoflora <i>Adonis vernalis</i>			Flora of the Southern Urals (Naumenko, 2008)	
	Place by the number of species	Number of genera/ % of the total	Number of species/ % of the total	Place by the number of species	Number of species/ % of the total
<i>Asteraceae</i> Bercht. et J. Presl	I	17/17,7	30/21,3	I	171/13,6
<i>Poaceae</i> Barnhart	II	10/10,4	14/10,0	II	117/9,3
<i>Rosaceae</i> Juss.	III	8/8,3	13/9,2	VII	57/4,5
<i>Caryophyllaceae</i> Juss.	IV	7/7,3	12/8,3	VI	58/4,6
<i>Apiaceae</i> Lindl.	V	9/9,4	11/7,9	IV	34/3,8
<i>Fabaceae</i> Lindl.	VI	7/7,3	11/7,9	III	70/5,6
<i>Ranunculaceae</i> Juss.	VII	5/5,3	7/5,4	VIII	50/3,9
<i>Scrophulariaceae</i> Juss.	VIII	2/2,0	6/4,3	X	43/3,4
<i>Lamiaceae</i> Martinov	IX	5/5,3	5/3,6	XI	38/3,0
<i>Boraginaceae</i> Juss.	X	3/3,1	3/2,1	XV	20/1,7
Total in 10 families		73/76,3	112/80,0		678/53,6
Total in the coenoflora		96	140		1266

*A. vernalis* is generally not dominant in communities and makes 3-5% in quantity. Long-rooted cereals (*Calamagrostis epigeios*, *Poa pratensis*) dominate in meadow communities along with a rather rich number of grasses (*Achillea millefolium*, *Artemisia latifolia*, *A. macrantha*, *Astragalus danicus*, *Campanula wolgensis*, *Dracocephalum ruyschiana*, *Filipendula vulgaris*). Dense shrub cereals dominate on the gentle slopes of the hills in meadow-steppe communities (*Stipa pennata*, *Festuca valesiaca*, *Helictotrichon desertorum*) along with grasses: *Achillea asiatica*, *Artemisia pontica*, *A. sericea*, *Lathyrus pratensis*, *Phlomis tuberosa*).

The majority of the species belongs to perennial species (133), annuals and biennials are represented by six species, and there is only one ephemeral species (*Draba nemorosa*).

Wood and semi-wood plants are represented by three trees (*Betula pendula*, *Pinus sylvestris*, *Populus tremula*), five shrubs (*Caragana arborescens*, *Cerasus fruticosa*, *Rosa acicicis*, *R. majalis*, *Spiraea hypericifolia*), and one semi-shrub (*Artemisia frigida*).

Among herbaceous plants, there are more long-rooted (51 species), stem-rooted (35 species), short-rooted (24 species) and further species in a descending order: brush-rooted (7 species), stolon-forming, dense- and loose-shrub-rooted (3 species each), tuberous and bulbous (2 species each).

The coenoflora mainly consists of mesophytes (68 species) and xeromesophytes (57 species). There are 15 species of xerophytes, which makes 10,7%. A little number of xerophytes proves meadow and meadow-steppe nature of the coenoflora.

Among coenotic groups, there dominate steppe species (66 species, or 47,1%) and meadow species (42 species, or 30%), forest (22 species, or 15,7%), and weedy (10 species, or 7,1%). Their locations are found in pastures on roadsides in agricultural lands and in abandoned housing buildings.

The coenotic confinement of *Adonis vernalis* is quite diverse. In the Volga Lowland *Adonis vernalis* grows on the wide hills and slopes of beams in sparse oakeries [1], in the Urals it is found on treeless or sparse hillsides [24], in the Southern Urals *Adonis vernalis* is found in dry pine forests and in steppe meadows [3]. In the Northwestern part of Altai and Sayan province, *Adonis vernalis* is quite frequent in steppes and steppe meadows. In Northern Kazakhstan, *Adonis vernalis* is a typical meadow-steppe plant of the southern forest steppe. Its presence in the steppe zone of the Kokshetau hills is caused by special climatic conditions.

**Conclusion.** The coenoflora of the communities involving *A. vernalis* includes 140 species belonging to 31 families and 96 genera. The richest families in species are *Asteraceae* (30 species), *Poaceae* (14 species), *Rosaceae* (13 species), *Caryophyllaceae* (12 species), *Fabaceae* and *Apiaceae* (11 species each). The leading genera are *Artemisia* - 8 species, *Veronica* - 5 species, *Achillea*, *Galatella*, *Lathyrus*, *Potentilla*, *Seseli*, *Silene* - 3 species each. The coenoflora mainly consists of mesophytes (68 species) and xeromesophytes (57 species). There are 15 species of xerophytes, which makes 10,7%. A little number of xerophytes proves meadow and meadow-steppe nature of the coenoflora.

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#### СОЛТҮСТІК ҚАЗАҚСТАНДАҒЫ *ADONIS VERNALIS* L. ЦЕНОФЛОРАСЫ

**Аннотация.** *Adonis vernalis* L. – Шығыс Еуропа, Орал және Оңтүстік Орал, Батыс, Орта, Шығыс Сібірдің орманды дала аймағында кең таралған көп жылдық шөптесін шашақтамырлы өсімдік. Қазақстандағы *A. vernalis* ценоареалдары алуан түрлі: Алтайда Бухтормин тауларында далаларда, дала беткейлерінде, бұта өскіндерінде, "Бурабай" мемлекеттік ұлттық табиғи паркінің аумағында кесілген қайың, қайыңды-қарағайлы ормандарда, Шығыс экспозицияларының дала шоқыларының баурайларында және шиыршықтарында өседі. Ал Батыс Қазақстанда кесілген қайыңды ормандарында байқалады.

Түрдің жоғалуының негізгі себебі шабындық далаларды жыртумен байланысты табиғи мекендейтін жерлердің бұзылуы болып табылады, нәтижесінде *A. Vernalis*-ті Қазақстанның Қызыл кітабына және СИТЕС (Convention of International Trade in Endangered Species of Wild Fauna and Flora) Конвенциясының II қосымшасына енгізілді.

Зерттеулер Ақмола және Солтүстік Қазақстан облыстарының аумағында 2018-2019 жж. мамыр-маусым айларында *A. vernalis* гүлдеу кезінде 100 м<sup>2</sup> алаңда жүргізілді. Флористикалық сипаттау үшін *Adonis vernalis*-тің тығыздығы жоғары аймақтары іріктелді. Барлығы 8 популяциялық локустар зерттелді.

*A. vernalis* қатысуымен қауымдастықтың ценофлорасы 31 тұқымдасқа және 96 туысқа жататын 140 түрден тұрады. Тұқымдастың түрлік құрамы бойынша ең бай *Asteraceae* (30 түр), *Poaceae* (14 түр), *Rosaceae* (13 түр), *Caryophyllaceae* (12 түр), *Fabaceae* және *Apiaceae* (11 түрден). Жетекші туыстары *Artemisia* – 8 түр, *Veronica* – 5 түр, *Achillea*, *Galatella*, *Lathyrus*, *Potentilla*, *Seseli*, *Silene* 3 түрден болып табылады. Солтүстік Қазақстан және Орталық Қазақстан ұсақ шоқысының солтүстік бөлігіне ең жақын Оңтүстік Орал флорасымен салыстырғанда *Rosaceae* және *Caryophyllaceae* дәрежесі едәуір жоғарылайды, бұл *Ranunculaceae* тұқымдастарында кеңінен ұсынылған бореалдық (орман мезофитті-шалғынды), сондай-ақ дала түрлерінің көп болуымен байланысты. *Brassicaceae* және *Chenopodiaceae* үлесі өте аз және бұл тұқымдастар түрлердің алғашқы ондығына кірмейді, ал оңтүстік Оралда олар V және IX позицияларды алады. Әлбетте, бұл арамшөп-рудеральды түрлердің аз мөлшерімен, сондай-ақ тұздалған жерлердің аз таралуына байланысты. *A. vernalis* әдетте қауымдастықтағы доминант емес, мөлшері 3–5%. Шалғынды жерлерде ұзын тамырлы дақылдар және алуан түрлі шөптер басым. Шалғынды-дала қоғамдастықтарындағы шоқылардың баурайларында тығыз буынды дақылдар мен түрлі шөптер доминант болып келеді.

Түрлердің басым көпшілігі көпжылдық түрлерге (133), бір-екі жылдықтың алты түрі, ал эфемерлердің бір түрі (*Draba nemorosa*) жатады.

Ағаш және жартылай ағаш өсімдіктерге үш ағаш (*Betula pendula*, *Pinus sylvestris*, *Populus tremula*), бес бұта (*Caragana arborescens*, *Cerasus fruticosa*, *Rosa acicularis*, *R. majalis*, *Spiraea hypericifolia*) және бір жартылай бұта (*Artemisia frigida*) ұсынылған.

Шөп өсімдіктерінің ішінде кең таралғаны ұзын тамырлы (51 түр), өзек – тамырлы түрлер – 35, қысқа тамырлы түрлер-24 түр және одан әрі кішірейтетін тәртіппен: шашақ тамырлы (7 түр), баған түзетін және тығыз және борпылдақ бұталардан 3 түрден, түйнектәмірлі және жуашық тамырлы түрлерде 2 түрден.

Негізгі ценофлора мезофиттен (68 түр) және ксеромезофиттен (57 түр) тұрады, ксерофиттердің саны 15 түр, бұл 10,7% құрайды. Ксерофиттердің аздаған саны шалғынды және шалғынды-дала ценофлорасының сипатын көрсетеді.

Баға топтары арасында шалғынды түрлер (66 түр немесе 47,1%) және дала түрлері (42 түр немесе 30%), орман түрлері (22 түр немесе 15,7%), арамшөпті түрлер (10 түр немесе 7,1%) басым. Олардың орналасуы жайылымдармен (*Centaurea scabiosa*, *Cynoglossum officinale*, *Euphorbia microcarpa*, *E. uralensis*) жол жиектерімен (*Chenopodium album*, *Taraxacum officinale*) ауыл шаруашылығы жерлерімен (*Cirsium setosum*, *Vicia cracca*) және қараусыз қалған тұрғын үй құрылыстарымен (*Stellaria media*, *Urtica dioica*) байланысты.

Төменгі Еділде *Adonis vernalis* кең төбелерде және сирек емен ағаштарында бөренелерде өседі, Оралдың маңында ол кең төбелер мен арқалықтардың беткейлерінде, ал Оралдың оңтүстігінде *Adonis vernalis* құрғақ борларда, қызған шалғайларда кездеседі. Алтай-Саян провинциясының солтүстік-батыс бөлігінде *Adonis vernalis* дала мен дала шалғындарында жиі кездеседі. Солтүстік Қазақстанда *Adonis vernalis* – оңтүстік орманды-далалық шалғынды-дала өсімдігі. Оның Көкшетау таулы аймағының дала аймағында болуы ерекше климаттық жағдайларға байланысты.

**Түйін сөздер:** *Adonis vernalis* L., ценопопуляция, Солтүстік Қазақстан, систематикалық құрылым, экология-ценодикалық топтар.

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## ЦЕНОФЛОРА *ADONIS VERNALIS* L. В СЕВЕРНОМ КАЗАХСТАНЕ

**Аннотация.** *Adonis vernalis* L. – многолетнее травянистое кистекорневое растение с довольно широким ареалом в лесостепной зоне Восточной Европы, Урала и Южного Зауралья, Западной, Средней, Восточной Сибири. Ценоареалы *A. vernalis* в Казахстане весьма разнообразны: на Алтае, в Бухторминских горах, встречается в степях, на степных склонах, в зарослях кустарников, на территории Государственного национального

природного парка «Бурабай». Он произрастает в разреженных березовых, березово-сосновых лесах, на пологих склонах восточных экспозиций степных сопок и в зарослях спиреи. В Западном Казахстане растение отмечено в разреженных березовых лесах.

Основными угрозами для существования вида является разрушение природных местообитаний, связанное с распашкой луговых степей, что послужило причиной внесения *A. vernalis* в Красную книгу Казахстана и в Приложение II Конвенции СИТЕС (Convention of International Trade in Endangered Species of Wild Fauna and Flora).

Исследования проводились на территории Акмолинской и Северо-Казахстанской областей во время цветения *A. vernalis* в мае-июне 2018-2019 гг. на площадках 100 м<sup>2</sup>. Для флористического описания подбирались участки с высокой плотностью *Adonis vernalis*. Всего обследовано 8 популяционных локусов.

Ценофлора сообществ с участием *A. vernalis* включает 140 видов, принадлежащих к 31 семейству и 96 родам. В состав десяти ведущих семейств входят 112 видов, что составляет 80% от общего числа видов ценофлоры. Наиболее богаты по видовому составу семейства *Asteraceae* (30 видов), *Poaceae* (14 видов), *Rosaceae* (13 видов), *Caryophyllaceae* (12 видов), *Fabaceae* и *Apiaceae* (по 11 видов). Ведущими родами являются *Artemisia* – 8 видов, *Veronica* – 5 видов, *Achillea*, *Galatella*, *Lathyrus*, *Potentilla*, *Seseli*, *Silene* по 3 вида. По сравнению с флорой южного Зауралья, которая наиболее близка к флоре Северного Казахстана и северной части Центрально-Казахстанского мелкосопочника, значительно повышается ранг *Rosaceae* и *Caryophyllaceae*, отчасти *Ranunculaceae*, что связано с большим количеством бореальных (лесных мезофитно-луговых), так и степных видов, широко представленных в этих семействах. Доля *Brassicaceae* и *Chenopodiaceae* чрезвычайно мала и эти семейства не входят в первую десятку видов, в то время как в южном Зауралье они занимают V и IX позиции. Очевидно, это связано с небольшим количеством сорно-рудеральных видов, а так же с небольшим распространением засоленных земель.

*A. vernalis*, как правило, не является доминантом в сообществах и присутствует с обилием 3–5%. В луговых сообществах преобладают длиннокорневищные злаки и довольно богатое разнотравье. На пологих склонах сопок в лугово-степных сообществах доминантами выступают плотнокустовые злаки и разнотравье.

Подавляющее количество видов относится к многолетним видам (133), одно-двулетники представлены шестью видами, а эфемеры одним видом (*Draba nemorosa*).

Древесные и полудревесные растения представлены тремя деревьями (*Betula pendula*, *Pinus sylvestris*, *Populus tremula*), пятью кустарниками (*Caragana arborescens*, *Cerasus fruticosa*, *Rosa acicularis*, *R. majalis*, *Spiraea hypericifolia*) и одним полукустарником (*Artemisia frigida*).

Среди травянистых растений более всего длиннокорневищных (51 вид), стержнекорневых видов – 35, короткокорневищных – 24 вида и далее в убывающем порядке: кистевые (7 видов), столонообразующие, плотно- и рыхлокустовые по 3 вида, клубнелуковичные и луковичные по 2 вида.

В основном ценофлора состоит из мезофитов (68 видов) и ксеромезофитов (57 видов), количество ксерофитов 15 видов, что составляет 10,7%. Небольшое количество ксерофитов подчеркивает луговой и лугово-степной характер ценофлоры.

Среди ценофитических групп доминируют луговые виды (66 видов или 47,1%) и степные виды (42 вида или 30%), лесные виды (22 вида или 15,7%), сорные виды (10 видов или 7,1%). Их нахождение связано с пастбищами (*Centaurea scabiosa*, *Cynoglossum officinale*, *Euphorbia microcarpa*, *E. uralensis*) обочинами дорог (*Chenopodium album*, *Taraxacum officinale*) сельскохозяйственными землями (*Cirsium setosum*, *Vicia cracca*) и заброшенными жилищными постройками (*Stellaria media*, *Urtica dioica*).

Ценофитическая приуроченность *Adonis vernalis* в достаточной степени разнообразно. В Низменном Заволжье *Adonis vernalis* растет по широкому холмам и склонам балок в разреженных дубняках, в Предуралье он обитает на безлесных или покрытых редколесьями склонах холмов, в южном Зауралье *Adonis vernalis* встречается в сухих борах, на остепненных лугах. В Северо-Западной части Алтае-Саянской провинции *Adonis vernalis* достаточно обычен в степях и на остепненных лугах. В Северном Казахстане *Adonis vernalis* типичное лугово-степное растение южной лесостепи. Нахождение его в степной зоне на территории Кокшетауской возвышенности обусловлено особыми климатическими условиями.

**Ключевые слова:** *Adonis vernalis* L., ценопопуляция, Северный Казахстан, систематическая структура, эколого-ценофитические группы.

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## **BIOLOGICAL FEATURES OF FORMATION OF EXTERIOR AND PRODUCTIVITY OF ADAY HORSES IN THE CONDITIONS OF THE MANGYSHLAK PENINSULA**

**Abstract.** It is established that milk mares of the Kazakh horse of the Aday breed have on average live weight of 389.2 kg, height at the withers of 139.2 cm, an oblique body length of 142.1 cm, a chest girth of 167.6 cm and a metacarpus girth of 17.5 cm.

Mares of the Kazakh breed of the Mangystau population surpass in the live weight and body measurements the peers of Aday offspring. Namely, the live weight was 415.3 kg, the height at withers – 140.9 cm, the oblique body length – 143.4 cm, the chest girth – 170.5 cm and the metacarpus girth - 18.3 cm.

In general, mares of the Kazakh horse of the Aday offspring are inferior to the minimum requirements for animals of the elite class in height at withers, the chest and metacarpus girths. At the same time, 90% of mares correspond to the 1 quality class.

In stallions – producers of the Kazakh horses of the Aday offspring, the live weight averaged 438.7 kg, and in stud horses the Mangystau population – 449,8 kg. Body measurements in Aday horses were 145.2-147.5-169.8-18.5 cm, in the Mangystau population – 145.6-148.1-172.2-18.5 cm, respectively.

Some regularities of growth and development of foals from birth to 30 months of age are established. A scale for the development of young Aday horses has been developed.

**Key words:** Kazakh horse, exterior, the precocity of foals, growth and development.

**Introduction.** Production technology of mare's milk is considered as a set of systems and ways of maintenance, feeding, milking, use of animals, the organizations of work providing a final product (mare's milk, koumiss, horse meat) or intermediate product (replacements) [1].

The task of the technology as science is an identification of the trend appeared in the industry, development, and application in practice of peasant farms of the most effective and economic productions demanding the smallest expenses of time and material resources, providing creation of conditions for the maximum use of biological capacity of animals [2].

The production technology of milk in each farm should take into account an efficiency level, a structure of forage lands, a system and a way of mares maintenance, a provision with livestock premises and possibilities of their reconstruction for a technology of this or that type, staffing and other features of the economy [3].

At breeding of the Kazakh horses of the Aday breed, firstly, it is considered adaptiveness, secondly, dairy productivity. Mare's milk is widely used freshly in the daily ration by the local population of the Mangyshlak peninsula [4,5,6,7].

Milking capacity of the Kazakh horses of the Aday offspring belongs to those productive qualities of horses that are not affected by selective work.

Mare's milk and koumiss as useful foodstuff and dietary drink satisfying thirst, have popularity among inhabitants of many regions of the world. Therefore koumiss-making is widely developed in Kazakhstan [3].

Under identical conditions of feeding, maintenance, and housing of mares of different breeds, their traits differ in unequal efficiency both concerning quantity and quality. Therefore comparative studying of economic and useful traits of horses promotes the right choice of breed for these or those specific conditions, that opens big additional reserves in the increase in horse breeding production. At the same time, the important value is studying of character and types of the interrelation of the main selection traits of milking capacity: milk yield amount, the content of fat and protein in milk [1].

**The research aims** to study biological features of the formation of an exterior and dairy productivity of the Aday horses in the conditions of the Mangyshlak Peninsula of the Republic of Kazakhstan.

**Methods of research.** Studies of biological features of the formation of the exterior and dairy productivity of the Aday horses in the conditions of the Mangyshlak Peninsula were carried out in the conditions of Taushyk LLP of Tupkaragan district of the Mangystau region of the Republic of Kazakhstan" from 2018 to 2019.

For describing the development and constitutional type, experimental mares were measured and weighed. In each animal, 4 measurements were undertaken: the height at withers, the oblique body length, the chest girth and the metacarpus girth with a further determination of live weight [8].

The live weight of mares was established by weighing on monophonic scales at the beginning and the end of lactation before morning feeding and drinking. The maintenance of milking mares is pasture [9].

Keeping of milk mares during the autumn and winter periods was stable-pasturable, and in the spring and summer periods - pasturable.

Mares were milked 5 times a day, with breaks between milkings of 2-2.5 hours by hand.

During the autumn and winter periods, except pasturable vegetation, the mares were given the rough and concentrated forages by classes taking into account the live weight and efficiency [9]. The commodity milking capacity of mares was defined monthly during the lactation period by a method of control milk yields, two times a month on two adjacent days. The dairy productivity was calculated taking into account milk sucked out at night by a foal by a Saygin I.A. formula [10].

The chemical analysis of milk of mares was carried out in laboratories of Kazakh National Agrarian University NJSC using the MilkoScan analyzer. At the same time, it was determined protein, fat and sugar contents in milk. The percentage of the milk solids non-fat "MSNF" in milk was determined by the difference of indicators of milk and the distilled water on the COMO scale. All experimental data were processed by a biometric method, applied to small samples [11].

All experimental data were processed using the biometric method used for small samples [11].

### Results of research.

**Biological features of an exterior of the Kazakh horses of the Aday offspring.** For receiving a total zootechnic characteristic of development and constitutional type, the experimental mares were measured and weighed. Data on live weight and body measurements of mares are provided in table 1.

Table 1 – Exterior of milking mares of the Kazakh horses of Mangystau population and Aday offspring

Indicators	Mangystau populations (n = 15 animals)		Aday offspring (n = 15 animals)		Difference reliability td	Elite class standard
	X±m <sub>x</sub>	CV, %	X±m <sub>x</sub>	CV, %		
Live weight, kg	415.3 ± 3.79	1.42	389.2 ± 4.21	1.49	4.6	400-410
Measurements, cm:						
Height at withers	140.9 ± 0.45	0.60	139.2 ± 0.50	0.57	2.5	143-144
Oblique body length	143.4 ± 0.51	0.90	142.1 ± 0.53	0.79	1.78	146-147
Chest girth	170.5 ± 0.58	0.87	167.6 ± 0.621	0.81	3.4	168-170
Metacarpus girth	18.3 ± 0.15	1.37	17.5 ± 0.16	1.31	3.6	18.0

In the Mangystau population, the difference in live weight, height at the withers, chest girth and metacarpal girth is highly significant compared with the horses of the Aday offspring,  $t_d$  is 4.6; 2.5; 3.4 and 3.6 ( $P > 0.999$ ). The reliability of the difference in the oblique body length is not high ( $t_d = 1.78$ ), however, the reliability according to the Student table is  $P > 0.90$ .

In general mares of the Kazakh horse of the Aday offspring are inferior to the minimum requirements for animals of the elite class in body measurements and live weight, however, comply with the first class standard. The obtained data are new as for the first time in 40 years, complex investigations of the biology of the formation of the exterior are conducted.

Table 2 shows the results of measurements and live weight of stallions – producers.

Table 2 – An exterior of stallions - producers of the Kazakh horse of Mangystau population and Aday offspring

Indicator	Mangystau populations (n = 15 animals)		Aday offspring (n = 15 animals)		Difference reliability $t_d$	Elite class standard
	M±m	CV, %	M±m	CV, %		
Live weight, kg	449.8± 368	468	438.7 ± 4.16	4.27	2.0	420
Measurements, cm:						
Height at withers	145.6 ± 0.49	1.69	145.2 ± 0.53	2.16	0.55	145 - 146
Oblique body length	148.1± 0.64	2.17	147.5 ± 0.71	2.33	0.63	147- 148
Chest girth	172.2 ± 0.66	1.76	169.8 ± 0.68	2.18	2.55	170 – 172
Metacarpus girth	18.5 ± 0.15	5.03	18.5 ± 0.19	6.11	–	18.5 – 19.0

The difference between live weight and chest girth between the Mangystau population and the Aday offspring is reliably  $t_d = 2.0$ , and 2.55 ( $P > 0.99$ ), the difference between the height at the withers, the oblique body length is not significant,  $t_d = 0.55 - 0.63$  ( $P < 0.90$ ).

#### The growth and development of foals of Kazakh horses of the Aday offspring

As can be seen from the data in table 3, the largest gain in live weight of foals of both groups is observed from the age of 3 days to 1 month and amounted to 41.2 kg in colts and 40.4 kg in fillies. The average daily gain was 1526 and 1496, respectively. From 1 month to 6 months of age, live weight gain is 84.3 kg in stallions and 83.0 kg in mares.

Table 3 – Age-related dynamics of measurements and live weight of young Aday offspring of Kazakh horses (2018 birth rates).

Age, months	n	Measurements, cm				Live weight, kg	Average daily gain, g
		Height at withers	Oblique body length	Girth			
				Chest	Metacarpus		
Colts							
3 days	60	90.7 ± 0.51	78.2 ± 0.48	94.6 ± 0.67	10.7 ± 0.17	38.9 ± 1.97	–
1	59	99.2 ± 0.62	89.6 ± 0.59	104.1 ± 0.64	11.2 ± 0.19	80.1 ± 2.09	1526
3	57	110.7 ± 0.61	102.6 ± 0.64	113.5 ± 0.61	112.3 ± 0.18	121.5 ± 2.17	450
6	55	118.7 ± 0.67	113.2 ± 0.71	123.7 ± 0.65	14.7 ± 0.17	164.4 ± 2.13	466
12	53	121.2 ± 0.58	118.7 ± 0.66	134.2 ± 0.63	15.5 ± 0.16	206.2 ± 2.72	231
18	50	128.7 ± 0.49	125.4 ± 0.51	146.5 ± 0.60	16.5 ± 0.15	281.7 ± 3.66	410
24	49	131.8 ± 0.54	128.3 ± 0.53	150.7 ± 0.57	17.0 ± 0.15	301.3 ± 3.68	108
30	49	139.4 ± 0.49	137.3 ± 0.50	155.4 ± 0.58	17.4 ± 0.14	356.7 ± 3.17	306
Fillies							
3 days	62	89.4 ± 0.48	77.6 ± 0.53	93.8 ± 0.57	10.5 ± 0.13	37.4 ± 1.68	–
1	62	97.2 ± 0.51	88.4 ± 0.55	102.5 ± 0.53	11.0 ± 0.12	77.8 ± 2.01	1496
3	58	109.5 ± 0.47	102.1 ± 0.51	112.6 ± 0.50	11.7 ± 0.12	118.3 ± 2.24	440
6	56	117.4 ± 0.49	111.3 ± 0.47	121.2 ± 0.48	13.5 ± 0.10	160.8 ± 2.42	462
12	56	119.5 ± 0.42	116.1 ± 0.45	133.4 ± 0.46	14.6 ± 0.09	194.7 ± 2.65	187
18	52	126.6 ± 0.37	123.7 ± 0.44	145.3 ± 0.51	15.2 ± 0.13	252.6 ± 3.71	315
24	51	129.1 ± 0.35	127.2 ± 0.42	149.2 ± 0.54	16.0 ± 0.10	263.4 ± 3.67	60
30	50	137.2 ± 0.32	135.6 ± 0.45	153.2 ± 0.50	16.3 ± 0.09	312.2 ± 3.69	270

It is seen from the data in table 4, a slight increase in the format index with age occurred due to the low growth intensity of the oblique body length. A higher increase in the index of girth of the chest occurred due to the higher energy of the body growth in depth and width, and the metacarpus bones in thickness than the growth of the bones of the chest limb in length. A high index of massiveness in colts is associated with a faster increase in body weight over the growth of horses in height and length.

Table 4 – Age-related changes in the body indices of the Aday offspring of the Kazakh horses

Age, months	n	Body indices, %			
		of format	of girth	of bone	of massiveness
Colts					
3 days	60	86.2	104.3	11.8	52.1
1	59	90.3	104.9	11.3	82.1
3	57	92.7	102.5	11.1	89.6
6	55	95.4	104.2	12.4	98.3
12	53	97.9	110.7	12.8	115.8
18	50	97.4	113.8	12.8	132.2
24	49	97.3	114.3	12.9	131.6
30	49	98.5	111.5	12.5	131.7
Fillies					
3 days	62	86.8	104.9	11.7	52.4
1	62	90.3	104.7	11.2	82.9
3	58	93.2	102.8	10.7	89.7
6	56	94.8	103.2	11.5	99.4
12	56	97.1	111.6	12.2	113.9
18	52	97.7	114.8	12.0	124.5
24	51	98.5	115.6	12.4	122.4
30	50	98.8	111.7	11.9	120.9

Analysis of the growth and development of young Aday horses at the age from 3 days to 30 months made it possible to establish patterns of growth and development of foals. Based on these materials, we developed a scale for the development of young Aday horses (table 5).

Table 5 – Development scale for young Aday horses (minimum requirements)

Age, months	Measurements, cm				Live weight, kg
	Height at withers	Oblique body length	Girth		
			Chest	Metacarpus	
Colts					
3 days	90	78	94	10.5	38
1	99	89	104	11.0	80
3	110	102	113	12.0	121
6	118	113	123	14.5	164
12	121	118	134	15.5	206
18	128	125	146	16.5	218
24	131	129	150	17.0	301
30	139	137	155	17.0	356
Fillies					
3 days	89	77	93	10.5	37
1	97	88	102	11.0	77
3	109	102	112	11.5	118
6	117	111	121	13.5	160
12	119	116	133	14.5	194
18	126	123	145	15.0	252
24	129	127	149	16.0	263
30	137	135	153	16.0	312

**Conclusions.** According to our development scale, the smallest indicators of stallions at 6 months of age should be at least 118 cm in height at the withers, not less than 113 cm in oblique body length, 123 cm in chest girth, 14.5 cm in metacarpus girth and no less than 164 kg of the live weight. Fillies of the same age should have these indicators, respectively 117–111–121–13.5 cm and a live weight of at least 160 kg. Stallions at the age of 30 months should have a measurement of at least 139–137–155–1.0.0 cm and a live weight of at least 356 kg and fillies - 137–135–153–136.0 cm and a live weight of 312 kg, respectively.

The working out of the development scale of young Aday horses allows us to monitor the development of young stock and contribute to the timely identification of some violations of horse breeding technology.

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#### **МАҢҒЫШЛАҚ ТҮБЕГІ ЖАҒДАЙЫНДА АДАЙ ЖЫЛҚЫЛАРЫНЫҢ ӨНІМДІЛІГІНІҢ ЖӘНЕ ЭКСТЕРЬЕР ҚАЛЫПТАСУЫНЫҢ БИОЛОГИЯЛЫҚ ЕРЕКШЕЛІКТЕРІ**

**Аннотация.** Адай жылқыларының экстерьерінің қалыптасуының биологиялық ерекшеліктері мен сүт өнімділігі Маңғышлақ түбегіндегі Түпқараған ауданындағы «Таушық» ЖШС шаруа қожалығында жүргізілді.

Қазақ жылқыларының адай тармағының орташа тірі салмағы 389,2 кг, шоқтық биіктігі 139,2 см, қиғаш ұзындығы 142,1 см, көкірек орамы 167,6 см және жіліншік орамы 17,5 см.

Маңғыстау популяциясындағы қазақ жылқылары адай тармағы биелерімен салыстырғанда, тірі салмағы және дене өлшемдері бойынша басымырақ. Атап айтқанда, 415,3 кг, шоқтық биіктігі 140,9 см, қиғаш ұзындығы 143,4 см, көкірек орамы 170,5 см, және жіліншік орамы 18,3 см.

Жалпылай алғанда, қазақ жылқыларының адай тармағы элита класты жануарларға қойылатын талаптарға дене өлшемдері және тірі салмағы бойынша сәйкес келмейді, бірақ бірінші класқа сәйкес келеді. Алынған мәліметтер жаңа болып табылады, соңғы 40 жыл ішінде экстерьердің қалыптасу биологиясының комплексті зерттелуі жүргізілді.

Қазақ жылқыларының адай тармағының орташа тірі салмағы 438,7, ал маңғыстау популяциясында – 449,8 кг. Адай тармағында дене өлшемдері - 145,2-147,5-169,8-18,5 см, маңғыстау популяциясында сәйкесінше 145,6-148,1-172,2-18,5 см.

Құлындардың туылғанынан бастап 30 айлыққа дейін өсуі мен заңдылығы анықталды. Адай жылқыларының құлындарының даму шкаласы жасалды.

Қос топтағы құлындардың тірі салмағының қарқынды қосуы 3 күндік жаспен 1 айда орын алады және айғырларда – 41,2 кг және биелерде 40,4 кг құрады. Орташа тәуліктік өсім сәйкесінше 1526 және 1496 г құрады. 1 айдан 6 айға дейін тірі салмақ өсімі айғырларда 84,3 кг, биелерде 83,0 кг құрады.

Мұнда тәуліктік өсім сәйкесінше 458 және 451 г құрады. 6 айдан 12 айлық аралығында құлындарда орташа тәуліктік өсім төмендейді және 213 және 187 г құрады, ол құлындардың өз бетінше алғашқы қыс-тауымен сипатталады.

Адай жылқыларының құлындарын 3 күндік және 30 айлық аралығында өсуі мен дамуын талдау құлындардың өсу мен даму заңдылықтарын анықтауға мүмкіндік берді. Аталған мәліметтердің негізінде адай жылқылары құлындарының өсу шкаласы жасалды.

Біз жасаған даму шкаласына сәйкес 6 айлық айғырларға қойылған минималды көрсеткіштер шоқтық биіктігі бойынша 118 см, қиғаш ұзындығы 113 см, көкірек орамы 123, жіліншік орамы 14,5 см және тірі салмағы 164 кг кем емес. Осы жастағы биелер келесідей көрсеткіштерге ие болуы керек 117 – 111 - 121 – 13,5 және тірі салмағы 160 кем емес. 30 айлық айғырларда дене өлшемдері 139 - 137 - 155 – 17,0 см және тірі салмағы 356 кг және биелер сәйкесінше 137 - 135 - 153 – 16,0 см және тірі салмағы 312 кг кем болмауы керек.

Адай жылқылары құлындарының өсу шкаласын жасау құлындардың дамуын бақылауға мүмкіндік берді және дер кезінде жылқы өсіру технологиясында орын алған қателіктерді табуға мүмкіндік берді.

**Түйін сөздер:** қазақ жылқысы, экстерьер, құлындардың жетілуі, өсу мен даму.

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## БИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ФОРМИРОВАНИЯ ЭКСТЕРЬЕРА И ПРОДУКТИВНОСТИ АДАЕВСКИХ ЛОШАДЕЙ В УСЛОВИЯХ ПОЛУОСТРОВА МАНГЫШЛАК

**Аннотация.** Исследования по изучению биологических особенностей формирования экстерьера и молочной продуктивности адаевских лошадей в условиях Полуострова Мангышлак проводили в условиях ТОО «Таушык» Тупкараганского района.

Установлено, что дойные кобылы казахской лошади адаевского отродья имеют в среднем живую массу 389,2 кг, высоту в холке 139,2 см, косую длину туловища 142,1 см, обхват груди 167,6 см и обхват пясти 17,5 см.

Кобылы казахской лошади мангистауской популяции превосходят по живой массе и промерам тела сверстниц адаевского отродья. В частности, живая масса составила 415,3 кг, высота в холке 140,9 см, косая длина туловища 143,4 см, обхват груди 170,5 см и обхват пясти 18,3 см.

В целом кобылы казахской лошади адаевского отродья уступают минимальным требованиям, предъявляемым к животным класса элита по промерам и живой массе, однако соответствуют стандарту первого класса. Полученные данные являются новыми, так как впервые за 40 лет проведены комплексные исследования биологии формирования экстерьера.

У жеребцов – производителей казахских лошадей адаевского отродья живая масса в среднем составила 438,7, а мангистауской популяции – 449,8 кг. Промеры тела составили у адаевского отродья – 145,2-147,5-169,8-18,5 см, мангистауской популяции – соответственно 145,6-148,1-172,2-18,5 см.

Установлены закономерности роста и развития жеребят от рождения до 30 месячного возраста. Разработана шкала развития молодняка адайских лошадей.

Наибольший прирост живой массы у жеребят обеих групп наблюдается от 3-х дневного возраста до 1 месяца и составил 41,2 кг у жеребчиков и 40,4 кг у кобылок. Среднесуточный прирост составил соответственно 1526 и 1496. С 1 месячного до 6-ти месячного возраста прирост живой массы составляет у жеребчиков 84,3 кг, у кобылок 83,0 кг.

Среднесуточный прирост при этом составил соответственно 458 и 451. С 6 – ти до 12 месячного возраста среднесуточные приросты у жеребят снижаются и были равны 213 и 187 г, что объясняется сложностью первой самостоятельной зимовки жеребят.

Анализ роста и развития молодняка адайских лошадей с 3 – х дневного до 30 месячного возраста дал возможность установить закономерности роста и развития жеребят. На основании этих материалов нами разработана шкала развития молодняка адайских лошадей.

Согласно разработанной нами шкалы развития, минимальные показатели жеребчиков в 6-ти месячном возрасте должны быть по высоте в холке не менее 118 см, косой длине туловища не менее 113 см, обхвату груди 123 см, обхвату пясти 14,5 см и живая масса не меньше 164 кг. Кобылки этого же возраста должны иметь эти показатели соответственно 117- 111- 121 – 13,5 и живую массу не ниже 160 кг. Жеребчики 30 месячного возраста должны иметь промеры не менее 139- 137- 155 – 17,0 см и живую массу не ниже 356 кг и кобылки соответственно 137 - 135 – 153 – 16,0 см и живую массу 312 кг.

Разработка шкалы развития молодняка адайских лошадей дало возможность вести контроль за развитием молодняка и способствовала своевременному выявлению некоторых нарушений технологии выращивания лошадей.

**Ключевые слова:** казахская лошадь, экстерьер, скороспелость жеребят, рост и развитие.

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## PATHOPHYSIOLOGICAL ASPECTS OF GOAT FALSE PREGNANCY (HYDROMETRA) AND MODERN METHODS OF ITS DIAGNOSIS AND THERAPY

**Abstract.** The article considers the unique, not described in the domestic scientific and educational literature, the dishormonal pathology of the reproductive sphere of goats. The disease is characterized by prolonged anaphrodisia, the persistence of one or more functionally active corpus luteum in the ovaries and hydrometra - volumetric increase in the size of the uterus due to effusion of sterile serous fluid into its cavity. Hydrometra is a leading diagnostic sign of the disease. The research aimed to analyze the data of foreign literature on epidemiology, pathophysiology, diagnostics, and therapy of false pregnancy (hydrometra) in goats.

Based on the analysis of foreign literature data, the epidemiological characteristics of the disease were determined. It was found that the hydrometra is a fairly common pathology and is recorded on average in 4.2% of goats. The risk group includes goats aged 6...8 years and older. A hereditary (familial) predisposition of milk goats to the development of hydrometra was revealed. Iatrogenic factors also have a significant effect on the frequency of incidence: hormonal treatment of goats during and/or out the estrous season with progestins alone or in combination with gonadotropin in the serum of mares.

The etiology of pseudopregnancy, as well as the cause-effect relationship between the persistence of the corpus luteum and the development of hydrometra have not been fully established. Retention of the corpus luteum always precedes and accompanies the development of hydrometra. Spontaneous regression of the persistent corpus luteum leads to interruption of pseudopregnancy and emptying of hydrometra.

Violation of the external regulation with prostaglandin of the functional activity of the corpus luteum, apparently, plays a pivotal role in the pathogenesis of the disease. According to the profile of progesterone in the blood, it was found that the duration of false pregnancy is an average of  $150.3 \pm 23.5$  days.

Visual echography is the main diagnostic method of false pregnancy. The diagnosis of the disease is based on the detection of hypoechoic fluid in the uterine cavity in the absence of placentas and fetuses in the uterus.

Prostaglandin therapy is a pathogenetically substantiated and quite effective method of treating hydrometra.

**Key words:** goats, pseudopregnancy, persistent corpus luteum, hydrometra, treatment.

False pregnancy (hydrometra) is a rather common dishormonal pathology and cause of infertility in goats.

This disease is characterized by prolonged anaphrodisia, the persistence of one or more functionally active corpus luteum in the ovaries and a volume increase in the size of the uterus due to transudation (effusion) into its cavity of a sterile serous liquid (hydrometra).

In sheep and goats, the hydrometra is the main clinical and sonographic manifestation and the leading diagnostic sign of false pregnancy. In animals of most other species (for example, females of cattle and carnivores), hydrometra is an independent disease. Pathogenetically, it is not associated with persistent progesteronemia. The basis of its development is relative or absolute hyperestrogenism associated with chronic anovulation and accompanied by glandular cystic endometrial hyperplasia [1].

The literature provides different data on the frequency of spread and risk factors for the development of pseudopregnancy in goats. [2,3,4,5,7,13,15,16,17,18,19,20,21].

Table 1 – Frequency of extension of pseudopregnancy (hydrometra) according to ultrasound data

Authors	Number of studied goats	Of them with hydrometra	
		animals	%
R. Duquesnel et al., 1992[5]	11011	271	2,5
J.W. Hesselink, 1993 [7]	550	50	9,0
J.W. Hesselink, L. Elving, 1996 [8]	483	50	10,35
T. Wittek et al., 1997, 1998 [15,16]	2434	143	5,87
M. Batista et al., 2001[4]	1321	43	3,26
J. L. Martel, 2001 [17]	1360	45	3,31
E.S. Lopes Júnior et al. 2004 [13]	23	7	30,4
E.P.B.X. Moraes et al., 2007 [18]	143	13	9,1
G.N. Purohit, J.S. Mehta, 2012 [19]	425	26	6,12
A. Milovanovic et al., 2016 [20]	47	7	10,45
A.L.R.S. Maia, et al., 2017 [21]	2680	268	10,0
T. Barna et al., 2017 [3]	3355	46	1,37
M. Almubarak et al., 2018 [2]	378	40	10,6
Total	24210	1009	4,2

According to transrectal and transabdominal ultrasound examinations on pregnancy and infertility, the frequency of extension of hydrometra in goats ranges from 1.3 to 30.4% and averages 4.2% (table 1).

There are convincing data on the hereditary (familial) predisposition of goats to the development of hydrometra. A study by Dutch scientists [8] showed that risk of developing pseudo-gestation in sexually mature Dutch white milk goats born from mothers with hydrometra is 4.2 times higher (37.8% versus 9.1%) than goats born from mothers with no history of complications in this pathology.

Contradictory results on the effect of dairy productivity on the frequency of extension of hydrometra. According to some materials [7,18], high dairy productivity is one of the risk factors for the development of pseudopregnancy; according to others [2,15,16,20], this factor does not affect the frequency of extension of hydrometra in milk goats.

The development of pyometra is also facilitated by iatrogenic factors: hormonal synchronization of estrus and ovulation [4], induction of estrus out of the season with the use of progesterone or its synthetic analogues alone or in combination with pregnant mare serum gonadotropin (PMSG) [2,3,4,5,20,15,16]. The risk of developing pseudopregnancy in the hormonal-induced reproductive cycle is 4 times higher than in the natural reproductive cycle [2]. However, according to the data of some researchers [13, 18], hormonal treatment is not a risk factor for the development of hydrometra in goats.

The disease is found only in animals of average and above-average fatness. In this case, the risk of developing hydrometra in goats above-average fatness is 3.4 times higher than in animals with an average fatness [2]. The season of the year, the number of lambing, the type of feeding and the housing system do not affect the frequency of extension of hydrometra in goats [2].

The etiology of pseudopregnancy, as well as the causal relationship between the persistence of the corpus luteum and the development of hydrometra are not fully established. Retention of the corpus luteum always precedes and accompanies the development of hydrometra [15,16,22,23,24]. Spontaneous regression of the persistent corpus luteum leads to interruption of pseudopregnancy and emptying of the hydrometra.

There is convincing experimental evidence showing that a violation of the external prostaglandin regulation of the functional activity of the corpus luteum plays a pivotal role in the pathogenesis of the disease. It is proved that the uterus in the absence of pregnancy with prostaglandin F2alpha (PgF2α) controls ovarian function: causes regression of the corpus luteum of the reproductive cycle [1,25]. Active immunization of goats against PgF2α leads in 63.6% of cases to the formation of a persistent corpus luteum with the development of the luteal phase of hydrometra on the 31st... 38th day [12, 24]. According to the profile of progesterone in the blood, the authors found that the duration of false pregnancy is quite comparable with the true one and lasts 150.3±23.5 days on average (with fluctuations from 103 to 168 days).

The corpus luteum of false pregnancy (as well as the true one) is very sensitive to the luteolytic effects of PGF2α and its synthetic analogue, cloprostenol. The effectiveness of the induction of luteolysis when

they are assigned to goats with hydrometra approaches 100%. With almost the same effectiveness, termination of false pregnancy in goats can also be done with oxytocin [26]. It is assumed that oxytocin, produced by the corpus luteum at the end of the luteal phase of the reproductive cycle, binds to special oxytocin receptors in the endometrium, activates prostaglandinogenesis and the release of PGF $2\alpha$  from its cells [6]. However, it should be noted that the active immunization of goats against oxytocin, although it helps to delay the reverse development of the corpus luteum (by about 10 days), does not lead to the development of hydrometra [6].

Pathophysiological factors that block the production of prostaglandin F $2\alpha$  by the endometrium and cause the development of false pregnancy (the symptom complex “persistent corpus luteum - hydrometra”) remain poorly studied. The specific cause of the appearance of hydrometra in most cases remains undetermined; in 17.9–20.0% of cases, it is associated with intrauterine death of the fetus with a gestational age of 40-90 days [15,16,21].

With the development of false pseudopregnancy, the estrus stops. The general state does not suffer. Biochemical and clinical indicators of blood are within the physiological norm [21]. In blood plasma, the progesterone content is always higher 2 ng/ml [5,7,8,26,24] or 1 ng/ml [21,15,16]. The concentration of estrogen in the blood of goats with hydrometra is higher than in the stage of diestrus, but lower than in animals with a physiologically developing pregnancy [21,15,16].

There were no significant differences in the content of prolactin in the plasma of peripheral blood of goats with a false and physiological pregnancy [12,15,16].

With a pseudo gestation period of approximately 30 days, serous fluid begins to accumulate in the uterine cavity. Its volume can vary from 0.1 or less to 8 or more liters [5,9,26] and on average reaches: according to some data [15,16] – 2.98±2.1 liters, according to others [28] - 13.7±6.0 liters. When a large amount of secretion accumulates in the uterus, a bilateral increase in the volume of the abdomen is observed. At the same time, in lactating goats, a decrease in dairy productivity is noted, in non-lactating goats in the late stages of pseudo gestation, on the contrary, there is breast hypertrophy (gigantomastia) and its preparation for new lactation. At the end of a false pregnancy, spontaneous involution of the persistent corpus luteum occurs. A decrease in the concentration of progesterone in blood plasma (below 1 ng/ml) leads to the disclosure of the cervix, activation of the contractile activity of the myometrium and the emptying of the hydrometra.

During laparoscopic and post-mortem examination of the internal genital organs in pseudopregnant goats, the volume increase in the size of the uterus is diagnosed due to the accumulation of fluid in its cavity. In the ovaries, along with the corpus luteum, vesiculate follicles larger than 5 mm are detected, sometimes ovarian cysts. The walls of the uterine horns are thinner and translucent. A histological examination of the mucous membrane indicates cystic atrophy of the endometrium [16].

The contents of hydrometra is a sterile serous or (extremely rare) mucous transudate produced by the endometrial glands [15,16]. When inoculation, it does not give bacterial growth. In terms of osmolarity, the contents of hydrometra correspond to, and in chemical composition differ from blood plasma, as well as the contents of amnion and allantois (table 2).

Table 2 – Physico-chemical composition of the fluid from the uterine cavity of goats with hydrometra [15,16]

Parameter	M±m
Fluid amount, l	2.98±2.1
pH	7.4±0.1
Osmolarity, mosmol/l	294.0±15.6
Glucose, mmol/l	0.5±0.53
Urea, mmol/l	6.4±2.8
Phosphates, mmol/l	0.03±0.09
Sodium, mmol/l	100.9±28.8
Potassium, mmol/l	9.7±7.5
Calcium, mmol/l	7.6±4.5
Chlorides, mmol/l	123.0±32.2
Total protein, g/l	4.05±3.6
Albumins, g/l	0.9±1.5

Visual echography is recognized as the main and most informative method for the diagnosis of pseudopregnancy, which allows one-time or two-time (with a break of 2 weeks) examination to differentiate false pregnancy from the true one. The optimal time for conducting an echographic study is 40... 70 days after insemination [12,25,15,16]. When researching during these periods at physiological pregnancy, it is possible to visualize its direct signs: the fetus or its body parts, contraction of the cardiac muscle, placenta; at false pregnancy – hypoechoic fluid in the absence of the placenta and fetus in the uterus, respectively [10].

When interpreting the results of visual echography, it should also be taken into account that an accumulation of fluid contents in the uterine cavity can also be due to pyometra. With pyometra, hyperechoic diffuse inclusions appear in the uterine cavity, due to which its contents become cloudy: the "snowstorm phenomenon" [9]. Hyperthermia, neutrophilia, leukocytosis with a shift of the leukocyte formula to the left also serve as very specific manifestations of pyometra, reflecting the inflammatory nature of the disease.

For therapy of hydrometra, some drugs have luteolytic and uterotonic properties – native prostaglandin F-2 alpha (PgF2 $\alpha$ ) or its highly active synthetic analogue, cloprostenol (table 3). The latter in its biological (luteolytic) activity is approximately 50 times higher than natural PgF2 $\alpha$  and for this reason, preparations based on it are prescribed to goats in much lower doses [1].

The protocols and clinical efficacy of using PgF2 $\alpha$  and its analogue cloprostenol in goats with hydrometra are given in table 3.

The analysis of the data given in table 3 indicates that the effectiveness of prostaglandin therapy depends on the administration regimen of drugs based on natural PGF2 $\alpha$  and cloprostenol. When administered once, they get very unstable and unacceptable for practice results. So, according to L.R.S. Maia et al. [21], after the first injection of cloprostenol (in the submucous membrane of the vestibule of

Table 3 – Clinical efficacy of treating hydrometra in goats with preparations of native PgF2 $\alpha$  and its synthetic analogue, cloprostenol

Authors	Number of animals	Drugs and treatment regimen	Notes
T. Barna et al., 2017 [3]	25	Cloprostenol - twice with a break of 11-12 days IM at a dose of 250 mcg; Antibiotics were also used for all animals (Baytril - three injections with a break of 2 days) and once in/m 5 ml of vitamin AD3E	All animals recovered. After recovery, experimental goats for 11 days were injected intravaginally with progestogen sponge containing 30 mg of flugestron acetate, as well as (48 hours before removing the sponge) 400 U of PMSG (in/m) and 5 mg of dinoprostum, (in/m). 42 hours after removal of the sponge, the goats were kept in place with billy goats for 2 days. According to the proportion of fertilized animals, the effectiveness of the method was 64%
E.P.B.X. Moraes et al., 2007 [18]	13	Native drug PGF-2alfa (lutalysis, Pfizer) once or twice (according to the clinical situation) with a break of 11 days IM at a dose of 0.5 mg	The therapy's effectiveness was monitored by ultrasound. After the first injection of the drug, 10, or 76.9%, animals recovered and were rutting, after the second, other 3, or 23.1%, goats had estrus. After mating with a billy goat in a spontaneously developed reproductive cycle, all animals became fertile
J.W. Hesselink, 1993 [7]	20	Dinoprostum once IM at a dose of 5 mg	After a single hormonal treatment, 40% of goats had estrus seeded and were naturally inseminated. Of these, only 15% became fertile. At the same time, in 9, or 45%, experimental goats there was recorded a relapse of the disease
	29	Dinoprostum twice with a break of 12 days IM at a dose of 5 mg	After two courses of prostaglandin therapy, 48.3% of experimental animals were fruitfully inseminated and rutting. One goat (3.4%) had a backset of the disease
L.R.S. Maia et al., 2018 [21]	20	Cloprostenol in the submucosa of the vestibule of the vagina at a dose of 37.5 mcg three times with a break of 10 days. On 5 day from the start of treatment, 1 ml (25 mcg) of Gestragan Plus (a highly active synthetic GnRH analog) or 1 ml of 0.9% sodium chlo-ride solution (10 animals in each group) were administered	According to ultrasound investigation, after the first injection of the drug, complete emptying of the uterus from the fluid contents was recorded in 50% of animals, after the second and the third ones - in 95 and 100%, respectively. On 90th day after mating with a billy goat, in 11, or 55%, experimental goats, the echographic signs of normally developing pregnancy were revealed. On 45-90 days after the therapy course, according to the Echographic diagnostics data, in 4, or 20%, experimental goats there was recorded a backset of the disease. The authors concluded that additional hormonal treatment of goats with a highly active GnRH analogue (5 days after the treatment start) does not improve treatment results

vagina at a dose of 37.5 mcg), a complete emptying of the uterus from the liquid with restoration of estrous cycle occurs only in 50% of goats with hydrometra, when, after the second and third injection of the drug - in 95 and 100% of animals, respectively. According to J.W. Hesselink [7], a single administration of dinoprostum intramuscularly at a dose of 5 mg in goats with hydrometra provides restoration of estrus cyclicity in only 40%, and fertility in 15% of animals, respectively. Other disadvantages of the single injection method are the high recurrence rate of the disease – 45.0% [7].

Good, suitable for practice results were obtained with two-, three-fold or differentiated, under the control of ultrasound investigation, one/two-fold (according to the clinical situation) administration of drugs based on natural PGF<sub>2α</sub> and cloprostenol.

At two- or three-time administration of these drugs, the effectiveness of prostaglandin therapy in the proportion of fertilized animals reaches 48.3-77.8% [3,10,14,23,24].

**Conclusions.** Pseudopregnancy, or false pregnancy, is a dishormonal pathology, the leading diagnostic feature of which is hydrometra - the accumulation of a variable amount of sterile serous fluid in the uterine cavity.

It occurs in goats of reproductive age. The risk group includes goats aged 6...8 years and older. A hereditary (familial) predisposition of dairy goats to the development of hydrometra was revealed. Iatrogenic factors also have a significant impact on the incidence rate: hormonal treatment of goats during and/or out of estrus with progesterone alone or in combination with pregnant mare serum gonadotropin.

Visual echography (ultrasound) is the main diagnostic method for false pregnancy. The diagnosis of the disease is based on the detection of hypoechoic fluid in the uterine cavity in the absence of the placenta and fetus in the uterus.

Prostaglandin therapy is a pathogenetically substantiated and quite effective method of treating hydrometra.

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## ЕШКІДЕ ЖАЛҒАН БУАЗДЫЛЫҚ ПАТОФИЗИОЛОГИЯЛЫҚ АСПЕКТИЛЕРІ (ГИДРОМЕТРЛЕР) ЖӘНЕ ОНЫҢ ДИАГНОСТИКАСЫ МЕН ТЕРАПИЯСЫНЫҢ ҚАЗІРГІ ЗАМАНҒЫ ӘДІСТЕРІ

**Аннотация.** Мақалада отандық ғылыми және оқу әдебиетінде сипатталмаған бірегей, ешкінің репродуктивті саласының дисгормоналдық патологиясы қарастырылады. Ауру ұзақ анафродизиямен, аналық бездегі бір немесе бірнеше функционалды белсенді сары денелердің персистенциясымен және гидрометрамен сипатталады-жатырдың көлемді ұлғаюымен, оның қуысына стерильді серозды сұйықтықтың түсуі салдарынан сипатталады. Гидрометр-аурудың жетекші диагностикалық белгісі.

Зерттеудің мақсаты – ешкі індеті, патофизиология, диагностика және жалған буаздылықты емдеу (гидрометрлер) бойынша шетелдік әдебиет мәліметтеріне талдау жүргізу.

Шетел әдебиетінің деректерін талдау негізінде аурудың эпидемиологиялық ерекшеліктері анықталды. Гидрометр өте кең тараған патология болып табылатыны және орташа алғанда 4,2% ешкіде тіркелгендігі анықталды. Қауіп тобына 6...8 жас және одан үлкен жастағы ешкілер жатады. Сүт ешкілерінің гидрометрлердің дамуына тұқым қуалайтын (отбасылық) бейімділігі анықталды. Аурушандық жиілігіне ятрогенді факторлар да елеулі әсер етеді: жыныстық маусым кезінде және/немесе одан тыс прогестиндермен өз бетінше немесе құлын биелері сарысуының гонадотропинмен біріктіріп ешкілерді гормоналды өңдеу.

Жалған буаздылық этиологиясы, сондай-ақ, сары дененің персистенциясы мен гидрометрдің дамуы арасындағы себеп-салдарлық өзара байланыс анықталған жоқ. Сары денені ұстау әрдайым гидрометрдің дамуына ықпал етеді. Персистентті сары дененің кенеттен регрессиясы жалған буаздылықты үзуге және гидрометрлерді босатуға әкеледі.

Сары дененің функционалдық белсенділігінің сыртқы простагландинді реттелуінің бұзылуы аурудың патогенезінде жетекші рөл атқарады. Қандағы прогестерон бейіні бойынша жалған буаздылық ұзақтығы орташа 150,3 ± 23,5 тәул.

Визуалды эхография-жалған буаздылықты диагностикалаудың негізгі әдісі. Аурудың диагностикасы жатыр қуысында плацентасы мен ұрығы болмаған кезде гипозохогенді сұйықтықтың анықталуына негізделген.

Простагландин терапиясы патогенетикалық негізделген және гидрометрлерді емдеудің жеткілікті тиімді әдісі болып табылады.

**Түйін сөздер:** ешкі, жалған буаздылық, персистентті сары дене, гидрометр, емдеу.

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### **ПАТОФИЗИОЛОГИЧЕСКИЕ АСПЕКТЫ ЛОЖНОЙ БЕРЕМЕННОСТИ (ГИДРОМЕТРЫ) У КОЗ И СОВРЕМЕННЫЕ МЕТОДЫ ЕЕ ДИАГНОСТИКИ И ТЕРАПИИ**

**Аннотация.** В статье рассматривается уникальная, не описанная в отечественной научной и учебной литературе, дисгормональная патология репродуктивной сферы коз. Заболевание характеризуется длительной анафродизией, персистенцией одного или нескольких функционально-активных желтых тел в яичниках и гидрометрой – объемным увеличением матки в размере, вследствие выпота в ее полость стерильной серозной жидкости. Гидрометра является ведущим диагностическим признаком заболевания.

Цель исследования – провести анализ данных иностранной литературы по эпидемиологии, патофизиологии, диагностике и терапии ложной беременности (гидрометры) у коз.

На основании анализа данных иностранной литературы определены эпидемиологические особенности заболевания. Установлено, что гидрометра является достаточно распространенной патологией и в среднем регистрируется у 4,2% коз. К группе риска относятся козы в возраст 6...8 лет и старше. Выявлена наследственная (семейная) предрасположенность молочных коз к развитию гидрометры. На частоту заболеваемости существенное влияние оказывают также ятрогенные факторы: гормональная обработка коз во время и/или вне полового сезона прогестинами самостоятельно или в комбинации с гонадотропином сыворотки жеребых кобыл.

Этиология псевдосукозности, также как и причинно-следственная взаимосвязь между персистенцией желтого тела и развитием гидрометры до конца не установлены. Задержание желтого тела всегда предшествует и сопутствует развитию гидрометры. Спонтанная регрессия персистентного желтого тела приводит к прерыванию псевдосукозности и опорожнению гидрометры.

Нарушение внешней простагландиновой регуляции функциональной активности желтого тела, по-видимому, играет ведущую роль в патогенезе заболевания. По профилю прогестерона в крови установлено, что продолжительность ложной сукозности составляет в среднем  $150,3 \pm 23,5$  сут.

Визуальная эхография – основной метод диагностики ложной беременности. Диагностика заболевания основана на обнаружении в полости матки гипозохогенной жидкости при отсутствии плацент и плода в матке.

Простагландиновая терапия является патогенетически обоснованным и достаточно эффективным методом терапии гидрометры.

**Ключевые слова:** козы, ложная беременность, персистентное желтое тело, гидрометра, лечение.

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## RESISTANCE, PRODUCTIVITY, AND QUALITY OF VEAL WHEN USING BASULIFOR PROBIOTIC FEED ADDITIVE

**Abstract.** Against the background of the use of a probiotic feed additive at a rate of 0.3 g/kg and 0.4 g/kg of fodder, in experimental calves, compared with the control analogs, there was a significant increase in the average daily weight gain on the 15th day of the experiment by 4.60-4.90%, on the 30th day - by 5.87 - 6.34%, on the 60th day - by 7.48 - 7.81%, in the blood of animals the number of red blood cells increased by 3.69 - 4.54%, leukocytes - by 1.48 - 1.75%, hemoglobin - by 6.39 - 7.59%, in blood serum the level of total protein - by 3.28 - 3.31% (P<0.05), albumin - by 2.08 - 2.69% (P<0.05), globulins - by 3.70 - 4.20% (P<0.05), gamma globulins - by 12.41 - 12.91 % (P<0.01). Introduction to the diet of calves of the specified probiotic feed additive promoted a slight increase of immunoglobulins A in blood serum in the experimental calves, in relation to the control analogues, in both experimental groups of animals by 5.00% (P<0.05), immunoglobulins M - by 4.43 - 5.64% (P<0.01), immunoglobulins G - by 5.69 - 5.90% (P<0.05), increasing the preservation of calves - by 3.22 - 3.69% (P<0.05).

**Key words:** calves, viability, productivity, probiotics, Basulifor feed additive, resistance, preservation.

**Introduction.** In the conditions of livestock industry, with an increase in the density of animals, the cubic space of premises and, consequently, the air volume per animal decreased sharply. With the accumulation in the livestock premises of excess heat, moisture, harmful gases, reducing the oxygen content and the overall deterioration of the microclimate, there is a weakening of the overall body resistance, productivity, and preservation of young animals. In this regard, it is difficult to achieve an improvement in the resistance and productivity of animals without the use of biologically active probiotic preparations and feed additives. [1,2,3,4].

Currently, an acute problem is the search, testing and use of inexpensive, simultaneously effective drugs and feed additives. To improve the digestibility and availability of fodder with low nutritional value, enzyme preparations are used that contain a complex of amylolytic, pectolytic, cellulolytic and proteolytic enzymes [5,6,7,8]. The use of such drugs is also important in the enzymatic dysfunction of the gastrointestinal tract as replacement therapy. The set of enzymes that make up such preparations depends on the type and age of an animal, as well as on the type of feed used in the diet. [9, 10].

For young cattle, it is more advantageous to use such fermentative preparations, which can be used both in the form of feed additives, and to ferment part of the feed outside the body. The use of exogenous enzymes, in particular, enzymes synthesized by various beneficial spore-forming bacteria, allows to break down the high-molecular components of the feed - proteins, fats, carbohydrates into low-molecular ones. In the animal body, the prepared fodder is more fully broken down by its own enzymes, contributing to its better digestibility and accessibility. Breakdown by enzymes of non-starchy polysaccharides contained in large quantities in grain feeds reduces feed viscosity and ultimately leads to the normalization of microflora in the gastrointestinal tract, which is crucial for calves [11,12,13,14].



In the light of the above-mentioned, one of the factors for increasing the viability, resistance, safety and productivity of young cattle is use of biologically active probiotic preparations and probiotic feed additives in the feeding animals. A special place among this group of drugs is given to the Basulifor, newly created probiotic feed additive, which due to its composition has high bioavailability in the body. In the available literature, we have not found work devoted to the study of the effect of this probiotic feed additive on the body of calves.[15,16,17].

**The aim of the research** – determination of zootechnic and veterinary practicability of using Basulifor probiotic feed additive when growing calves.

**Materials and methods.** Scientific and economic test was carried out in the dairy complex of Akkond-Agro JSC of Yantikovsky district, the Chuvash Republic, in Chuvash Republican Veterinary Laboratory of the State Veterinary Service of the Chuvash Republic and in the biochemical laboratory of the Department of Morphology, Obstetrics And Therapy of the Chuvash State Agricultural Academy, in winter and spring periods 2018.

The studies were conducted using 45 healthy, well-developed, of average fatness, 1-week-old, with a live weight of 32-34 kg, calves of the Black-and-white breed. Based on the principle of groups-analogs animals were divided into 3 groups (control and two experimental) of 15 animals each. The calves were kept in separate sections, the feeding and housing conditions were the same for all groups. Calves were accustomed to eating hay and combined feed starting from 10-12 days of age. In contrast to the control group, calves of the first experimental group within 30 days with milk, and within 31-90 days with feed were additionally given dry Basulifor at the rate of 0.3 g/kg of fodder, and animals of the second experimental group were given Basulifor at a dose of 0.4 g/kg of fodder. Observation of the animals was carried out up to 120 days of age.

When performing this experimental work, the following research methods were used:

– zoohygienic – when assessing the microclimate in calf houses, temperature, relative air humidity were taken with the TKA-PKM (model 42), carbon dioxide concentration – using the Subbotin-Nagorsky method, ammonia, and hydrogen sulfide content – using the universal gas analyzer UG-2; air velocity - using TKA-PKM (model 50) thermal anemometer, concentration of microorganisms and dust in the air of the premises – using the Krotov apparatus;

– clinical-physiological – the body temperature, pulse rate, respiration rate were determined by generally accepted and approved methods in veterinary medicine;

– biochemical – the total protein content in the blood serum of animals was determined with IGF-454B-2M refractometer, separate fractions (albumin, alpha, beta and gamma globulins) – by the turbidimetric (nephelometric) method;

– hematologic – the number of erythrocytes, leukocytes, hemoglobin in the blood was determined using VetSanHM5 veterinary hematology analyzer [18];

– immunological – determination of IgA, IgM, IgG in the serum of animals – by the method of radial immunodiffusion in a gel [19];

– economic – the economic efficiency of using probiotic feed additives for growing young cattle was calculated according to the common method;

– statistical – biometric processing of the obtained digital data was carried out using Windows XP Professional.

**Results.** Before the beginning of the scientific and production test and during its implementation, regular measurement of the main parameters of the microclimate in the premises for keeping young cattle was carried out. The results of the study are shown in table 1.

As is seen from the table, the microclimate in the calf house mostly corresponded to zoohygienic requirements. The air temperature in the room, depending on the season, fluctuated at the level of  $16.80 \pm 0.13$  -  $16.92 \pm 0.06$  °C, relative humidity -  $72.61 \pm 0.44$  -  $71.51 \pm 0.64\%$ , air velocity -  $0.14 \pm 0.02$  -  $0.16 \pm 0.08$  m/s.

As known, harmful gases and solid aerosols have a certain negative impact on health and productivity of young farm animals. According to the research results, the concentration of ammonia in the room, depending on the season of the year, was at the level of  $6.85 \pm 0.14$  -  $7.76 \pm 0.08$  mg/m<sup>3</sup>, carbon dioxide -  $0.17 \pm 0.02$  -  $0.18 \pm 0.02\%$ , hydrogen sulfide -  $3.00 \pm 0.05$  -  $3.84$  mg/m<sup>3</sup>, solid aerosols -  $6.68 \pm 0.14$  -  $6.89 \pm 0.16$  mg/m<sup>3</sup>. The basic parameters of the microclimate in a sectional calf house, to which animals were transferred from a calf preventative clinic, fluctuated in approximately the same indicators.

Table 1 – Zoohygienic parameters of the air environment in the calf house

Parameters	Group		
	Control	1 experimental	2 experimental
Air temperature, °C	16.80±0.13	16.76±0.14	16.92±0.14
Relative humidity, %	72.61±0.44	72.12±0.55	71.51±0.64
Air velocity, m/s	0.14±0.02	0.15±0.03	0.16±0.08
Contents: of ammonia, mg/m <sup>3</sup>	6.85±0.14	7.56±0.10	7.76±0.09
Carbon dioxide, %	0.17±0.02	0.16±0.04	0.18±0.02
Hydrogen sulphide, mg/m <sup>3</sup>	3.67±0.06	3.00±0.05	3.84±0.08
Solid aerosols, mg/m <sup>3</sup>	6.68±0.14	6.76±0.12	6.89±0.16

Specified tested probiotic feed additive had an impact on the physiological parameters of the experimental calves (table 2).

Table 2 – Dynamics of physiological indices of calves when using Basulifor probiotic feed additive (M±m)

Index	Age of animals, days	Group of animals		
		Control	1 experimental	2 experimental
Body temperature, °C	1-2	38.14±0.05	38.11±0.06	38.14±0.08
	15	38.07±0.06	38.40±0.07*	38.47±0.10*
	30	38.47±0.09	38.86±0.12**	38.82±0.11**
	60	38.31±0.08	38.61±0.11*	38.66±0.13*
Pulse rate, min.	1-2	93.31±2.59	97.51±1.96	98.30±1.98
	15	89.62±1.88	96.72±1.99*	97.82±2.42*
	30	82.12±1.76	89.72±2.23**	89.92±2.35**
	60	77.53±1.84	85.41±2.32*	85.93±2.68*
Respiratory rate, min.	1-2	33.41±2.55	37.82±2.63	38.50±2.66
	15	29.41±1.69	36.01±1.88*	37.85±1.92*
	30	27.80±1.60	34.60±1.79**	36.40±1.60**
	60	27.32±1.26	34.42±1.74*	36.12±1.49*

Note: \* P<0.05; \*\* P<0.01.

The data in the table suggest that the introduction of this probiotic feed additive into the main diet of the experimental calves, compared to the control analogues, contributed to a slight increase in body temperature, ranging from 0.3 to 0.4 °C. Thus, in the first experimental group, where the probiotic feed additive was used at a dose of 0.3 g/kg of fodder, in 15, 30, 60 - days age cycle, the body temperature in animals fluctuated at the level of 38.40±0.07 °C, 38.86±0.12 °C, 38.61±0.11 °C; in the control group this index was characterized by 38.07±0.06, 38.47±0.09, 38.31±0.08 °C. The difference in favor of the experimental animals of this group, at the indicated age, was significantly higher on average by 0.30-0.39 °C (P<0.05), in the second experimental group of animals when using the feed additive at a dose of 0.4 g/kg of fodder, this difference was higher by 0.35 - 0.40 °C (P<0.05), respectively. At the same time, these discrepancies were within the limits of physiological fluctuations.

Against the background of the use of this probiotic feed additive, a change in the pulse rate occurred approximately along with a similar pattern. This indicator in experimental animals, compared with the control analogues, by the 15th day of the tests significantly increased by an average of 7.10-8.20 (P<0.05), by the 30th day - by 7.60 - 7.80 (P<0.05), and by the 60th day of the experiments – by 7.88 - 8.40 (P<0.05) beats per minute.

This feed additive had a definite effect on the respiratory rate. This parameter in the experimental groups of animals, compared with the control analogues, increased by 15-day age by 6.60 - 8.44, by 30 and 60-day age cycle – by 6.80 - 8.60 and 7.10 - 8.80 respiratory movements per minute (P<0.05) as a result of the use of this additive. The results of hematological studies are presented in table 3.

Table 3 – Hematological parameters in calves using Basulifor probiotic feed additive

Group of animals	Age, days	Hematological parameters		
		red blood cells, $10^{12}/l$	leucocytes, $10^9/l$	hemoglobin, g/l
Control	1-2	7.77±0.28	8.80±0.72	116.68±2.14
	15	6.23±0.24	8.10±0.56	108.66±1.92
	30	6.12±0.28	8.21±0.62	109.64±1.94
	60	6.38±0.26	8.57±0.68	109.84±1.96
1 experimental	1-2	7.25±0.30	8.82±0.79**	108.12±2.25
	15	6.46±0.38	8.22±0.64**	115.61±2.64**
	30	6.37±0.44	8.34±0.67	116.87±2.78**
	60	6.66±0.51	8.71±0.61	117.41±2.83
2 experimental	1-2	7.82±0.50	8.10±0.58	118.76±2.36
	15	6.49±0.49	8.23±0.65*	116.39±2.12
	30	6.39±0.38	8.36±0.68**	117.79±2.29**
	60	6.67±0.39	8.72±0.69	118.18±2.97

Note: \* P<0.05; \*\* P<0.01

On the first day of the feed additive application, the numbers of formed elements and hemoglobin in the blood of calves from the control and experimental groups were equal. As far as the experiment lasts, the indicated blood parameters change noticeably. So, the content of the number of red blood cells in calves of the first experimental group, compared with the control, on the 15th day of the experiment increased by 3.69% (P<0.05), on the 30th day - by 4.08% (P<0.05), on the 60th day of the experiment – by 4.38% (P<0.05). In the second experimental group, the growth of these indicators in the fixed dates of the experiment was 4.17, 4.41, 4.54% (P<0.05). The number of leukocytes in the blood of experimental animals also slightly increased in the range of 1.48 - 1.75% (P<0.5), however, with biometric processing of digital values, they were statistically unreliable.

A similar pattern was observed with respect to hemoglobin, the value of which changed upwards depending on the age characteristics and timing of the experiment. In the blood of animals of the first experimental group, it increased by 6.39 - 6.89% (P<0.01), in the second experimental group of calves – by 7.11 - 7.59% (P<0.01). It should be noted that the change in hematological parameters in the blood of experimental animals against the background of the use of the specified feed additive did not go beyond the limits of physiological fluctuations.

Indicators of the protein spectrum and immunological parameters of blood serum of calves on the back of the use of probiotic additives are shown in table 4.

Table 4 – Dynamics of total protein, protein fractions and serum immunoglobulins of calves when using the probiotic feed additive Basulifor

Parameters	Group		
	Control	1 experimental	2 experimental
total protein, g/l	65.82±0.78	67.98±0.82 *	68.00±0.86 *
Albumins, g/l	27.78±0.39	28.36±0.41 *	28.53±0.42 *
Globulins, g/l	38.04±0.44	39.45±0.46,*	39.64±0.48*
including alphaglobulins, %	12.62±0.22	11.16±0.20	11.24±0.21
beta-globulins, %	7.46±0.18	8.10±0.19	8.12±0.20
gamma – globulins, %	17.96±0.24	20.19±0.26 **	20.28±0.25 *
Immunoglobulins Ig «A», g/l	0.20±0.01	0.21±0.02**	0.21±0.02**
Immunoglobulins Ig«M», g/l	2.48±0.10	2.59±0.11*	2.62±0.12*
Immunoglobulins Ig «G», g/l	19.32±0.26	20.42±0.30 *	20.46±0.33 *

Note: \* P<0.05; \*\* P<0.01

The digital data of the table show that the level of total protein in the blood serum of the first group experimental animals, compared with the control analogues, under the influence of the probiotic feed additive Basulifor, slightly, but significantly increased on the 30th day of the test on average by 3.28% ( $P<0.05$ ), in the second group experimental animals – by 3.31% ( $P<0.05$ ). The rise in the level of total protein in the blood serum of the experimental animals was mainly due to albumins, an average of 2.69 and 2.08% ( $P<0.05$ ) and gamma-globulins, which reliable growth in the experimental groups of animals amounted to 12.41–12.91% ( $P<0.01$ ) compared with control analogs.

Further investigations have shown that the level of immunoglobulins A in the blood serum of the experimental calves when using the probiotic feed additive Basulifor slightly increased compared to the control animals. Thus, this parameter in the serum of calves of both experimental groups, relating to the control one, was significantly higher on average by 5.00% ( $P<0.01$ ). As is well known, in addition to serum, immunoglobulins A are found in secrets on the surface of mucous membranes and are synthesized in plasma cells of the spleen, lymph nodes and mucous membranes. Secretory Ig"A" play a significant role in local immunity, since they prevent the adhesion of microorganisms to epithelial cells of the mucous membranes of mouth, intestines, respiratory and urinary tracts. At the same time, this immunoglobulin in an aggregated form activates the complement in an alternative way, which leads to the stimulation of local phagocytic protection [20].

When using the probiotic feed additive Basulifor, the growth of immunoglobulins M in the serum of the experimental calves of the first group was characterized on average by 4.43% ( $P<0.05$ ) compared with those of the intact group, of the second experimental group – by 5.64% ( $P<0.01$ ). The researchers found that Ig M begins to be synthesized in the body of the fetus and appear first in the serum after immunization of animals with most antigens. This immunoglobulin class belongs to a large part of normal antibodies – isohemagglutinins, which are presented in the blood serum of animals, belonging to certain blood groups.

The introduction of the tested feed additive into the basic diet had a similar positive effect on the level of immunoglobulins G. Thus, an increase in this parameter in the serum of the experimental calves of the first group was on average by 5.69% ( $P<0.05$ ), in the second experimental group of animals – by 5.90% ( $P<0.05$ ). Immunoglobulin G is the only class of antibodies that penetrates the placenta into the fetus. After the birth of the fetus, the content of Ig "G" in the serum drops and reaches its minimum concentration by 3-4 months, after which it begins to increase due to the accumulation of its own content.

On the back of the use of the probiotic additive, an enhance of the intensity of the live weight gain was observed in the experimental calves (table 5).

From the figures in the table it can be seen that in the experimental groups of calves, the average daily live weight gain was significantly higher. So, in the control group of calves on the 15-, 30-, 60-days of the test, this indicator gradually increased from  $365.18\pm 20.12$  to  $668.12\pm 32.36$  g.

In the first experimental group with the use of feed additive, depending on the age characteristics and timing of the experiment, the growth of this indicator was significantly higher and ranged from  $382.00\pm 21.52$  to  $718.10\pm 33.51$  g, which is 336.10 g, and in the second experimental group - from  $383.10\pm 22.12$  to  $720.36\pm 34.28$  g, with a difference of 337.26 g.

Table 5 – Indicators of the average daily gain in live weight of calves when using a probiotic feed additive ( $M\pm m$ ).

Age, days	Group		
	Control	1 experimental	2 experimental
1	$31.55\pm 0.60$	$32.12\pm 0.78$	$31.68\pm 0.67$
15	$365.18\pm 20.12$	$382.00\pm 21.52$ *	$383.10\pm 22.12$ *
30	$496.64\pm 26.43$	$525.82\pm 31.34$ *	$528.14\pm 31.08$ *
60	$668.12\pm 32.36$	$718.10\pm 33.51$ **	$720.36\pm 34.28$ **
Note: * $P<0.05$ ; ** $P<0.01$			

On the 60<sup>th</sup> day of the test, the variation in weight gain in the first experimental group of calves, compared with the control analogues, was higher on average by 7.48% ( $P<0.01$ ), in the second experimental group - by 7.81% ( $P<0.01$ ).

**Summary.**

1. Under the influence of the probiotic feed additive Basulifor, containing microorganisms of the *Bacillus subtilis* and *Bacillus licheniformis* strains, the body's physiological parameters, hematological, biochemical, and immunological parameters of blood serum in young cattle are activated.

2. On the back of the use of the probiotic feed additive, there is an increase in meat productivity of calves, which is expressed by stimulation of the intensity of the average daily weight gain.

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**БАСУЛИФОР ПРОБИОТИКАЛЫҚ АЗЫҚ ҚОСЫНДЫСЫН ҚОЛДАНУ КЕЗІНДЕ ТӨЗІМДІЛІК, ӨНІМДІЛІК ЖӘНЕ БҰЗАУ ЕТІНІҢ САПАСЫ**

**Аннотация.** Жұмыс мақсаты – бұзауларды өсіруде «Басулифор» пробиотикалық азықтық қоспаларды қолданудың зоотехникалық және ветеринарлық қажеттілігін анықтау. Ғылыми-шаруашылық тәжірибиелер Чуваш Республикасының Янтиков ауданының «Акконд-Агро» АҚ сүтті комплексінде, 2018 ж қысқы және көктем мезгілінде Чуваш Республикасының мемлекеттік ветеринарлық қызметі және Чуваш мемлекеттік ауыл шаруашылық академиясының морфология, акушерства және терапия кафедрасының биохимиялық зертханасы «Чуваш Республикасының ветеринарлық зертханасы» жүргізілді.

Зерттеулер дені сау, жақсы дамыған, орташа дамыған бір апталық тірі салмағы 32 – 34 кг, қара – ала 45 бұзауларға жүргізілді. Жануарларға үш топқа бөлінді (бақылау және екі тәжірибиелік топ) әр топта 15 бастан. Бұзаулар жеке секцияларда бағылды, азықтандыру жағдайы және бағылуы барлық топтарда бірдей. Бұзауларды 10–12 тәуліктен бастап сабанға және қосымша азыққа үйретілді. Бақылау тобына қарағанда, бірінші топтағы бұзауларға 30 тәулік барысында сүтпен бірге ал 31 және 90 аралығында комбикорммен бірге қосымша 1 кг / 0,3 г құрғақ есеппен Басулифор берді, ал екінші топ жануарларына 0,4 г/кг азық берілді. Жануарларды бақылауды 120 тәуліктік жасқа дейін жүргізілді.

Мемлекеттің азықтық қауіпсіздік мәселелерін шешуде мал шаруашылығындағы негізгі талап максималды жоғары, сапалы жұқпалы және инвазиялық аурулары жоқ жануарларды алу. Бұл тұрғыда тиімділігі жоғары биологиялық белсенді препараттарды қолдану, оның қатарында жаңа пробиотикалық қоспаларды ірі қара төлдерін өсіруде жаңа пробиотикалық қоспаларды азығына қосу өзекті мәселе болып табылады.

Сыналып отырған «Басулифор» азықтық қоспасы аздап дене температурасын, тыныс алу және жүрек қағысын жиілетеді. Алайда, бұл көрсеткіштер физиологиялық норма шегінде болды. Тәжірибиелі жануарларда физиологиялық өзгерістер болатынын басқада зерттеушілер анықтаған, ол пробиотикалық азықтық қоспа құрамына кіретін спора түзетін бактерияларда синтезделетін биологиялық белсенді заттардың тотығу – тотықсыздану процестерінің әсерінен болатын ағзаға әсер етуінен деп түсіндірілді.

Бақылаумен салыстырғанда, 0,3 г/кг және 0,4 г/кг тәжірибиелік топтағы бұзауларда 15 тәулікте орташа тәуліктік өсім 4,60-4,90%, 30 тәулікте - 5,87-6,34%, 60 тәулікте - 7,48-7,81%, жануарлар қанында эритроциттер 3,69-4,54%, лейкоциттер - 1,48 - 1,75%, гемоглобин – 6,39 - 7,59 %, қан сарысуындағы жалпы ақуыз - 3,28-3,31% (P<0,05), альбуминдер – 2,08-2,69% (P<0,05), глобулиндер – на 3,70-4,20% (P<0,05), гамма-глобулиндер – на 12,41 - 12,91% (P<0,01). Аталған пробиотикалық азықтық қоспаны бұзаулардың азығына қосу бақылаудағы аналогтармен салыстырғанда, қос топтың жануарлардың иммуноглобулиндерінде класс «А» 5,00% (P<0,05), «М» – 4,43-5,64% (P<0,01), «G» – 5,69-5,90% (P<0,05) өсуіне себепші болды, бұзаулардың өлім – жітімін азайту 3,22-3,69% (P<0,05).

**Түйін сөздер:** бұзаулар, өміршеңдік, өнімділік, пробиотиктер, Басулифор азықтық қоспасы, резистенттілік, өлім – жітімін азайту.

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## РЕЗИСТЕНТНОСТЬ, ПРОДУКТИВНОСТЬ И КАЧЕСТВО МЯСА ТЕЛЯТ ПРИ ИСПОЛЬЗОВАНИИ ПРОБИОТИЧЕСКОЙ КОРМОВОЙ ДОБАВКИ БАСУЛИФОР

**Аннотация.** Цель настоящей работы – определение зоотехнической и ветеринарной целесообразности применения пробиотической кормовой добавки «Басулифор» при выращивании телят.

Научно-хозяйственный опыт проведен на молочном комплексе АО «Акконд-Агро» Янтиковского района Чувашской Республики, БУ ЧР «Чувашская Республиканская ветеринарная лаборатория» Государственной ветеринарной службы Чувашской Республики и в биохимической лаборатории кафедры морфологии, акушерства и терапии Чувашской государственной сельскохозяйственной академии, в зимний и весенний периоды 2018 г.

Исследования проведены на здоровых, хорошо развитых, средней упитанности, недельного возраста, живой массой 32-34 кг 45 телятах черно-пестрой породы. Животные по принципу групп-аналогов были разделены на 3 группы (контрольная и две опытные) по 15 голов в каждой. Телят содержали в отдельных секциях, условия кормления и содержания были одинаковыми для всех групп. К поеданию сена и комбикорма телята приучались с 10-12-суточного возраста. В отличие от контрольной группы, телятам первой опытной группы в течение 30 суток с молоком, а с 31 по 90 сутки с комбикормом дополнительно давали Басулифор сухой из расчета по 0,3 г/кг корма, а животным второй опытной группы – по 0,4 г/кг корма. Наблюдения за животными проводили до 120-суточного возраста.

При решении проблемы продовольственной безопасности страны основной задачей в животноводстве является получение максимально высокой, качественной продукции и недопущение возникновений инфекционных и инвазионных заболеваний животных. В этой связи испытание и применение новых высокоэффективных биологически активных препаратов, в том числе новых пробиотических добавок к корму при выращивании молодняка крупного рогатого скота, несомненно, имеет актуальность.

Испытываемая кормовая добавка «Басулифор» вызвала незначительное повышение температуры тела, частоты сердечных сокращения и дыхания. Однако эти показатели находились в пределах физиологических норм. Такие незначительные изменения физиологических параметров у опытных животных на фоне применения пробиотиков устанавливали и другие исследователи, которые связывают их с усилением интенсивности окислительно-восстановительных процессов в организме под воздействием биологически активных веществ, синтезируемых спорообразующими бактериями, входящими в состав указанных пробиотических кормовых добавок.

На фоне применения пробиотической кормовой добавки из расчета 0,3 г/кг и 0,4 г/кг корма, у подопытных телят, по сравнению с аналогами в контроле, происходило достоверное повышение среднесуточного прироста живой массы на 15-е сутки опыта на 4,60-4,90%, 30-е сутки – на 5,87 - 6,34%, 60-е сутки – на 7,48 - 7,81%, в крови животных количества эритроцитов – на 3,69 - 4,54%, лейкоцитов – на 1,48 - 1,75%, гемоглобина – на 6,39 - 7,59 %, в сыворотке крови уровня общего белка на 3,28 - 3,31% (P<0,05), альбуминов – на 2,08 – 2,69% (P<0,05), глобулинов – на 3,70 - 4,20% (P<0,05), гамма-глобулинов – на 12,41 - 12,91% (P<0,01). Введение в рацион телят указанной пробиотической кормовой добавки способствовало незначительному росту в сыворотке крови у опытных телят, по отношению к аналогам в контроле иммуноглобулинов классов «А» в обеих опытных группах животных на 5,00% (P<0,05), «М» – на 4,43 - 5,64% (P<0,01), «G» – на 5,69 - 5,90% (P<0,05), повышению сохранности телят – на 3,22 - 3,69% (P<0,05).

**Ключевые слова:** телята, жизнеспособность, продуктивность, пробиотики, кормовая добавка Басулифор, резистентность, сохранность.

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## DIAGNOSTICS AND TREATMENT OF DIOCTOPHYMOSIS IN DOGS

**Abstract.** This article includes materials on the rare disease in domestic and wild carnivores, dioctophimosis, caused by a helminth from the group of aphasmidia nematodes, *Dioctophyme renale*, which is parasitic in the kidneys, recently registered in veterinary clinics in Almaty. The disease has important social significance - a person is susceptible to it, the infection of which occurs when raw fish is eaten. In Almaty, according to the statistics of veterinary clinics in recent years (2018-2019), 17 cases of dioctophimosis in dogs have been registered, that is up to 0.3% of the number of dogs examined for helminthiasis. The appearance of this disease, which is relatively new for our region, can have a significant impact on the epizootiological and epidemiological situation. The results of in vivo laboratory diagnosis of dioctophimosis in dogs by ovoscopic methods are presented, with the provision of microphotos of the parasite eggs; methods of instrumental diagnostics - ultrasound examination (ultrasound) of the kidneys with the provision of photos proving the presence of a parasite in the renal pelvis. Since the only treatment for dioctophimosis is surgery and extraction of dioctophyma from the affected organ (kidney), our own original materials are presented for a step by step surgical intervention to extract helminth from the kidneys of dogs and treat animals. The condition of the operated animals is satisfactory, the prognosis for surgery is favorable.

**Key words:** dogs, carnivores, helminths, helminthiasis, monitoring, nematodes, epizootiological and epidemiological situation, hematuria, dioctophimosis, ultrasound, OIE, WHO, invasive material, urine, feces, kidneys, surgical treatment.

**Relevance of research.** Dioctophimosis (code according to ICD-10 - B83.9) is a helminthiasis disease of silver-black foxes, dogs, jackals, marten and other carnivores, as well as humans when eating raw fish. The disease is characterized by damage to the kidneys, renal pelvis, ureters, bladder, abdominal cavity, sometimes the liver, blood vessels and heart; manifested by intoxication of the body, uremic phenomena, bloody urine. The literature describes cases of human infection with dioctophyma and rarely cattle. The disease relates to the group of helminthiasis caused by aphasmidia nematodes [1,2].

The systematic position of the dioctophimosis pathogen [1]:

Kingdon – *Animalia*; Type – *Nemathelminthes*; Class – *Nematoda*; Subclass – *Adenophorea*; Order – *Dioctophymida*; Suborder – *Dioctophymata*; Superfamily – *Dioctophymoidea*; Family – *Dioctophymidae*; Genus – *Dioctophyme*; Specie – *Dioctophyme renale*.

The *Dioctophyme renale* pathogen, is a nematode referring to the *Dioctophymidae* family, the only specie of the *Dioctophyme*. *D. renale* genus, represents sexual dimorphism and is considered the largest nematode, which infects the domestic animals, males can reach a length of 40 cm, and females can reach up to 100 cm [3]. The female has the rounded tail end, its vulva opens at the level of the initial part of the esophagus. The male has the tail end, which ends with a bell-shaped bursa, from which a spicule protrudes. The papillary tubercles in the form of two circles are around the mouth of the helminth [2].

Reproduction occurs by discharging eggs of 0.077 - 0.083x0.046 - 0.047 mm, brown, with lids at the poles. The egg shell consists of three layers: the outer, inner and vitelline membrane. The surface of the egg is dotted with small impressions like pockets. Eggs are secreted into the environment with the urine of a sick animal [2].

Dioctophyma are biohelminths. The pathogen development takes place with the participation of two hosts: definitive and intermediate hosts.



Definitive hosts: The main definitive hosts are ermines and canids. However, this nematode has been reported in pigs, cats, horses, cattle and other mammals such as wild cat, cheetah, coati, focial densification, mongoose rat [4]; and about 24 cases have been reported in humans [5], therefore, it is considered a zoonotic disease. Intermediate hosts: *Branchiobdella* or *Lumbriculus* oligochaetes.

Additional and reservoir hosts: fish (sabrefish, perch, barbel, mackerel, spike, shovel, pike, catfish, gambusia and some other cyprinids), in the body of which helminth larvae are encapsulated, remaining viable for a long time [2].

Sexually mature females, localized in a sick animal in the renal pelvis, ureters, and bladder, lay eggs, which are excreted with the urine into the external environment. Eggs, which fall into the water, are developed within 25 to 30 days. They form larvae, which reach 0.28 - 0.31 mm in length.

The eggs with developed larvae are swallowed together with detritus by the first intermediate hosts – oligochaetes of the *Branchiobdella* or *Lumbriculus* genus. In the intestine of the oligochaetes, larva emerges from the egg and migrates into the abdominal blood vessel, where it grows and develops. After 45-60 days, depending on the water temperature, the first molt occurs and the larva turns into the second stage, reaching 0.885-1.181 mm in length. After 3.5 - 4 months the larva molts for a second time and turns into a third-stage larva, reaching 6.905 - 8.018 mm in length. At this stage of larval development, young males and females are formed.

Oligochaetes infected by invasive larvae are eaten by fish, the second intermediate hosts (sicklefish, perch, barbel, shemaya, ship, shovelnose sturgeon, pike, catfish, gambusia and some other cyprinids) [2].

The further development of the third stage larva occurs only in the organism of the definitive host, where it can enter together with the oligochaetes or with infected fish. Larvae of dioctofimide, once entered in the intestines of the final host (carnivores or humans), penetrate its wall, enter the body cavity and migrate through the body, reaching the renal pelvis. At this time, the larvae molt twice. The life cycle of dioctofimide is completed in 8.5 - 9 months.

The lifespan of a nematode in the organism of a definitive host is up to 3–5 years [2].

Epizootological data. Locally, dioctophimosis of carnivores is found in areas of Transcaucasia, Central Asia, Kazakhstan, the Far East, Karelia and Siberia in large river basins. Dioctophimosis is registered in far abroad countries: Italy, Austria, Germany, Holland, France, England, Japan, North and South America [2]. For example, infection of dogs in some areas of North America reaches up to 37%, in Kazakhstan it ranges from 1 to 9% [6]. This parasite has a worldwide distribution, however, most reports have been received from South-East Asia [7,8].

Epidemiology. Human dioctophimosis is registered in many countries of the world: Argentina, Paraguay, Brazil, the USA, a number of European countries, Iran, South Vietnam, China, Japan. In the CIS countries, it is more often found in Tajikistan, Uzbekistan, Kazakhstan, isolated cases are registered in Leningrad and Arkhangelsk regions. Since annelids (intermediate hosts of *Dioctophyme renale*) live on the wet coasts of water bodies, endemic foci are confined to river valleys and lakes [6].

Symptoms and pathogenesis. Mostly sexually mature helminths are localized in animals in the kidneys and less often in the abdominal cavity. But, before getting there, nematodes migrate from the stomach of a mammal, where they get with fish or oligochaetes. They invade the muscle layer of the stomach wall, causing a hematoma. Then they migrate to the body cavity and are closer to the liver. Penetrate into its parenchyma, and then into the renal pelvis. As a result, its wall is greatly stretched and thinned, the kidney atrophies. Sometimes the nematode enters the urethra. All this leads to significant violations of these organs and painful phenomena of the whole organism. An animal or a human does not have appetite, vomiting, general exhaustion, and an oppressed state appear. A muddy, bloody liquid accumulates inside the renal pelvis, its smell resembles that of urine. The mucous membrane of the renal pelvis becomes grayish-white or yellowish in color. In places of degenerated areas, the lime salt are deposited in the form of multiple lumps [2,6].

Pathological changes in the human body at the onset of the disease are associated with the migration of larvae into the abdominal cavity and into the liver, which is accompanied by hemorrhages, serous-fibrinous inflammation of the mesentery, venous congestion in the liver, and the formation of granulomas and scars at the sites of damage. During parasitization of adult helminths in the human renal pelvis, the kidney parenchyma is destroyed step by step, and the capsule is preserved only. The right cavity, directly adjacent to the duodenum, from which the parasite larvae migrate, is more often affected [6,9].

The most characteristic symptoms of the disease are renal colic, pyuria, hematuria, oliguria and anuria. Often there are complaints of pain in the lumbar region, which spread throughout the abdomen.

Complications in humans are renal coma [6,10].

In fish, *Dioctophyme renale* larvae reach 6.9 - 8.2 mm in length and 0.19 - 0.2 mm in width. They are localized in the internal organs: in the intestinal wall, on the peritoneum, mesentery, in the gonads, a connective tissue capsule is formed around them.

Diagnosis. To make a diagnosis during life, urine is examined for the parasite eggs and an ultrasound examination of the kidneys is performed. Posthumously, disease is diagnosed on the basis of an autopsy of animals and finding a nematode in the kidney, less commonly in other organs. When examining the fish, encapsulated larvae are found in the intestine, mesentery, and gonads [2].

Treatment. The only treatment at this time is surgery and extraction of *Dioctophyme renale* from the affected organ. There is evidence of attempts to treat animals with ivomek, praziquantel, levomizole, etc. [2,6,11].

Prevention of the disease is to identify dysfunctional water bodies and prohibit to feed the animals with raw fish. In areas unfavorable due to dioctophimosis, dogs are not allowed to sites of catching and cutting fish. The diet of fur-bearing animals excludes the raw fresh fish caught in reservoirs unsuccessful due to this invasion. They explanatory work is conducted among fisheries workers and among the population on the prevention of dioctophimosis [12,13,14,15,16].

The epidemiological and epidemiological situation with many helminthiasis of carnivores, especially in zoonotic helminthiasis in Kazakhstan and in neighboring countries, should be improved. In the world, especially in tropical and subtropical countries, the epidemiological and epidemiological situation regarding zoonotic helminthiasis is very problematic. For example, according to the classification of the Office International des Epizooties (OIE), some helminthiasis, in particular echinococcosis, which is spread among population and productive animals by the carnivorous, are included in the list of the most common diseases and in many countries are included in national programs to eliminate the disease. The annual costs for treating patients and losses in animal husbandry are amounted to USD 3 bln. Kazakhstan is among the regions permanently unfavorable for echinococcosis. World experience shows that establishing the incidence of helminth infections in animals allows us to assess the degree of threat to humans. According to the World Health Organization (WHO), every year a quarter of the population (more than 1.4 billion people) is infected with parasites, the most significant group of which is helminths. Nematodoses are the most common of the helminthiasis [17].

Kazakhstan also has a difficult epidemiological and epidemiological situation regarding zoonotic helminthiasis. From the State report on the situation in Kazakhstan, it follows that the epidemiological situation with parasitosis in the country poses a threat to public health. About 20,000 cases of parasitosis are recorded annually in Kazakhstan, the intensive incidence rate is on average about 24.2 per 100 thousand people. A number of researchers (Kereyev Ya.M., 2010; Shalmenov M.Sh., 2005; Akshulakov S.K., 2002; Amireyev S.A., 2002; Shabdarbayeva G.S., Abdibekova A.M., Shapiyeva Zh.Zh., 2012; Lider L.A., 2009; Shabdarbayeva G.S. et al., 2016) note a large infection of carnivores and humans with zoonotic helminthiasis [18-23].

In Kazakhstan, a number of scientists performed researches related to monitoring of helminthiasis of carnivorous zoonotic helminthiasis. 11 species of helminths from different systematic groups were registered in the studied carnivorous. From the class of trematodes, only 1 species was noted – *Opistorhis felineus*; from the cestode class 4 species: *Multiceps multiceps*, *Dipilidium caninum*, *Echinococcus granulosus*, *Alveococcus multilocularis*; from the class of nematodes of 6 species: *Dioctophyme renale*, *Toxocara canis*, *Toxascaris leonina*, *Ancylostoma caninum*, *Trichocephalus vulpis*, *Dirofilaria immitis*. The greatest invasion in carnivores was noted by various nematodes, in particular, the species *Toxascaris leonina* that amounted to 28.9% of the total number of infected animals. A rather high infection was observed in carnivorous with toxocariasis: 22.4%. Significant invasion was also noted by the species from the cestodes *Dipilidium caninum*, which is 13.8%. All the above types of helminths are dangerous in human infection and can cause significant damage to his health. The remaining helminths, including dioctophimosis (*Dioctophyme renale*) are presented in isolated cases – from 0.7% to 5.8%. The average helminth infection in the studied dogs was 79.6% [24]. Based on the monitoring results, recommendations were suggested on the control of zoonotic helminthiasis and on methods for detecting larval stages of helminths in fish [25,26].

In connection with the increase in the number of livestock, the types of their diseases are also increasing today. Since invasive diseases occur in all types of domestic animals, they cause enormous damage to the national economy. Many invasive diseases, in particular parasitic diseases lead to mass death of animals [27].

**Results.** The studies were carried out in Almaty clinics. 17 cases of a rare helminthiasis nematode disease – dioctophimosis in dogs were registered during 2018-2019.

During the anamnesis, the nature of nutrition of the dogs was ascertained whether the animals were fed with raw fish or not. If so, where was the fish come or purchased from?

Clinical examination was carried out using methods of animal thermometry, focusing on the nature of urination: difficult or not; urination frequency; pain during urination; color and texture of urine.

Then, several portions of urine were obtained from dogs, and urine was centrifuged at 1000 rpm within 1 minute. The supernatant was carefully drained, the suspension remaining at the bottom of the centrifuge tube was pipetted by portions on a glass slide and viewed under a microscope at 10×40 magnification. Characteristic *Dioctophyme renale* eggs were found (figure 1). The preliminary clinical diagnosis in all cases was confirmed by intravital urine examination.

During ultrasound examination of the kidneys (ultrasound) contours of 1 or 2 helminths were found in the renal pelvis in dogs. The phenomena of kidney atrophy from squeezing of tissues by a parasite and coagulated helminth in the renal pelvis were observed (figures 2–4).

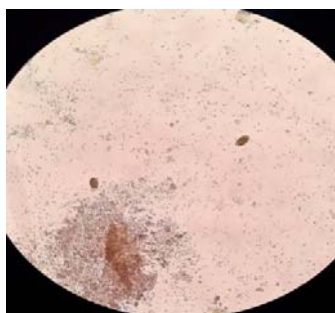


Figure 1 – Diocotophyme renale eggs at 10x40 magnification



Figure 2 – Dog's kidney ultrasound Results



Figure 3 – Diocotophyme renale in the dog's kidney pelvis



Figure 4 – Dog's kidneys ultrasound examination results

Having established a positive diagnosis and location of helminths, surgical treatment of diocotophimosis was performed. The progress of operation to extract *Dioctophyme renale* from the kidney is shown in figures 5–16.

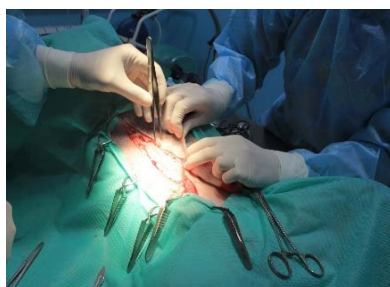


Figure 5 – Incision of the abdominal wall



Figure 6 – Suction of fluid from the tissues around the kidney



Figure 7 – Incision of the kidney wall

At first, the type of anesthesia for the animal was determined. The need and dosage of anesthesia were calculated and given according to the weight of the animal. Next, the access points to the kidney were determined, the incision site was planned, the incision site was treated with aseptic antimicrobial agents, and the abdominal wall was incised. Then, reaching the kidney, suction of fluid collected around the kidney as a result of the inflammatory process was performed.

A small incision was made in the kidney wall, the forceps were carefully inserted into the incision, the helminth was fixed, and removed carefully through the incision using the twisting method (figures 5–9).

The extracted helminths were identified by genus and species, measured, museum preparations were prepared from them, which replenished the parasitological museum of the department.

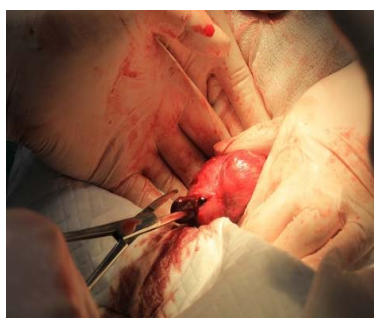


Figure 8 – Capturing helminth with forceps



Figure 9 – Removing helminth from the kidney

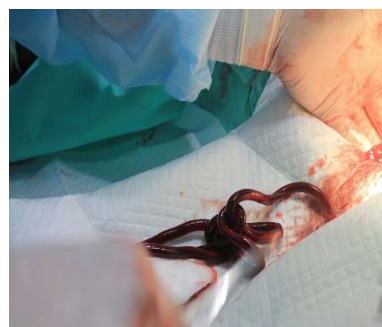


Figure 10 – Helminth extracted from the dog's kidney



Figure 11 – *Diocotophyme renale* from the dog's kidney



Figure 12 – Female and male of *Diocotophyme renale* from the dog's kidney



Figure 13 – Measurement of *Diocotophyme renale*



Figure 14 – Head end of *Diocotophyme renale*



Figure 15 – Suture on the wall of the abdominal cavity after surgery



Figure 16 – Postoperative anesthesia in a dog

The condition of the patients after the surgery was satisfactory in all cases, there was no temperature reaction, the food was taken with pleasure, the wound healed by primary intention. Urination is not difficult, the kidneys regained their function.

**Conclusion.** Taking into account the geographical location of Almaty, the lack of large rivers around the metropolis with the above species composition of fish, it becomes clear why there is a very small infection of carnivorous with diocotophimosis. Cases of infection of the dog with diocotophimosis in our clinical practice are apparently imported cases. But infection of carnivores and humans from invasive fish imported from regions unsuccessful for this disease is not excluded.

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### ИТТЕРДІҢ ДИОКТОФИМОЗЫН БАЛАУ ЖӘНЕ ЕМДЕУ

**Аннотация.** Мақалада соңғы уақытта Алматы қаласының ветеринариялық клиникаларында тіркелген, үй және жабайы етқоректі жануарлардың сирек кездесетін ауруы – диоктофимоз, бүйректерде паразиттелетін афазмидиялық нематод тобының гельминті тудыратын *Diocotophyme renale* бойынша материалдар ұсынылған. Аурудың маңызды әлеуметтік мәні бар - адам оған сезімтал, инфекция шикі балық жеген кезде пайда болады.

Ет қоректі гельминтоздардың мониторингі бойынша зерттеулер Алматы қаласының клиникаларында жүргізілді. Зоонозды гельминтоздардың мониторингіне көп көңіл бөлінді. Алматы қаласында әртүрлі жүйелі топтар гельминттерінің 11 түрі тіркелген. Трематод класынан тек 1 түр ғана белгіленген – *Opistorhis felineus*; цестод класынан 4 түр: *Multiceps multiceps*, *Dipilidium caninum*, *Echinococcus granulosus*, *Alveococcus multilocularis*; нематод класынан 6 түр: *Diocotophyme renale*, *Toxocara canis*, *Toxascaris leonina*, *Ancylostoma caninum*, *Trichocephalus vulpis*, *Dirofilaria immitis*.

Ет қоректілердің ең жоғарғы инвазиялануы әртүрлі нематодтармен, атап айтқанда, *Toxascaris leonina* түрімен белгіленген және жұқтырылған жануарлардың жалпы санының 28,9% құрайды. Өте жоғары залал ет қоректік токсокарозда байқалады, ол 22,4% құрады. Сондай-ақ, зақымадалу таспа құрттарға жататын *Dipilidium caninum*-да көрінді, ол - 13,8% құрады. Гельминттердің жоғарыда аталған барлық түрлері адам инфекциясы кезінде қауіпті және оның денсаулығына айтарлықтай зиян келтіруі мүмкін. Қалған гельминттер, оның ішінде диоктофимоз (*Diocotophyme renale*) окшауланған жағдайларда - 0,7% -дан 5,8%-ға дейін көрінді. Зерттелген иттердегі гельминттердің орташа деңгейі 79,6% құрады.

Біздің зерттеулер бойынша 2018-2019 жж. сирек кездесетін гельминтоздардың нематодозды зооноздық ауруы - иттердің диоктофимозының 17 жағдайы тіркелді, бұл гельминтозға тексерілгендердің 0,3% құрайды.

Анамнез кезінде иттердің тамақтану сипаты анықталды, яғни, жануарларды шикі балықпен азықтандырды ма? Егер иә болса, балық қайдан әкелінген немесе сатып алынған.

Клиникалық тексеру жануарларды термометрия әдісімен жүргізілді, зәр шығару сипатына: қиындау немесе жоқ; зәр шығару жиілігі; зәр шығару кезіндегі ауырсыну; зәр түсі мен консистенциясына назар аударды.

Содан кейін иттерден бірнеше рет зәрді алып, зәрді 1000 айн/мин. 1 минут ішінде центрифугадан өткіздік. Центрифугалық пробирканың түбінде қалған тұнба үстіндегі сұйықтықты абайлап төгіп, тамшылатқышпен заттық шыныға тамызып және микроскоптың 10x40 ұлғайған көрсеткішімен қарады. Диоктофимидке тән жұмыртқа табылды (1-сурет). Несепті алдын ала клиникалық балау барлық жағдайларда жануар тірі кезінде зерттелген. Бүйрекке ультрадыбыстық зерттеу жүргізу кезінде (УДЗ) бүйрек таяқшасында иттерде 1 немесе 2 гельминт контуры табылды. Бүйрек түтікшелерінде бүктелген гельминт және паразит тіндерінің қысылуынан бүйректің атрофиясы байқалады.

Біздің өңірімізге қатысты жаңа аурудың пайда болуы зоонозды гельминтоздардың эпизоотологиялық-эпидемиологиялық жағдайына айтарлықтай әсер етуі мүмкін. Иттердегі диоктофимозды тірі кезіндегі зертханалық диагностикасының нәтижелері, паразит жұмыртқаларының микрофотографиясын ұсына отырып, овоскопиялық әдістермен; аспаптық диагностика әдістерімен – бүйректі ультрадыбыстық зерттеу (УДЗ), бүйректің лоханкасында паразиттің болуын дәлелдейтін фотосуреттерді қолдана отырып ұсынылған. Диоктофимозды емдеудің жалғыз әдісі хирургиялық араласу және зақымданған мүшелерден (бүйректен) диоктофимдерді алу болып табылатындықтан, иттерді бүйректен гельминтті алу және жануарларды емдеу мақсатында кезең-кезеңмен оперативтік араласу бойынша өзіндік бірегей материалдар келтірілген. Операциядан өткен жануарлардың жағдайы қанағаттанарлық, операциядан өткен кездегі болжам қолайлы.

**Түйін сөздер:** иттер, ет қоректілер, гельминттер, гельминтоздар, мониторинг, нематодтар, эпизоотологиялық-эпидемиологиялық жағдай, гематурия, диоктофимоз, УДЗ, ХЭБ, ДДҰ, инвазирленген материал, несеп, нәжіс, бүйрек, операциялық емдеу.

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### ДИАГНОСТИКА И ЛЕЧЕНИЕ ДИОКТОФИМОЗА СОБАК

**Аннотация.** В статье представлены материалы по зарегистрированным в последнее время в ветеринарных клиниках г. Алматы редком заболевании домашних и диких плотоядных – диоктофимозе, вызываемом гельминтом из группы афазмидиевых нематод – *Diocotophyme renale*, паразитирующего в почках. Заболевание

имеет важное социальное значение – к нему восприимчив человек, заражение которого происходит при употреблении в пищу сырой рыбы.

Исследования по мониторингу гельминтозов плотоядных проведены в клиниках г. Алматы. Большое внимание было уделено мониторингу зоонозных гельминтозов. Зарегистрировано у исследованных плотоядных г. Алматы 11 видов гельминтов из разных систематических групп. Из класса трематод отмечен только 1 вид – *Opistorhis felineus*; из класса цестод 4 вида: *Multiceps multiceps*, *Dipilidium caninum*, *Echinococcus granulosus*, *Alveococcus multilocularis*; из класса нематод 6 видов: *Diocetophyme renale*, *Toxocara canis*, *Toxascaris leonina*, *Ancylostoma caninum*, *Trichocephalus vulpis*, *Dirofilaria immitis*.

Наибольшая инвазированность у плотоядных отмечена различными нематодами, в частности, видом *Toxascaris leonina* и составляет 28,9% от общего числа зараженных животных. Довольно высокая зараженность отмечена у плотоядных токсокарозом, которая составила 22,4%. Значительная инвазированность отмечена также видом из цестод *Dipilidium caninum*, составила 13,8%. Все указанные выше виды гельминтов представляют опасность в заражении человека и могут наносить значительный ущерб его здоровью.

Остальные гельминты, в том числе и диоктофимоз (*Diocetophyme renale*), представлены в единичных случаях – от 0,7% до 5,8%. Средняя зараженность гельминтами исследованных собак составила 79,6%.

Нами в течение 2018-2019 гг. зарегистрировано 17 случаев редкого гельминтозного нематодозного зоонозного заболевания – диоктофимоза собак.

При анамнезе выясняли характер питания собак, кормили ли животных сырой рыбой. Если да, то откуда была привезена или закуплена рыба.

Клиническое обследование проводили методами термометрии животных, акцентировали внимание на характер мочеиспускания: затрудненное или нет; частоту мочеиспускания; болезненность при мочеиспускании; на цвет и консистенцию мочи.

Далее получали несколько порций мочи от собак, центрифугировали мочу при 1000 об/мин. в течение 1 минуты. Осторожно сливали надсадочную жидкость, оставшуюся на дне центрифужной пробирки взвесью, пипеткой порциями переносили на предметное стекло и просматривали под микроскопом при увеличении 10x40. Обнаружены характерные яйца диоктофимид (рисунок 1). Предварительный клинический диагноз во всех случаях был подтвержден прижизненным исследованием мочи.

При проведении ультразвукового исследования почек (УЗИ) в почечной лоханке у собак были обнаружены контуры 1 или 2 гельминта. Наблюдалось явления атрофии почки от сдавливания тканей паразитом и свернувшийся гельминт в почечной лоханке.

Появление данного, относительно нового для нашего региона заболевания, может оказать значительное влияние на эпизоотолого-эпидемиологическую обстановку зоонозных гельминтозов. Представлены результаты прижизненной лабораторной диагностики диоктофимоза у собак овоскопическими методами, с предоставлением микрофотографий яиц паразита; методами инструментальной диагностики – ультразвуковым исследованием (УЗИ) почек с предоставлением фотографий, доказывающих наличие паразита в лоханке почки.

Так как единственным методом лечения диоктофимоза является хирургическое вмешательство и извлечение диоктофим из пораженного органа (почки), приведены собственные оригинальные материалы по поэтапному оперативному вмешательству с целью извлечения гельминта из почек собак и лечения животных. Состояние прооперированных животных удовлетворительное, прогноз при проведении оперативного вмешательства благоприятный.

**Ключевые слова:** собаки, плотоядные, гельминты, гельминтозы, мониторинг, нематоды, эпизоотолого-эпидемиологическая обстановка, гематурия, диоктофимоз, УЗИ, МЭБ, ВОЗ, инвазированный материал, моча, фекалии, почки, оперативное лечение.

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## **MODERN TECHNOLOGIES FOR INCREASING THE REPRODUCTION LEVEL IN DAIRY CATTLE**

**Abstract.** The work aims to study the features of herd reproduction in the conditions of a modern specialized unit for growing repair young animals.

The studies were carried out in the conditions of Megaferma OOO in the Kuznetsky region, which is part of the Rusmolco Company in the Penza region, on the number of animals in the modern herd reproduction center. The object of the research was the replacement heifers of the Holstein breed; the subject of the research was: live weight of heifers in different technological periods and the efficiency of insemination of heifers with sexed and ordinary sperm.

The studies show the dynamics of live weight of the Holstein heifers of different origin (Holland, the USA, Russia) during directed growing; the achievement of live weight of 350 kg was established by the period of the first insemination at the age 12 months; the Dutch heifers had a higher growth rate during all growing periods.

The results of studies indicate that when using sexed semen, the pregnancy rate of heifers from the first insemination was 54.5%; 82.5% of heifers were received from the studied livestock, which is 29.5% more than from the insemination with ordinary semen. When inseminating with sexed semen of heifers of different origins (Hungary, Germany, Russia), the existing differences in the experimental groups were found. The pregnancy rate from the first insemination in the studied livestock ranged from 48.7 to 59.7%, and the yield of heifers - from 77.5 to 89.4%.

Such indicators are consistent with the international practice of using sexed semen and with the guarantees of the semen producer. Consequently, an increase in the number of heifers in offspring allows breeding farms to abandon the acquisition of expensive breeding young stock.

**Key words:** technology, growing, Holstein breed, reproduction, origin, replacement heifers, insemination, sexed semen, offspring.

**Relevance.** In Russia, dairy cattle breeding is one of the main branches of animal husbandry, therefore it should be competitive in the external and domestic markets. Sustainable development of the industry is ensured by increasing production volumes, significantly expanding the range of products, the use of innovative technologies and modern equipment in the production process, as well as the widespread use of domestic and foreign cattle genetic resources [1,2]. In the studies of local scientists, there has been a steady increase in the number of Holstein cows on dairy farms in Russia. This is due to the import of cattle, as well as the use of accumulation cross breeding of animals of this breed with Black-and-motley breed and other breed groups of cattle [3,4].

The acquisition of modern dairy complexes and farms by imported livestock requires significant financial investments. In addition, imported animals do not always adapt to local natural and climatic conditions, which subsequently affects their health, productive and breeding qualities. Obviously, for the improvement of the dairy herd and its replenishment by herd replacements, it is necessary to organize their own breeding of elite calves.



In most regions of Russia, the key issue of herd reproduction is the growing of replacement young animals. In agricultural entities, the average age of heifers at the first insemination is 22-23 months with an average live weight of 340-350 kg, which is 6-7 months and 30-50 kg less than the indicators proposed in the recommendations for the growing of heifers of dairy and combined breeds.

Therefore, for replacement heifers, it is necessary to create conditions for the formation of a strong healthy body and the subsequent high dairy productivity with long-term economic use of cows. This is of particular importance in conditions of intensive milk production in modern dairy complexes and farms.

The problem of providing the herd with the necessary number of replacement heifers is not always possible to solve with traditional reproduction methods. In the body of bulls, two types of germ cells - spermatozoa are formed: with X-chromosomes and Y-chromosomes; so, in dairy cattle breeding, about 51% of calves born in cows are bulls and 49% - heifers. Modern large dairy farms and complexes specializing in milk production need a large number of replacement heifers to update the herd. Currently, new unique mechanisms are used in animal husbandry to ensure the necessary reproduction rate, among which the most innovative is the use of genetic material, divided by sex [5,6].

Many studies have established that the regulation of the sex of offspring in farm animals is of considerable practical interest, as it helps to accelerate genetic progress in selection and breeding work [7,8,9,10].

The aim of the work is to study the characteristics of herd reproduction in the conditions of a modern specialized enterprise of replacement young stock reproduction.

**Materials and methods of research.** The modernization of the dairy cattle breeding industry in the Penza region, as in other parts of Russia, is carried out through the construction of new modern dairy complexes, the reconstruction of existing dairy farms, the active introduction of innovative milk production technologies, the acquisition of highly productive imported cattle and the use of highly efficient modern technological equipment. The formation of highly productive dairy herds is carried out through the acquisition of cows, bred heifers or heifers from Europe, the USA, Canada, and Australia.

In 2015, in Tatarskiy Kanadei of the Kuznetsk district, the Rusmolco ran Megaferma OOO, Russia's largest modern center for the herd reproduction, amounted to 5200 animals, designed to equip the company's dairy complexes. The center consists of two sites, combined in a single cycle of growing heifers from the age of 5 months to the period of 7 months of pregnancy, followed by their return to the company's dairy complexes.

The technology for growing replacement heifers at all sites of Rusmolco provides the creation of optimal conditions for the intensive production of young animals of a random age, the implementation of planned gains in live weight, and the timely identification of animals ready for insemination. To achieve this goal it is necessary to fulfill several objectives: to ensure the safety of young animals more than 97%; to grow heifers for the first insemination at 12 months of age with a live weight of at least 350 kg.

The studies were carried out in the conditions of Megaferma OOO. The objects of the research were the heifers of the Holstein breed, received for growing from dairy complexes of RAO Narovchatskoye, the Narovchatskiy district, and of OSP MTK Pachelmskoye of Arshinovka.

The genetic and paratypical factors were subject to study. Genetic factors included the origin of animals, and paratypical ones – the growth, development and reproductive qualities of heifers.

A comparative assessment of the growth and development of heifers of different origin was studied by the dynamics of weight growth. The weight growth of replacement heifers was taken into account in terms of live weight by carrying out regular control weighings at the age corresponding to the technological periods of growing (at birth, at the age of 5, 10 and 12 months), followed by the calculation of growth rate indicators.

The reproductive qualities of animals of the studied groups were evaluated according to zooveterinary records.

**Research results.** In Megaferma, replacement heifers born from cows of the Rusmolco dairy herd, as well as imported heifers, are being grown. Therefore, the peculiarities of growth and development of heifers of different origin were studied during directed growing in a specialized enterprise. For research by the method of analogues (according to age and live weight) 180 animals born from imported mothers of Holland (the first group – 60 animals), the USA (the second group – 60 animals), as well as domestic cattle (the third group – 60 animals) were selected.

Table 1 – Change in live weight of heifers according to the technological periods

Live weight, kg:	Country of origin/group		
	Holland / the first	The USA / the second	Russia / the third
at birth	37.0 ± 0.67	37.5 ± 0.58	37.5 ± 0.46
5 months	201.0 ± 0.89***	190.1 ± 1.37	190.8 ± 1.42
10 months	327.0 ± 1.06***	316.4 ± 1.53	314.9 ± 1.50
12 months	373.5 ± 1.88***	359.5 ± 1.90	359.1 ± 1.92
*p < 0.05; **p < 0.01; ***p < 0.001.			

Table 1 shows the dynamics of the live weight of experimental animals in control age periods.

It was established that Dutch heifers exceeded American and Russian peers in all age periods in terms of live weight: at the age of 5 months - by 5.7% (p < 0.001) and 5.3% (p < 0.001), at the age of 10 months – by 3.3% and 3.8%, at the age of 12 months - by 3.8% (p < 0.001) and 3.9% (p < 0.001) respectively.

Based on the research results, it can be concluded that the technology for growing replacement heifers in Rusmolko helps to achieve optimal live weight (360 kg) for the first insemination at the age of 12 months, and not at the age 16 months as is accepted in the recommendations for young stock breeding.

Studies of the influence of the first fruitful insemination age and live weight of heifers on the value of subsequent milk yield revealed the great importance of the live weight of heifers. The increase in the insemination age unreasonably raised the cost of growing first-calf heifers [11].

Considering that since 2015, Megaferma with artificial insemination of replacement heifers began to use the modern biotechnological method of reproduction using sexed semen, the objects of the research included the study of its effectiveness in breeding livestock.

The studies were carried out on heifers (929 animals) of the Holstein breed, grown in Megaferma of the Kuznetskiy district.

According to local and foreign scientists, sexed semen is an effective tool for increasing the breeding stock of cattle, so it is necessary to carefully plan and prepare for insemination both animal and sperm. It is especially important to choose heifers that meet the requirements for the insemination [12,13,14,15,16, 17,18,19].

In this regard, one of the main technological features on the second site of Megaferma is the selection and preparation of animals for insemination. The first insemination of heifers is done with sexed semen. The semen is supplied to Russia from America and Canada, and the main suppliers are AltaGenetics, SEMEX, WWS. In total, in 2018, sexed semen of the breeding bulls was imported in the amount of 230676 doses or 6.4% of the total sperm production [20].

The results of the insemination by sexed semen of the replacement heifers of the Holstein breed in the conditions of the specialized enterprise Megaferma in 2017 are presented in table 2.

Table 2 – The insemination efficiency of the replacement heifers

Indicator	Number of animals	
	heads	%
<b>Total number of heifers</b>	929	100
<b>First insemination (by sexed sperm):</b>		
The number of heifers of the first fruitful insemination, animals	507	54.5
The number of unfertilized heifers, animals	422	45.5
<b>Re-insemination (with ordinary sperm):</b>		
Total number of heifers	422	100
The number of heifers of the fruitful re-insemination, animals	227	53.8
The number of unfertilized heifers, animals	195	46.2

Since, the necessary condition for the successful use of sexed sperm is the health of the herd and the fatness of the animals, the specialists of Megaferma carefully select the heifers suitable for the first insemination with the sexed semen. Pregnancy from the first insemination in the studied livestock was 54.5%, but 44.5% of heifers remained unfertilized. Upon repeated insemination of these heifers with the ordinary semen, the pregnancy increased by 9.3%, but 46.2% of the animals required the third insemination.

An indicator of the effectiveness of insemination is the number of the received offspring (table 3).

Table 3 – Obtaining offspring during insemination of heifers with the sexed and ordinary sperm

Indicator	Number of animals	
	heads	%
<b>Total number of calves</b>	610	100
<b>Calves received from the first insemination with the sexed semen:</b>	412	67.5
Including:		
- heifers	340	82.5
- bull-calves	72	17.5
<b>Calves received from the repeated insemination with the ordinary semen:</b>	198	32.5
Including:		
- heifers	105	53.0
- bull-calves	93	47.0

Of the total studied population (929 animals), 65.7% of calves were obtained. At the first insemination of heifers with the sexed sperm, 67.5% of the calves received, and at the repeated insemination of the unfertilized heifers with the usual semen, 32.5% of calves. It should be noted the high yield of heifers from insemination with the sexed semen – 82.5%. When re-inseminating the heifers with the ordinary semen almost the same output of heifers and bull-calves was received.

Studies have found that using sexed semen gave 29.5% more heifers than ordinary semen, with almost the same pregnancy, and the yield of heifers was 82.5%.

In connection with the acquisition of dairy farms with imported and domestic livestock, the research objectives included the study of the insemination effectiveness with sexed sperm of the Holstein replacement heifers of different origins. Three groups of heifers of different origin were formed taking into account the year of birth: imported in 2017 from Hungary (the 1st group – 315 animals) and from Germany (the second group – 311 animals), as well as domestic heifers (the third group – 300 animals), born in dairy farms of Rusmolco.

The results of the insemination of replacement heifers of the Holstein breed of different origin in the conditions of Megaferma enterprise are shown in table 4.

The largest percentage of fruitfully inseminated animals was recorded in the third group (59.7%), which is higher by 11% and 4.1% than in heifers of the second group and the first group, respectively. A significant number of replacement heifers remained unfertilized.

The results of the re-insemination with ordinary semen also indicate the differences between the experimental groups. The best indicator of fruitful insemination (59.6%) was for the heifers of the second group, and the lowest result (44.6%) was in animals of the third group. In general, the fruitful insemination of heifers by sexed and ordinary sperm does not exceed 60%.

The efficiency of insemination is characterized by obtaining offspring (table 5).

From the data of table 5, it follows that the results of the insemination of the heifers of the studied groups using the sexed semen differ. The largest number of heifers after the first insemination was received from German animals - 89.4%, but at the same time, the largest number of deadborn offspring (13.7%) was recorded in this group, which is obviously associated with problems of adaptation to the maintenance conditions. In Hungarian and Russian animals, the rates of heifers are slightly lower, and amounted to 83.2 and 77.5%, respectively.

Table 4 – Results of insemination of heifers

Indicator	Country /group		
	Hungary/ 1 <sup>st</sup> group	Germany/ 2 <sup>nd</sup> group	Russia/ 3 <sup>rd</sup> group
Total number of heifers, -heads -percent	315 100	314 100	300 100
First insemination (sexed semen):			
The number of heifers of the first fruitful insemination: -heads -percent	175 55.6	153 48.7	179 59.7
The number of unfertilized heifers, -heads -percent	140 44.4	161 51.3	121 40.3
Repeated insemination (ordinary semen):			
The number of heifers of the re-insemination: -heads -percent	140 100	161 100	121 100
The number of heifers of the repeated fruitful insemination, -heads -percent	77 55.0	96 59.6	54 44.6
The number of unfertilized heifers, -heads -percent	63 45.0	65 40.4	67 55.4

At repeated insemination, the number of heifers and bull-calves obtained in the experimental groups had insignificant differences.

Table 5 – Obtaining offspring after insemination of heifers with sexed and ordinary semen

Indicator	Country /group		
	Hungary/ 1 <sup>st</sup> group	Germany/ 2 <sup>nd</sup> group	Russia/ 3 <sup>rd</sup> group
First insemination (sexed semen):			
Total number of heifers	175	153	179
Received calves from the first insemination with sexed semen, animals:	161	132	170
including: heifers, - heads - percent	134 83.2	118 89.4	132 77.5
- bull-calves, heads - percent	27 16.8	14 10.6	38 22.5
Registered: - deadborn, number - percent - twins, number - percent	14 8 1 0.6	21 13.7 1 1	9 5 0 0
Repeated insemination (ordinary semen):			
Total number of heifers	77	96	54
Received calves from the repeated insemination with ordinary semen: - animals	71	87	50
Including: - heifers, heads - percent	35 49.3	48 55.2	28 56.0
- bull-calves, heads - percent	36 50.7	39 44.8	22 44.0
Registered: - deadborn, number - percent	6 7.8	9 9.4	4 7.4

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### **СҮТТІ МАЛ ШАРУАШЫЛЫҒЫНДА ӨСІМІН МОЛАЙТУ ДЕҢГЕЙІН АРТТЫРУДЫҢ ҚАЗІРГІ ЗАМАНҒЫ ТЕХНОЛОГИЯЛАРЫ**

**Аннотация.** Қазіргі заманғы сүт кешендері мен фермаларды импорттық мал басына жинақтау үлкен қаржылық салымдарды талап етеді, сондай-ақ әкелінетін жануарларды жергілікті табиғи-климаттық жағдайларға бейімдеу мәселелерін туғызады, бұл одан әрі олардың денсаулығы мен өнімділігіне әсер етеді. Жоғары өнімді табынды қалыптастыру үшін элиталық бұзауларды жеке өсіруді ұйымдастыру қажет. Жеке жөндеу қашарларын өсіру өндірістің тұйық циклын құруға, мал импортын қысқартуға, жануарларды асыраудың және азықтандырудың ерекше жағдайларына бейімдеу мәселелерін шешуге мүмкіндік береді.

Сүтті мал шаруашылығында өсірудің дәстүрлі әдістерімен табынды жөндейтін төлдердің қажетті санымен қамтамасыз ету проблемасын шешу қиын, сондықтан қазіргі заманғы биотехнологиялық әдістерді пайдаланады, олардың бірі қашарларды секциялы тұқыммен ұрықтандыру болып табылады.

Жұмыстың мақсаты - қазіргі заманғы мамандандырылған кәсіпорын жағдайында мал төлін өсіру ерекшеліктерін зерттеу.

Зерттеулер Пенза облысының "УК" Русмолко "ЖШҚ құрамына кіретін Кузнецкий ауданының "Мега-ферма" ЖШҚ жағдайында табынның өсімін молайту жөніндегі қазіргі орталықтың Жануарлар басына орындалды. Зерттеу объектісі голштин тұқымының жөндеу қашарлары болды; зерттеу пәні: әртүрлі технологиялық кезеңдерде қашарлардың тірі салмағы және қашарларды секциялы және кәдімгі тұқыммен ұрықтандыру тиімділігі болды.

Зерттеулерде бағытталған өсіру кезінде әртүрлі шығу тегі голштин тұқымдас қашарлардың (Голландия, АҚШ, Ресей) тірі салмағының серпіні көрсетілген; 12 айда алғашқы ұрықтандыру жасына 350 кг тірі салмағына қол жеткізу белгіленді; голландиялық қашарлар өсірудің барлық кезеңдерінде өсудің жоғары қарқындылығы болды.

Зерттеу нәтижелері бойынша, секцияланған ұрықты пайдаланған кезде қашарлардың бірінші ұрықтандырудан 54,5% - ды құрағанын көрсетті; зерттелетін мал басынан 82,5% қашарлар алды, бұл кәдімгі ұрықпен ұрықтандырудан 29,5%-ға артық.

Секстелген тұқыммен ұрықтандыру кезінде әртүрлі текті қашарларды (Венгрия, Германия, Ресей) тәжірибелі топтарда бар айырмашылықтар анықталды. Зерттелетін мал басының алғашқы ұрықтандырудан бастап ұлтарактығы 48,7%-дан 59,7%-ға дейін, ал қашарлардың шығуы-77,5% - дан 89,4% - ға дейін болды. Мұндай көрсеткіштер секстелген ұрықты пайдаланудың әлемдік практикасына және тұқым өндірушінің кепілдігіне сәйкес келеді.

Демек, төлде қашарлар санының артуы асыл тұқымды шаруашылықтарға қымбат тұратын асыл тұқымды төлді сатып алудан бас тартуға мүмкіндік береді.

**Түйін сөздер:** технология, өсіру, голштин тұқымы, өсіру, шығу тегі, жөндеу қашарлар, ұрықтандыру, секстелген тұқым, төл алу.

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### **СОВРЕМЕННЫЕ ТЕХНОЛОГИИ ПОВЫШЕНИЯ УРОВНЯ ВОСПРОИЗВОДСТВА В МОЛОЧНОМ СКОТОВОДСТВЕ**

**Аннотация.** Комплектование современных молочных комплексов и ферм импортным поголовьем требует больших финансовых вложений, а также создает проблемы адаптации завозимых животных к местным природно-климатическим условиям, что в дальнейшем отражается на их здоровье и продуктивности. Для формирования высокопродуктивного стада необходимо организовать собственное выращивание элитных

телят. Выращивание собственных ремонтных телок позволит создать замкнутый цикл производства, сократить импорт скота, снять проблемы с адаптацией животных к специфическим условиям содержания и кормления.

Традиционными методами воспроизводства в молочном скотоводстве трудно решить проблему обеспечения стада необходимым количеством ремонтного молодняка, поэтому используют современные биотехнологические методы, одним из которых является осеменение телок сексированным семенем.

Цель работы – изучить особенности воспроизводства стада в условиях современного специализированного предприятия по выращиванию ремонтного молодняка.

Исследования выполнялись в условиях ООО «Мегаферма» Кузнецкого района, входящего в состав ООО «УК «Русмолко» Пензенской области, на поголовье животных современного центра по воспроизводству стада. Объектом исследований служили ремонтные телки голштинской породы; предметом исследований являлись: живая масса телок в различные технологические периоды и эффективность осеменение телок сексированным и обычным семенем.

В исследованиях представлена динамика живой массы телок голштинской породы разного происхождения (Голландия, США, Россия) при направленном выращивании; установлено достижение живой массы 350 кг к возрасту первого осеменения в 12 месяцев; голландские телки имели более высокую интенсивность роста во все периоды выращивания.

Результаты исследований свидетельствуют, что при использовании сексированного семени стельность телок от первого осеменения составила 54,5%; от исследуемого поголовья получили 82,5% телок, что на 29,5% больше, чем от осеменения обычным семенем.

При осеменении сексированным семенем телок разного происхождения (Венгрия, Германия, Россия) установлены имеющиеся отличия в опытных группах. Стельность от первого осеменения у исследуемого поголовья колебалась от 48,7 до 59,7%, а выход телок – от 77,5 до 89,4%. Такие показатели соответствуют мировой практике использования сексированного семени и гарантиям производителя семени.

Следовательно, увеличение численности телок в приплоде позволяет племенным хозяйствам отказаться от приобретения дорогостоящего племенного молодняка.

**Ключевые слова:** технология, выращивание, голштинская порода, воспроизводство, происхождение, ремонтные телки, осеменение, сексированное семя, получения приплода.

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## **MARKET OF RAPE PLANT: CONDITION AND PROSPECTS FOR KAZAKHSTAN**

**Abstract.** The article shows current situation and dynamics of development of global and Kazakhstani rapeseed market over the past several years. Development of the rapeseed market is observed not only in Kazakhstan, the sown area under oilseeds is expanding everywhere in many foreign countries. Use of rapeseed is observed in various sectors of the economy: in agriculture, in the production of animal feed, in the food industry, rapeseed oil is used, rapeseed is used in cosmetology, etc.

Authors revealed importance of rapeseed for the further development of certain sectors of the economy. The article analyzes production and consumption of rapeseed, shows the dynamics of changes in the area under rape. In order to justify the material presented, statistical data were used for a number of years, starting from 2013 to 2019.

Authors of the article evaluated rapeseed production by the main world producers. The consumption of rapeseed by country is considered. Dynamics of changes in the area under rape in Kazakhstan is examined and studied. The main reasons affecting the development of the domestic rapeseed market are identified. The practical relevance of solving these problems, the poor study of certain issues of the methodology and practice of managing the competitiveness of the rapeseed market in Kazakhstan indicates the relevance of the study. The rapeseed market has favorable conditions for the development of this crop.

**Key words:** Kazakhstan, agriculture, plant growing, rape plant, canola, market, rape plant's oil, seeds, biofuel, detergents and cosmetics, feed, export, import.

**The relevance of the topic.** Rape plant is a grassy annual plant of the Cabbage family. It is noteworthy that rape plant does not occur in the wild. It is considered that this plantation was artificially created about 6 thousand years ago, by crossing the rape plant with ordinary garden cabbage. Rape plant is used to produce biofuels and technical oils, and edible vegetable oil is extracted from rape plant. In agriculture, rape plant is used for harvesting green fodder, and rape plant is used as the basis for combined feed. In the production of cosmetics and detergents also rape plant is used. Through the process of processing, rape plant by the amount of protein can be equated to lucerne.

The process of growing rape is labor-intensive, it takes more than 300 days. Sowing of winter rape plant starts at the end of summer, closer to the middle of August. The disadvantage of rape plant is that it can withstand frosts only to minus 4 degrees, which shows its low winter hardiness.

**Material and research methods.** During the research, the official statistical information of the Ministry of National Economy of the Republic of Kazakhstan was studied, as well as the materials of the research bureau "Grains & Oilseeds. Kazakhstan" and the data of the Union of Grain Processors of Kazakhstan for a number of years.

When drafting the article, the authors applied various general scientific methods: the analysis of the collected material was carried out using inductive and deductive methods, the accumulated information was analyzed, detailed, generalized. The logical and systemic approaches were applied.

**Results and its discussion.** In modern conditions the rape plant is among the strategically important plants of the future. The main regions for growing rape plant are China, India, Europe and North and South America, northern Africa, New Zealand and Russia. The geography of rape plant is upscaling every year.

From the middle of the last century, Canadian canola, rape plant was simply not applicable for food, it is used for the production of paints and varnishes and biofuels. In recent years, the growth of food



consumption of rape plant has been observed due to the use of modern processing technologies and the worldwide popularization of Omega acids in food, while the share in the total volume is less than 1.5-2%. Rape plant is mainly processed into rape plant's oil and used in the production of margarine and other fats, it is used as adjustment to the fat content and mixed with other types of vegetable oils.

The main players in the development of biodiesel fuel are Europe, Canada and China.

The main exporters of rape plant are Canada, Australia, the major consuming countries are Japan, China and the EU.

Considering the structure of rape plant producers by countries, it is possible to distinguish 12-15 countries that use rape plant for different purposes. The European Union is a leading rape plant producer, as well as the leading importer. The EU countries are an oil-dependent region with a strong economy and high environmental requirements for fuel. EU for 7 years consumed 36.1% of all rape plants harvested globally. 14.7% of consumption is imported rape plant.

The second largest market, China, has a higher balance of import dependence, and in connection with the plans of the Government, it will grow. A new policy of China's food security policy was fixed: if before domestic production was subsidized; now the ineffectiveness of these measures was acknowledged by practice, and import is cheaper.

Both of these markets form 50% of total global imports. The main supplies come from the balance-positive countries. Canada and Australia are net exporters. For the most part, domestic consumption in these countries is due to the export of rape plant already in a processed form – in the form of oil, meal.

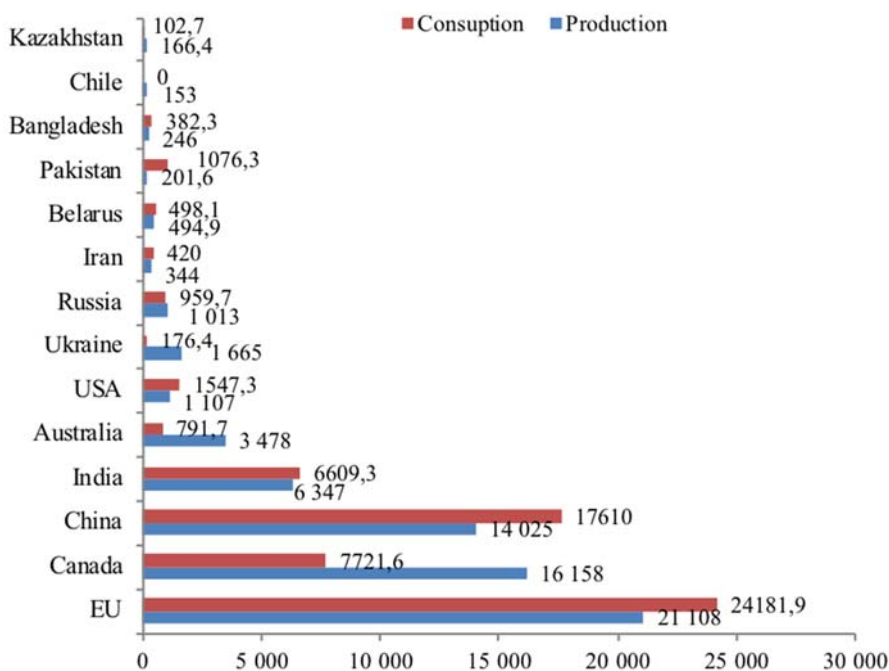


Figure 1 – Production and consumption of rape plant by countries. Note: based on data [1]

The growth of interest in the rape plant market is witnessed by the fact that in countries where, for biological reasons, it is impossible to increase the production of universal, widely sought-after soybeans, they are returning to rape plant. For example, Australia, a great help to grow rape plant is the weather, a lot of rain.

In 2017, Iran significantly increased the production of rape plant from 180-220 thousand tons to 300 thousand tons in 2018. The Ministry of Agriculture of the country plans to increase its oilseed production by another 70% over the next 10 years, while it plans to reduce the import of oilseeds. Statistics show a high growth in annual consumption of vegetable oils in the country, which is 18–19 kg per capita, versus the global average consumption as 12 kg per year (table 1).

Table 1 – Rape plant Production by Country in Dynamics

Countries	2017/2018 February	2017/2018 March	Change. m/m	2016/2017	2015/2016	2014/2015
EU	20 100	21000	–	22 199	24 587	21 306
Canada	18 500	18 500	–	18 377	16 410	18 551
China	13 500	13 500	–	14 931	14 772	14 458
India	6 800	6 800	–	5 920	5 080	6 650
Australia	3 600	4100	500	2 994	3 540	3 832
USA	1 404	1404	–	1 306	1 141	1 004
Ukraine	1 154	1 154		1 744	2 200	2 352
Russia	997	997	–	1 001	1 324	1 259
Iran	340	340	–	340	340	340
Belarus	300	300	–	300	730	676
Pakistan	250	250	–	160	220	190
Kazakhstan	170	170	–	138	241	242
Rest	687	687	–	814	853	790
Note: based on data [1].						

The geographical remoteness of Kazakhstan from the European market, the unequal conditions of membership in the EEU promoted the appearance of the name “Black Sea raps”.

Oilseeds are a perishable product, so not only storage conditions, but also delivery conditions play a significant role. Rape plant has the most specific features:

1) even for such a small supply of Kazakhstani rape plant in Kazakhstan – there is a shortage of large-cod grain-carriers with increased tightness, which are the most economically justified;

2) most of the export of oilseeds from Kazakhstan to the Baltic ports is carried out by road, which speeds up delivery several times, as well as eliminates the problem of the lack of its own fleet of more cubic grain-carriers;

3) the transit of any goods through Russia is tightly controlled, and the operation of some of the rules complicates Kazakhstan’s trade with the EU countries. For example, there is a regulation on the transportation of oilseeds on the territory of Russia only by Russian wagons, which contributes to higher prices for exports.

On the other hand, the import of products to Russia in the Customs Union is practically unlimited, which leads to a tax-free import. Only a small part of the export is registered with the customs authority. Harvest period - the period of activation of the "gray" dealers. Their activity does not imply VAT, they can carry out dumping, which negatively affects the formation of the market.

Official data shows how significant the “EEU factor” is, it is estimated that only 30–40% of volumes fall into the statistics. Subsequently, these volumes can be found in the export of oilseeds and by-products in the export data of Russia and Belarus.

Rape plant, by virtue of its high marginality, is certainly attractive for Kazakhstani farmers, as an export crop that forms the main income, especially against the background of negative trends in the grain market. In comparison with 2017, the area under rape plant in 2018 decreased by 34% [4]. At the end of 2018, it was harvested by 8.4% less than in 2017. Over the aforementioned period, the yield increased from 8 to 10.8 c / ha. The highest yield of rape plant falls on the Akmola region (14.6 c / ha). It is predicted that in the medium term, the yield of rape plant will increase to 20 or more c / ha (table 2).

It should be noted that the areas under rape plant are reduced over the last series of years (figure 2).

This is due to the following main reasons. The first is biological. Farmers are also trying not to go beyond the existing profitability of rape plant, looking for ways to reduce the cost of production. The second reason is the economic, restraining growth of rape plant production in Kazakhstan. Until recently, there was a negative price trend in the world. In 2013, at a cost of \$ 230 per hectare, farmers, on average, received \$ 500-550 per ton (plus \$ 26 in the form of subsidies). Profitability of rape plant – less than

Table 2 – Rape plant harvest in Kazakhstan

Areas	Area under crops thousand hectares of harvesting area		Harvesting area, thousand hectares		Harvested				Collected, thousand tons		Reliability, kg/ha	
					thousand hectares	%	thousand hectares	%				
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Akmola	24,2	13,9	24,2	13,9	24,2	100,0	13,9	100,0	13,8	20,3	5,7	14,6
East Kazakhstan	9,9	5,9	9,0	5,9	9,0	100,0	5,9	100,0	9,9	7,7	11,0	13,2
Kostanay	34,5	16,1	34,5	16,1	23,6	68,4	16,1	100,0	10,6	12,2	4,5	7,6
Pavlodar	3,2	2,0	3,2	2,0	3,2	100,0	2,0	100,0	2,7	2,3	8,4	11,5
North Kazakhstan	173,8	123,6	173,8	123,6	174,0	100,1	121,4	98,2	151,0	129,6	8,7	10,7
Total	245,6	161,5	244,7	161,5	234,0	95,6	159,3	98,6	188,0	172,1	8,0	10,8

Note: based on data [2].

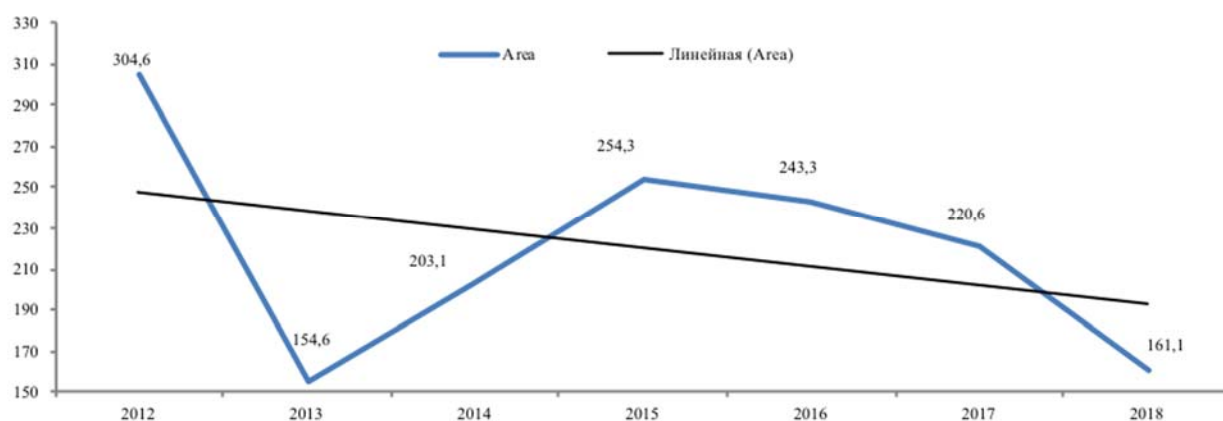


Figure 2 – Dynamic of change of areas under rape plant in Kazakhstan.  
Source: research bureau “Grain-olive Kazakhstan”

200%. Since 2007, assistance has been launched to farmers who wish to introduce various priority crops into the crop rotation. Since 2011, hectare grants have been granted. We traced the impact of these subsidies on the rate of diversification of rape plant (table 3).

Table 3 – The impact of subsidies on the pace of crop diversification: rape plant, by regions

Areas/ Rape plant	2014		2015		2016		2017		2018	
	standart	S	standart	S	standart	S	standart	S	standart	S
Akmola	3400	16,4	3400	27,1	4000+	28,7	7000+	27	8500+	17,9
East Kazakhstan	4000	4,7	4000	7,4	10000+	10,2	14000+	9,5	14000	9
Kostanay	3500	30,5	38000+	19,5	3800	20,5	11000+	29	9000-	29,3
NKR	3400	101,3	3400	149	3900+	192,8	12000+	176,3	5200-	161,1

Note: norm – standard of subsidies on 1 ha; S – harvested area. Note: based on data [2].

The third reason for the reduction of rape plant cultivation in Kazakhstan is pests. The fourth reason hindering the production of rape plant is feeble logistics. Canola is very whimsical during transportation and storage. Farmers cannot ensure long seed safety with their own capacities. At the slightest violation of the norms increases the acid number, which makes the product almost substandard [4].

Under these conditions, rape plant producers become dependent on grain storage owners or exporters. High interest in rape plant does not allow one to lower the price one and a half times in the fall (as with

wheat), but relative dependence on the trader / logistician is traced. In the past few years, the storage capacity of oilseeds has significantly increased, in particular rape plant, however, the grain storages belong to traders and processing companies that set the condition - to accept rape plant only without return.

The low supply of rape plant, as well as the above-mentioned factors, formed low-profile rape plant exports in the 2016-2017 marketing year (figure 3).

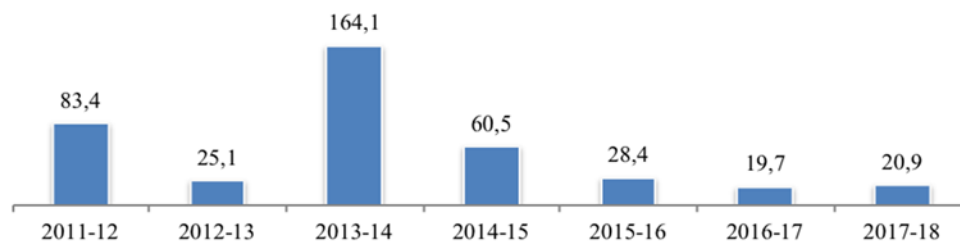


Figure 3 – Dynamics of export of rape plant from Kazakhstan. Source: Customs Control Committee RK

In the diagram below, we calculated all extent exported outside the country in 2012–18, first to see a list of potential markets, and second to reveal the share of each of them in previous years (figure 4).

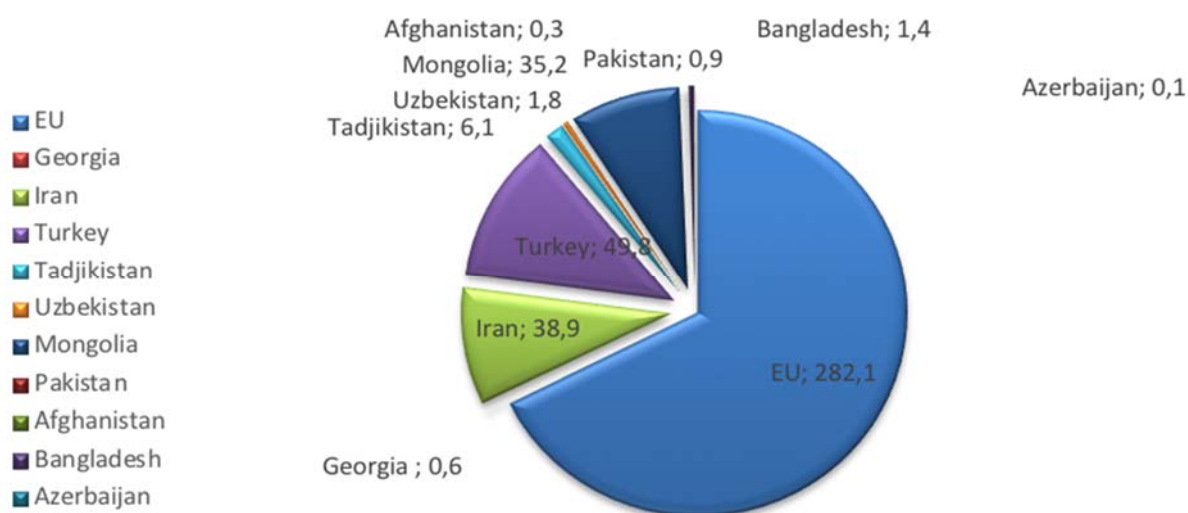


Figure 4 – structure of export of rape plant in 2012-2018, thousand tons. Source: Customs Control Committee RK (without EEU)

Recently, exports evolved as follows: the bulk of the volume was delivered to Europe, random batches went to Iran or Turkey.

Since April 2016, the requirements for residual substances in products of plant origin have become tougher in Europe. These requirements touched the entire oilseed group. The vegetation periods of oilseeds in the Siberian conditions are stretched (this has especially manifested itself in the last three wet years), forcing farmers to use desiccants extensively. And, just the same, they contain substances that are opposed by European legislation.

Under these conditions, the less demanding Eastern market is becoming increasingly relevant. Unfortunately, the necessary documents for opening direct export of rape plant from Kazakhstan to China are still at the signing stage. But China’s need for Kazakhstan rape plant is great, and the market has found a way out. Chinese companies-built rapeseed processing plants in Mongolia, where volumes from Altai, Siberia, Russia and Kazakhstan flow. This is a short-term trend.

The capacity of oil refining has increased in Kazakhstan, and for the last three years, the production of rape plant oil has more than halved. In 2016 - 50093 thousand tons, in 2017 – 33144 thousand tons, in 2018 - 20022 thousand tons. If at least preservation of volumes happens to other positions, then in rape plant oil – a decrease happens [3].

Export of rape plant oil was not recorded. Even with a certain price disposition, rape plant oil is imported from Russia.

The sectoral agencies of the main countries of rape plant producers, exporters and importers gave their preliminary forecasts for key indicators for the 2017-2018 marketing year.

Research Bureau "Grain and Oilseeds Kazakhstan" systematized the available information on 7 major manufacturers, whose share in the world in the season of 2016-2017 was 96%. According to preliminary data, a slight increase in production is expected in the 2017-2018 marketing year (table 4).

Table 4 – Estimation of rape plant production by main producers, thousand tons

Country	2018-2019	2017-2018	2016-2017	2015-2016	2014-2015	2013-2014
EU	23 000	22 128	21 000	22 199	24 587	21 306
Canada	19 000	18 500	18 424	18 377	16 410	18 551
China	13 500	13 100	13 500	14 931	14 772	14 458
India	6 800	6 800	6 800	5 920	5 080	6 650
Australia	3 500	3 690	4 100	2 994	3 540	3 832
Ukraine	1 100	1 120	1 154	1 744	2 200	2 352
Russia	1 000	1 100	997	1 001	1 324	1 259
<i>TOTAL</i>	<i>67 900</i>	<i>66 438</i>	<i>65 975</i>	<i>67 166</i>	<i>67 913</i>	<i>68 408</i>
USA		1 600	1 404	1 306	1 141	1 004
Iran		340	340	340	340	340
Belarus		300	300	300	730	676
Pakistan		250	250	160	220	190
Kazakhstan		180	170	138	241	242
Others			687	814	853	790
Note: based on source of research bureau "Grain-olive Kazakhstan".						

According to the schedule "Production plus initial stocks", there is a reduction in the total supply of rape plant, which will be a deterrent to the overall negative price trend.

**Conclusions.** Kazakhstan soil is not suitable for the cultivation of large volumes of rape plant. Part of the Akmola region (Bulandy, Burabai, Sandyktau districts), part of North Kazakhstan region are typical rape plant areas most suitable for this crop. Kazakhstanian rape plant in the face of rising costs of cultivation, weak domestic breeding will have difficulty in competing in foreign markets with countries with higher level of capacity. The trend is the preservation of production volumes, a slight increase is possible with an increase in trade with China [4].

The average yield of rape plant in the world is 15 c / ha. However, in developed countries, thanks to high technology, the yield of rape plant is quite high. According to Oil World, rape plant yields in the key EU countries are as follows: in Germany - 38.8 c / ha, France - 34.2 c / ha, Great Britain - 36 c / ha, Poland - 31.7 c / ha, the Czech Republic - 33.6 c / ha. In 2017, the yield of rape plant in Kazakhstan increased from 8 to 10.8 c / ha. The highest yield of rape plant falls on the Akmola region (14.6 c / ha). It is predicted that in the medium term, the yield of rape plant will increase to 20 or more c / ha [5].

The positive dynamics of rape plant yield in Kazakhstan did not lead to the elimination of some of the factors constraining exports. The main task facing the country is the storage and transportation of rape plant.

At the same time, it would be desirable to use Kazakh rape plant in the production of domestic detergents and cosmetics, the harvesting of green fodder and use it in the basis of compound feed.

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### РАПС НАРЫҒЫ: КАЗАХСТАНДАҒЫ ЖАҒДАЙ ЖӘНЕ ДАМУ БОЛАШАҒЫ

**Аннотация.** Азық-түлік қауіпсіздігі мәселелері азық-түліктің негізгі түрлерін шығару мүмкіндігі арқылы халықаралық нарықта шешілуде. Мұнда майлы дақылдар маңызды рөл атқарады, өйткені олар рапс өндірісінің практикалық маңыздылығын сипаттайтын арзан азық-түлік және жем ақуыздары мен басқа да тұтыну көзі болып табылады.

Рапс - қырыққабат тұқымдасының бір жылдық шөптесін өсімдік. Бұл соядан кейінгі екінші әйгілі майлы дақыл және болашақтағы стратегиялық маңызды өсімдіктердің біріне жатады. Ғалымдардың пікірінше, бұл мәдениет жасанды түрде шамамен 6 мың жыл бұрын, бақша қырыққабатын сурепицамен кесіп, қосу арқылы алған. Рапс табиғатта болмайды, өңделген кезде белок мөлшері жоңышқаға тең келеді.

Рапсты пайдалану халық-шаруашылығының әртүрлі салаларында байқалады: ауылшаруашылығында мал азығын өндіруде, косметологияда, жуғыш заттарды, техникалық жабдықтарды дайындауда, биоотын өндірісінде және т.б.

Биодизель отынының дамуы рапс майын өндіру мен тұтынуудың едәуір өсуіне себеп болды. Еуропа негізгі ойыншы (биодизель отының дамуы), содан кейін аз дәрежеде Канада мен Қытай. Осы майдың энергиясын пайдаланумен қатар, рапсты жем ретінде қолдануға қызығушылық артып келеді, оны қазір Қытайда байқауға болады. Алайда, рапс майының тағамдық қасиеттері оны тағамда қолдануды арттырған Америка Құрама Штаттарында тағамдардың салыстырмалы бағалары мен тенденцияларының өзгеруіне байланысты сұраныс рапс өсімдігінің үздіксіз дамуына төтеп бере алатындай күшті болады деп күтуге болады.

Рапстың негізгі өсетін аймақтары – Қытай, Үндістан, Еуропа, Солтүстік және Оңтүстік Америка, Солтүстік Африка, Жаңа Зеландия және Ресей.

Мақалада авторлар соңғы бірнеше жылдағы әлемдік және қазақстандық рапс нарығының қазіргі жағдайы мен даму динамикасын көрсетеді. Рапс нарығының дамуы тек Қазақстанда ғана байқалмайды, майлы дақылдардың егіс алаңы көптеген шет елдерде кеңеюде.

Рапстың экономиканың жекелеген салаларын одан әрі дамыту үшін маңызы ашылды. Мақалада рапстың өндірісі мен тұтынуы талданған, рапс өсіру аймағындағы өзгерістер динамикасы көрсетілген. Ұсынылған материалды негіздеу үшін 2013 жылдан 2019 жылға дейінгі статистикалық мәліметтер қолданылған.

Рапс өндірісіне ірі әлемдік өндірушілер баға берген. Елдер бойынша рапсты тұтынуы зерттеліп, Қазақстандағы рапс аумағының өзгеру динамикасы зерттелген. Рапс өсіруге қолайлы аудандар - Ақмола облысы (Буланды, Бурабай, Сандықтау аудандары), Солтүстік Қазақстан облысының бөлігі.

Ішкі нарықтың дамуына және рапстың сапасына әсер ететін негізгі себептер анықталды, мысалы, потенциалы неғұрлым жоғары елдермен сыртқы нарықтарда отандық селекцияның бәсекеге қабілеттілігінің төмен болуы; зиянкестер; әлсіз логистика (сақтау және тасымалдау). Фермерлер өз қондырғыларымен ұзақ мерзімде тұқым қауіпсіздігін қамтамасыз ете алмайды. Нормалары біршама бұзылуы кезінде қышқыл саны артады, бұл өнімді іс жүзінде сапасыз етеді. Сонымен бірге фермерлер рапстың белгіленген рентабельділік шегінен шықпауға тырысады және өнімнің өзіндік құнын төмендету жолдарын іздейді.

Осы мәселерді шешудің тәжірибелік өзектілігі, Қазақстандағы рапс нарығының бәсекеге қабілеттілігін басқару әдістемесі мен практикасының жекелеген мәселелерін жеткіліксіз зерттеу жүргізілген зерттеудің өзектілігін көрсетеді. Бұл мәселені шешу саланың өсімдік майлары мен басқа да май және май өнімдері импортына тәуелділігін төмендетеді, сонымен қатар елдегі азық-түлік қауіпсіздігінің артуына ықпал етеді.

Рапс нарығы - осы ауыл-шаруашылық дақылдың дамуына қолайлы жағдайлар бар. Болашақта қазақстандық рапсты отандық жуғыш заттар, косметика өндірісінде, жасыл жемшөп дайындауда қолдануға және мал азығына негіз ретінде пайдалануға болады.

Ресурстардың жоқтығынан әлем елдері генетикалық модификацияланған өнімдерге көбірек көңіл бөле бастайды. Табиғи өнімдер аз қолданылатын тауарларға айналады (және, сәйкесінше, анағұрлым қымбат), мұндай өнімдерге қазақстандық рапс кіреді.

**Түйін сөздер:** Қазақстан, ауыл шаруашылығы, өсімдік шаруашылығы, рапс, канола, нарық, рапс майы, тұқымдар, биоотын, жуғыш заттар мен косметика өндірісі, құрама жем, экспорт, импорт.

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## РЫНОК РАПСА: СОСТОЯНИЕ И ПЕРСПЕКТИВЫ ДЛЯ КАЗАХСТАНА

**Аннотация.** Вопросы продовольственной безопасности решаются на международном рынке за счет потенциальных возможностей производства основных видов продовольствия. Здесь важное место отводится масличным культурам, так как они являются относительно недорогим источником получения пищевого и кормового белка и других предметов потребления, что характеризует практическую значимость производства рапса.

Рапс – травянистое однолетнее растение семейства капустных. Это вторая, самая массовая масличная культура после соевых бобов и относится к числу стратегически важных растений будущего. Ученые считают, что данная культура создана искусственно около 6 тыс. лет назад, при скрещивании сурепицы и огородной капусты. Рапс в дикой природе не встречается. При переработке по количеству белка сравним с люцерной.

Применение рапса наблюдается в самых различных отраслях народного хозяйства: в сельском хозяйстве при производстве комбикормов, в косметологии, при производстве моющих средств, технических средств, биотоплива и т.д.

Развитие биодизельного топлива вызвало значительное увеличение как производства, так и потребления рапсового масла. Европа является основным игроком (развитие биодизельного топлива), а затем в меньшей степени Канада и Китай. Наряду с использованием энергии этого масла, растет интерес к использованию рапса как корм, что сейчас наблюдается в Китае. Тем не менее, в зависимости от изменений в относительные оценки блюд и тенденций, наблюдаемых в США, где питательные свойства рапсового масла привели к увеличению его использование в пищу, можно ожидать, что спрос будет оставаться достаточно сильным, чтобы выдержать непрерывное развитие рапса.

Основные регионы по выращиванию рапса – это Китай, Индия, Европа и Северная и Южная Америка, север Африки, Новая Зеландия и Россия.

В статье авторами показаны текущая ситуация и динамика развития мирового и казахстанского рынка рапса за последний ряд лет. Развитие рынка рапса наблюдается не только в Казахстане, повсеместно идет расширение посевных площадей под масличные культуры во многих зарубежных странах.

Раскрыто значение рапса для дальнейшего развития некоторых отраслей экономики. В статье проведен анализ производства и потребления рапса, показана динамика изменения площадей под рапс. С целью обоснованности изложенного материала использованы статистические данные за ряд лет, начиная с 2013 по 2019 годы.

Проведена оценка производства рапса основными мировыми производителями. Рассмотрено потребление рапса по странам и изучена динамика изменения площадей под рапс в Казахстане. Подходящими площадями для возделывания рапса является Акмолинская область (Буландинский, Бурабайский, Сандыктауский районы), часть Северо-Казахстанской области.

Выявлены основные причины, влияющие на развитие отечественного рынка и качество рапса, такие как слабая конкурентоспособность отечественной селекции на внешних рынках с имеющими более высоким уровнем потенциала странами; вредители; слабая логистика(хранение и транспортировка).Собственными мощностями фермеры не могут обеспечить долгую сохранность семян. При малейшем нарушении норм возрастает кислотное число, что делает товар практически некондиционным. Вместе с тем, фермеры также стараются не выходить за рамки сложившейся рентабельности рапса ищут способы удешевить производство.

Практическая востребованность решения данных проблем, слабая проработка отдельных вопросов методологии и практики управления конкурентоспособностью рапсового рынка Казахстана свидетельствует об актуальности исследования. Решение данной проблемы снизит зависимость отрасли от импорта растительных масел и других масложировых продуктов питания, а также будет способствовать росту продовольственной безопасности страны.

Рынок рапса имеет благоприятные условия для развития данной сельскохозяйственной культуры. В перспективе казахстанский рапс можно применять в производстве отечественных моющих средств, косметики, заготовке зеленых кормов и использовать в основе комбикормов.

В связи с нехваткой ресурсов страны мира в целом станут более лояльными к генетически модифицированной продукции. Натуральная продукция станет менее распространенным товаром (и соответственно, более ценным и дорогим), к такой продукции относится и казахстанский рапс.

**Ключевые слова:** Казахстан, сельское хозяйство, растениеводство, рапс, канولا, рынок, рапсовое масло, семена, биотопливо, производство моющих средств и косметики, комбикорм, экспорт, импорт.

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## INTRODUCTION OF EXPLANTS AND REPRODUCTION ON NUTRIENT MEDIUM OF DONOR MATERIAL *IN VITRO* VARIETIES OF *CALLISTEPHUS CHINENSIS* (L.) NESS. FOR ITS FURTHER USE IN LANDSCAPING

**The relevance of the research topic.** On the recent methods of biotechnology are increasingly used in plant breeding and seed production. Herbaceous plants such as strawberries, potatoes, a vegetable, some medicinal and others are capable of vegetative propagation the traditional methods of culture, successfully introduced in both in vitro and can achieve a high rate of reproduction.

Modern plant biotechnology – the sum of the technologies developed in molecular and cell biology of plants – a new stage in the development of the technology of plant breeding.

With these improved characteristics may occur at the level of individual genes and individual genes that determine a specific trait, can be identified. They may be the final selection, they can be isolated, insert, delete, or modify the genotype or variety.

**Goal.** Identify the features of the manifestation of economically valuable features and decorative properties of *Callistephus chinensis* and the inclusion of the best varieties in the biotech link, their adaptation to the conditions of the Forest-Steppe of Ukraine and their further use in landscaping. **Methods.** Laboratory – determination of seed germination; mathematical and statistical - for processing the reliability of the obtained research results. **Results.** The nutrient medium for growing plant tissues and cells, by analogy with the medium for culturing animal tissues, should contain all that the tissues in the plant organism receive from xylem and phloem currents of substances. However, in practice it has been found that vegetable juices cannot serve as a complete nutrient medium for growing isolated tissues and cells. This manifests the specificity of the receipt, transportation and especially the redistribution of nutrients in the plant.

Based on the analysis, research was conducted to study the possibility of mass off-season vegetative propagation of plants of *Callistephus chinensis* in vitro. Practical recommendations on the selection of sterilizer, sterilization, nutrient medium and for the adaptation period of the best genotypes of this culture have been developed.

As a result of the conducted researches the methods of selection of the initial plant material of *Callistephus chinensis* (*Callistephus Chinensis* (L.) NEES) and its surface sterilization, modification of existing aseptic culture methods have been studied and mastered. The morphogenetic potential of explants from different plant organs was investigated and selection of nutrient medium and study of the influence of plant growth regulators and physical parameters on the process of morphogenesis was carried out. The features of regeneration of isolated explants depending on the composition of the nutrient medium and selection of conditions for obtaining self-clones of *Callistephus chinensis* (*Callistephus Chinensis* (L.) NEES) were studied.

**Key words:** in vitro, plant biotechnology, *Callistephus Chinensis*, nutrient medium, rhizogenesis.

**Introduction.** The signing by Ukraine of the Association Agreement with the European Union requires a review of the strategic priorities for the development of the main sectors of the national economy, especially those that base their activities on the use of natural resources and influence the formation of the assimilation potential of the territories [1].

Biotechnology techniques have been increasingly used in plant breeding and seed production over the last decades. Herbaceous plants such as strawberries, potatoes, many vegetables, some medicinal plants and others capable of vegetative propagation by traditional methods of culture, successfully introduced in vitro and can achieve high rates of reproduction. However, accelerated reproduction of deficient genotypes in vitro makes sense only when in the process of microcloning, the heredity of the breeding individual remains intact [2].

Modern plant biotechnology – is the sum of the technologies developed from molecular and cellular plant; it is a new stage in the development of plant breeding technology.

Using these technologies, feature improvement can occur at the level of an individual gene, and the separate genes that define some feature can be identified. Genes can be sampled, they can be isolated, introduced, deleted or modified in the genotype of the plant or variety. The contribution of biotechnology to various fields, including floriculture, is to facilitate the traditional methods of plant propagation and to develop a new technologies that make it possible to increase the efficiency of agriculture. Genetic and cellular engineering methods were created resistant to pests, diseases, herbicides genotypes. The technique of plant healing from the accumulation of infections has been developed, which is especially important for vegetatively propagated crops (potatoes, etc.). One of the actual problems is the ability to manage the nitrogen fixation process, including including the possibility of introducing nitrogen fixation genes into the useful plant genome, as well as managing photosynthesis processes. Studies are underway to improve the amino acid composition of plant proteins, new plant growth regulators, microbiological plant protection products against pests and diseases, bacterial fertilizers are being developed [3].

Plant cells in vitro retain biosynthetic potential inherent in plants in vitro and can be a source of economically important cell metabolism products. This feature of cultured plant cells is used for for the creation of technologies for the industrial production of valuable substances [4].

In addition to the biosynthesis of important compounds, cultured cells are capable of biotransformation, that is, they can turn cheap recycling or waste products into valuable products. Another unique feature of cultured cells is their totipotency which enables the creation of unconventional technologies for agriculture that facilitate and accelerate the breeding process as well as plant reproduction.

The universal nature of modern biotechnology is manifested in the widespread use of cellular and genetic engineering methods, that are based on the development of molecular genetics, which provides great opportunities for the genetic reconstruction of living organisms in the directions desired for researchers. The main purpose of these studies is to obtain through genetic reconstruction the greatest possible diversity of organisms that could be used not only for the production of qualitatively new products, but also for the processing of various organic and inorganic substances [5].

Flowering plants in which the period of growth and development from sowing of seeds to harvesting takes place during one growing season are attributed to annuals. These plants also include flowering plants, which by their biological characteristics are perennial, but under different conditions of cultivation their ontogeny takes place over one year [6].

The genus *Callistephus chinensis* (L.) Ness. comes from the Far East of Russia, northern and northeastern regions of China, as well as Mongolia and Japan. Systematics of the genus *Callistephus chinensis* (L.) Ness. varied over a long period of cultivation. The aster is still preserved there in the wild, it grows mainly on rocks and clay-stony soils of the southern mountain slopes in the area of deciduous forests [7].

In botany literature, this plant species was mentioned and described under different synonyms, namely *Aster hortensis* L., *Callistemma hortense* Cass., *Callistephus hortensis* Cass., *Diplopappus sinensis* Less. [8]. This species was first described by Karl Linnaeus, it was initially attributed to the genus *Aster* L. In 1826 N. Cassini separated it into a separate species *Callistemma* Cass., which was later renamed *Callistephus*. The modern name of the species – *Callistephus chinensis* gave the aster the annual Neess (Ness) [9]. According to modern scientific ideas of the genus *Callistephus* Cass. belongs to the order Asterales Link, family Asteraceae Bercht. et J Presl [10].

The aster belongs to the Compositae family (asters) (Asteraceae). The botanists gave it the name *Callistephus Chinese* (*Callistephus chinensis*), however, worldwide this flower is called aster Chinese (*Callistephus chinensis* (L.) Ness.) or annual aster. It is an annual plant of the above mentioned family. In Greek, its name means "star". Ancients believed that asters emerged from the star dust that fell from the sky. Nowadays, this beautiful plant is rightly one of the most popular autumn flowers, the most favorite

garden culture on private plots in townspeople. It is appreciated for the generous autumn flowering, the variety of colors and forms of inflorescences, which, due to the fact that their central part consists of yellow tubular flowers, at the edges surrounded by long wavy, really resemble a wreath [11-13].

Astra belongs to the Angiosperm Class, Dicotyledonous, Asteraceae family (Compositae). Plants of this family are spread on all continents and climatic zones. The Aster family has 1300 genera and more than 20000 plant species [14].

Annual aster – a herbaceous plant with a wide-stemmed root system. It has a sufficiently large seedlings - within 1 cm with flat cotyledons. Most varieties have oval cotyledons, rosy asters – spherical, in varieties of Unicum – elongated. The stem of aster is green (usually in varieties with light-colored inflorescences) or reddish (in varieties with dark-colored inflorescences), hard, erect, often pubescent. There are longitudinal sulcuses all over the surface of the stem. The thickness of the stems in different varieties is different. According to the N.A. Petrenko classification (1973) [15,16], giant asters have a height of up to 100 cm. Tall asters grow up to 80 cm. Asters up to 60 cm tall belong to the middle-aged. Short-stemmed asters have a height of 35 cm, dwarfs – 25 cm.

Depending on the group, the branch of the bush in asters is different. Tall and undersized asters branches more than the medium-sized asters. According to the number of 1st order shoots, asters are divided into small branches – up to 4 shoots, such as Radio, Ostrich Feather, sufficiently branched – 5-7 shoots (most garden groups), heavily branched – up to 10 shoots (Pompon, Lilliput) and extremely branched - more than 10 shoots (Ambria, Walderee). The branching of the stem starts from the top and has a pronounced sympodial character [17-19].

**Materials and methods of research.** In our studies, we used 20 varieties of Calistephus Chinese with various important features, origins and directions of use. The characteristics of the varieties are shown in table 1.

Nutrient medium are prepared in a separate room that has lab tables, reagent storage cabinets, refrigerators for the storage of concentrated solutions of nutrient medium, analytical, technical and torsion scales, pH meters, electric or gas cookers, water baths, magnetic mixers.

Table 1 – Characteristics of the starting material of the studied varieties of Calistephus Chinese, 2016–2018

№	Variety	Origin	Sortotype	Productivity, g / bush	Direction of use
1	King Size	Germany	Peonies-shaped	3,0-4,0	universal
2	Anastasia	IH NAAS		3,0-3,5	universal
3	Anastasia	IH NAAS		3,0-3,5	universal
4	Salmon Turm	Germany		2,5-3,0	universal
5	Oksana	IH NAAS		2,5-3,0	universal
6	Odarka	IH NAAS		3,5-4,0	on a cut
7	Hilda	Germany	Princess	4,5-5,0	on a cut
8	Princess (red)	IH NAAS		to 6	on a cut
9	Alexandra	Germany		4,5-5,0	on a cut
10	Raspberry layer	Russia	Pompony-shaped	to 6	universal
11	Winter Cherry	Western Europe		2,0-2,5	universal
12	Blue Moon	Western Europe		2,0-2,5	on a cut
13	Sophia	IH NAAS	Artistic	3,0-3,5	universal
14	Swan Lake	IH NAAS	Artistic	2,0	on a cut
15	Esmeralda	Germany	Spherical	3,0-3,5	on a cut
16	Velvet	IH NAAS		2,0-2,5	universal
17	The Gray Lady (blue)	Russia	Duchess	2,5-3,0	on a cut
18	Vesnyanka	IH NAAS	Rose-shaped	4,0	universal
19	Snizhana	IH NAAS	Laplata	3,0	on a cut
20	Amber	IH NAAS	American Bushes	3,5	on a cut

The room for sterilization of mediums, instruments and utensils is equipped with vertical (VK-60, VK-75) and horizontal (GK-100, AG-100) autoclaves, with drying cabinets for sterilization by dry heat.

For work in aseptic conditions use laminar box, which injected sterile air that passes through a bacterial filter. The laminates are placed in a separate room. If there are no laminar boxes, then equip a special room-box – operating room. The walls of such a room are tiled, the floor is covered with linoleum. Operating doors should be closed hermetically and there should be a tambour (pre-box) in front of them. The box should be supplied with sterile conditioned air. Boxing is equipped with bactericidal lamps. In the operating room placed that are covered with easy-to-wash material, medical cabinets, binocular microscopes, tools, alcohols.

Isolated tissues are cultured in a thermostated room (cultural room) with conditioned air, controlled temperature (22-28°C) and humidity (70-80%). Regulation of light mode is provided by time switch.

The laboratory premises are equipped with the equipment necessary for biochemical, histo- and cytogenetic and other studies related to basic plant tissue cultivation works.

**Research results.** The nutrient medium for growing plant tissues and cells, by analogy with the medium for culturing animal tissues, should contain all that the tissues in the plant receive from the xylem and phloem current substances. However, in practice it has been found that floral juices cannot serve as a complete nutrient medium for growing isolated tissues and cells. This manifests the specificity of the receipt, transportation and especially the redistribution of nutrients in the plant.

The basis for the selection of different mediums for the culture of plant tissues were nutrient solutions that were used in growing whole plants. The method's founders, R. Gautre and F. White, used the Knop nutrient mixture and the Uspenskykh solution, respectively.

These solutions were supplemented with sugars, trace elements, vitamins. R. Gautre also reduced the concentration of the mineral salts of the Knop original solution by half. F. White's medium, created in 1943 on the basis of the Uspenskykh solution, it was used first to grow isolated root culture and then unchanged to grow plant tissues.

With the development of the method of tissue culture and the introduction into the culture of new and new plant tissues of different species, it became necessary to change the composition of nutrient medium. The most complete study of tissue mineral nutrition was conducted by R. Heller in 1953. To achieve correctness, he refused from solid agar medium and grew tissues only in liquid nutrient medium. R. Heller studied in detail the importance of individual ions for the nutrition of tissues and the effect of their exclusion from the composition of the medium on the further tissue growth during transplantation. He proposed a nutrient medium whose composition was significantly different from the medium used for whole plants and from medium previously used for the cultivation of isolated tissues. This medium is very rich in K<sup>+</sup> and P<sup>+</sup>. R. Heller also proposed a new composition of a mixture of trace elements.

As a result of a series of studies, the requirements of tissues for sources of carbohydrate nutrition, vitamins, and physiologically active substances were clarified.

Cultivation of plant organs, tissues and cells, most of which are modifications of the basic nutrient medium (White, Hamburg, Murashige and Skug). The composition of any nutrient medium for growing a culture of isolated plant tissue includes the following groups of substances: mineral salts - macro and microelements; carbohydrates; vitamins; amino acids; growth promoters of synthetic and natural origin; water; agar.

Due to the need to change the composition of the nutrient medium when finding the optimum for new, yet untested in culture tissue, it is worth to stop on the characteristics of the nutritional characteristics of isolated tissues.

Weighed microbiological agar was poured in half with distilled water and heated to 90-100°C.

Dissolved agar was added to the components of the nutrient medium, also dissolved in distilled water.

The medium was filtered, took the required volume, normalized to pH, poured into culture vessels and autoclaved.

To accelerate the work pre-prepared concentrated solutions of salts, which were then mixed in the preparation of the nutrient medium in accordance with the Murashige-Skug recipe (solutions 1-4).

In this regard, we aimed to study the impact of growth regulators on the development of *Calistephus* Chinese explants. Auxins and cytokinins were added at different concentrations to different medium, which are shown in table 2.

Table 2 – Composition supplements to the prescriptions of standard nutrient medium, 2016-2018

№	Medium	Growth regulators, concentration %	Medium code
1	MS+6BAP	0,5	MS-1
		1,0	MS-2
		1,5	MS-3
2	B <sub>5</sub> +6BAP	0,5	B5-1
		1,0	B5-2
		1,5	B5-3

Note: MS - medium of Murashige and Skug (the composition of the medium in applications); B5 - medium of Hamburg (the composition of the medium in applications).

This table shows the composition of additions to the prescriptions of standard nutrient medium used in the variants of the experiment. The basis of the nutrient substrate was introduced macro- and micronutrients according to the prescriptions of the medium Murasige-Skug and Hamburg.

Modified nutrient substrates by growth regulators of auxins and cytokinins to study concentrations and the ratio of exogenous regulators to the development of *Calistephus* Chinese explants.

Subsequent work has analyzed the growth and development of seeds of different varieties of *Calistephus* Chinese in different nutrient medium.

Analyzing table 3, we can conclude that the development of seeds of different varieties of *Calistephus* Chinese in different mediums was uneven. The MS-2 and B5-2 variants of mediums were identified as the best substrates for explant development, on average by genotype. The MS-2 medium contributed to the seed development at the level of 96.0% and the B5-2 medium - 88.0%. These variants of the experiment had the same content of growth regulators, but their numbering depended on the time of introduction into the culture. Describing the composition of the nutrient medium, it should be noted that this similar balance of growth regulators had a positive hormonal effect on the development of *Calistephus* Chinese explants.

Table 3 – Impact of growth regulators on the development of macrostructures, 2016-2018

Medium code	Number of planted material	Seed development		Stationary explant condition		Explant necrosis	
		pieces	%	pieces	%	pieces	%
1	2	3	4	7	8	9	10
MS-1	100	24	24	48,0	48,0	28,0	28,0
MS-2	100	96	96	2,0	2,0	2,0	2,0
MS-3	100	2,0	2,0	92,0	92,0	6,0	6,0
B <sub>5</sub> -1	100	15,0	15,0	45,0	45,0	40,0	40,0
B <sub>5</sub> -2	100	88,0	88,0	12,0	12,0	0,0	0,0
B <sub>5</sub> -3	100	12,0	12,0	32,0	32,0	56,0	56,0

During the period of 10-12 days the volume of biomaterial planted on the nutrient substrate increased in 1.5-2.0 times. This indicates that the phytohormones introduced into the substrate accelerate the period of mitotic cycles passage.

However, in other variants of the experiment, the development of seeds of *Calistephus* Chinese plants was not significant and ranged from 2.0 to 24%. At the same time, the steady state of the explant was almost the same for MS-1 and B5-1 mediums, in B5-1 medium this indicator was slightly lower and amounted to 32.0%. It should be noted that on MS-2 medium seed development, steady state of explant and necrosis of explant were at the same level - 2%. As for loss of the material (explant necrosis), the highest rates were in variants B5-1 and B5-3, respectively, with values from 40.0 to 56.0%. The average material loss rate was recorded on MS-1 medium and was 28%.

Therefore, as a result of the experiment, a nutrient medium was selected to activate the development of *Calisthephus* Chinese plants *in vitro*. That is, for the rapid growth and development of *Calisthephus* Chinese plants, the material requires the introduction of high average concentrations of auxins into the nutrient substrate.

It is well known that during the formation and growth of roots there are a number of caused by each other different biochemical, physiological and histological processes. Among anatomical factors, the formation of root primordia is facilitated by the cell's proximity to vascular tissues. The viability of rooted *in vitro* plants is largely determined by the rooting site. In some embodiments even with sufficient *in vitro* rooted test plants observed almost complete loss of plants under non-sterile conditions. In the process of rooting distinguish three main, specific for nutritional requirements and cultivation conditions, stages: induction, initiation, root growth. With a successful combination of the composition of the environment and the conditions of rooting and bringing them into line with the genotype of the plant, the duration of the first two stages is 10-15 days [19].

For accelerated root formation, the plants are planted in a nutrient medium for rhizogenesis. The nutrient medium should contain high concentrations of auxins. This is the basic rule of inducing root formation [20].

Under the influence of auxins (NOCs, hetero-auxins), the division of parenchyma cells is stimulated, which leads to differentiation of the root rudiments of the basal tissue [21].

To increase the activity of risogenesis, we excluded cytokines and added higher concentrations of gibberel acid to the nutrient medium. This made it possible to obtain an extension of the shoot even in the breeding medium.

In our studies, we used 5-7 mm biomaterial from the initial growth of the plant material. As can be seen from the data in table 4, the best medium for rooting plant material of *Calisthephus* Chinese was MS-2, since, in the breeding medium, we observed a single rhizogenesis.

Table 4 – Influence of indolylacetic and indolyl butyric acid on rooting *Calisthephus* Chinese plant material *in vitro* (on the average by genotype), 2016-2018

№	Medium	Growth regulators, concentration %	code
1	MS+IOK	0,5	MS-1
		1,0	MS-2
		1,5	MS-3
2	MS+IMP	0,5	MS-4
		1,0	MS-5
		1,5	MS-6
3	B <sub>5</sub> +IOK	0,5	B5-1
		1,0	B5-2
		1,5	B5-3
4	B <sub>5</sub> +IMK	0,5	B5-4
		1,0	B5-5
		1,5	B5-6

6-BAP was excluded from this medium and modified with indolylacetic acid - IOC (1.5-2.5%). The highest results were obtained with the introduction of 1.0 mg / l of indolylacetic acid. This allowed us to follow the relevant pattern. For 16-18 days (on average on repetitions) from 100 pieces of plants planted for rhizogenesis, 96% of the material formed roots. Concentrations of 1.5 and 2.5 mg / l gave a slightly smaller number of rooted plants (4 to 36, which is 12 and 78%) over a longer period (5 to 22 days).

That is, a concentration of indolylacetic acid up to 1.0 mg / l is optimal for the rhizogenesis of Chinese *calisthephus* plants (shorter period of time).

Therefore, the nutrient medium were improved with different concentrations of indolylacetic and indolyl butyric acid, and it was proved that the concentration of 1.0 mg / l is optimal for the rhizogenesis of *Calisthephus* Chinese plants for a shorter period of time.

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**АЛДАҒЫ УАҚЫТТА КӨГАЛДАНДЫРУ МАҚСАТЫМЕН *CALLISTEPHUS CHINENSIS* (L.) NESS.  
СОРТЫНА ЖАТАТЫН *IN VITRO* ДОНОРЛЫҚ МАТЕРИАЛЫНЫҢ  
АЗЫҚТЫҚ ОРТАДА ТАРАЛУЫН ЗЕРТТЕУГЕ КІРІСПЕ**

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**ВВЕДЕНИЕ ЭКСПЛАНТОВ И РАЗМНОЖЕНИЕ НА ПИТАТЕЛЬНОЙ СРЕДЕ  
ДОНОРСКИХ МАТЕРИАЛОВ *IN VITRO* СОРТОВ *CALLISTEPHUS CHINENSIS* (L.) NESS.  
С ЦЕЛЮ ДАЛЬНЕЙШЕГО ИСПОЛЬЗОВАНИЯ В ОЗЕЛЕНЕНИИ**

**Актуальность темы исследования.** На протяжении последнего времени методы биотехнологий находят все больше применение в селекции растений и семеноводстве. Травянистые растения, такие как земляника, картофель, многие овощные, некоторые лекарственные и другие, способны к вегетативному размножению традиционными методами культуры, успешно вводятся в *in vitro* и могут достигать высоких показателей коэффициента размножения.

Современная биотехнология растений – сумма технологий, которые развиваются из молекулярной и клеточной биологии растений, – новая стадия в развитии технологии селекции растений.

С помощью этих технологий улучшение признаков может происходить на уровне индивидуального гена, а отдельные гены, определяющие определенный признак, могут быть идентифицированы. По этим показателям может быть проведен отбор, их можно изолировать, ввести, удалить или модифицировать в генотипе растения или в сорте.

**Цель.** Выявить особенности проявления хозяйственно-ценных признаков и декоративных свойств калистефуса китайского и включения лучших сортов в биотехнологическую звено, их адаптация к условиям Лесостепи Украины и дальнейшее использование в озеленении. **Методы.** Лабораторный – определение всхожести семян; математически-статистический – для обработки достоверности полученных результатов исследований. Для проведения работ в асептических условиях используют ламинарный бокс, в который нагнетается стерильный воздух, проходящий через бактериальные фильтры. Ламинар размещают в отдельной комнате. **Результаты.** Питательная среда для выращивания растительных тканей и клеток, по аналогии со средой для культивирования тканей животных, должна содержать все то, что ткани в растительном организме получают от ксилемного и флоемного потока веществ. Однако, на практике выяснилось, что растительные соки не могут служить полноценной питательной средой для выращивания изолированных тканей и клеток. В этом проявляется специфика поступления, транспортировки и особенно перераспределения питательных веществ в растениях.

На основе анализа было проведено исследование по изучению возможности массового позасезонного вегетативного размножения растений калистефусу китайского через *in vitro*. Разработаны практические рекомендации по подбору стерилизатора, стерилизации питательной среды и адаптационного периода лучших генотипов этой культуры.

В результате проведенных исследований изучены и освоены методики отбора исходного растительного материала калистефуса китайского (*Callistephus Chinensis* (L.) NEES). Определена его поверхностная стерилизация, проведена модификация существующих методов получения асептической культуры. Исследованы морфогенетичный потенциал эксплантов из различных органов растений и проведен подбор питательных сред и изучение влияния регуляторов роста растений и физических параметров на процесс морфогенеза. Изучены особенности регенерации изолированных эксплантов в зависимости от состава питательной среды, и подбор условий получения самоклонов калистефуса китайского (*Callistephus Chinensis* (L.) Nees).

**Ключевые слова:** *in vitro*, биотехнология растений, калистефус китайский, питательные среды, ризогенезу.

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## THE EFFECT OF PRE-SOWN PRIMING OF BARLEY SEEDS IN THE SOLUTIONS OF DIFFERENT SALTS IN THE COMBINATION WITH DIATOMITE ON ALLANTOIN CONTENT IN ROOTS SEEDLINGS UNDER SALINE CONDITIONS

**Abstract.** Pre-sown priming of barley seeds in diatomite suspension in the combination with the solutions of biological important elements strongly increased their germination under saline conditions. For maximal seed germination and content of the potential antioxidant allantoin in seedling roots under salinity it was necessary the priming in the presence of diatomite, KNO<sub>3</sub> and Na<sub>2</sub>MoO<sub>4</sub>. Role of nitrate and molybdate in maximal formation of allantoin by explained in vivo cooperations of molybdenum-containing enzymes of nitrate reductase (NR) and xanthine dehydrogenase (XDH) in the conditions of salinization. For finding out of role of diatomite further researches are required.

Thus, pre-sowing treatment of plant seeds in a combination of diatomite suspension with solutions of biologically important elements dramatically increases the stability of seed germination in saline conditions. Pre-sowing seed treatment by priming is an environmentally friendly and cheap technology of pre-sowing seed treatment for saturation with important elements, which allows to do without fertilization on huge surface. This will provide the plants with important elements from the germination stage to full maturity.

**Key words:** diatomite, barley seeds, allantoin, pre-sown priming, nitrate reductase, xanthine dehydrogenase, salt tolerance.

**The relevance of the topic.** Today the application of new and unconventional methods to increase the resistance of cultivated plants to adverse environmental conditions in agriculture is told more and more. And first of all we are talking about diatomites-sedimentary rock consisting of shells of diatoms [1]. Diatomite is considered as a source of soluble silica, which plays an important role in the formation of soil fertility, increasing the productivity of plants and their resistance to diseases [2,3]. However, the mechanism of diatomites in plant resistance to adverse environmental conditions has not been sufficiently studied yet.

Plant resistance to salinization is determined by a variety of biochemical pathways that promote water retention and / or assimilation, protect chloroplast functions, and maintain ionic homeostasis. The main pathways include those that lead to the osmotic synthesis active metabolites, specific proteins and certain free radical purification enzymes that control the ion flow and water and control the level of oxygen radicals. The ability of plants to detoxify radicals under salinization is probably the most important condition for their resistance to this stress. Many salt-tolerant species accumulate metabolites that play an important dual role as protectors against radicals [4]. One of these metabolites are uric acid (urate) and allantoin. These substances are formed as metabolic intermediates of purine catabolism. Our early studies have shown the involvement of purine catabolism in plant protection from stress [5]. When oxygen radicals are neutralized, urate is converted to allantoin, allantoin to allantoic acid.

It is well known that the key enzyme of purine catabolism is xanthine dehydrogenase (XDH), which converts xanthine or hypoxanthine (products of adenine and guanine oxidation) into a potential antioxidant

– uric acid. Last enzyme uricase or under strong oxidative stress (i.e., in the presence of a high concentration of ROS in the cell) oxidizing turns into allantoin. Allantoin is also a strong antioxidant that neutralizes ROS in the cell (in this case, it is converted to allantoic acid). Thus, these purine catabolism products are potential antioxidants. On the other hand, as it has been established before, that tropical legumes and some other plants use allantoin and allantoic acid (i.e. ureides) as the main transport and spare forms of nitrogen. Recently, allantoin has been shown that activates the production of abscisic acid (ABA), thereby stimulating the expression of stress-related genes and increasing the tolerance of plant seedlings to abiotic stress. These studies suggest a possible link between purine catabolism and stress hormone homeostasis (ABA) and highlight the potential importance of allantoin in these interactions [6]. *Arabidopsis thaliana* was used as a model system to study the effect of salt stress on allantoin metabolism. In different concentrations of NaCl in plant seedlings, an increased content of allantoin and a reduced allantoate were found. Treatment of seedlings with NaCl resulted in the expression of genes involved in allantoin biosynthesis [7]. Thus, depending on plant growth and development conditions, urate and allantoin may play an important role in nitrogen metabolism and in stress protection. However, the effect of diatomite on purine metabolism (i.e. on the formation of ureides) in plant cells under various environmental conditions has not been studied at all.

The value of pre-sowing seed priming. For normal growth and development of agricultural crops of seeds, rapid germination and pecking is of great importance, therefore, pre-sowing priming of seeds is important. Priming is an effective technology to achieve rapid and simultaneous seed development, high growth energy, resulting in a good harvest. This is a simple and cheap method of soaking, in which the seeds are partially moistened to the point where the metabolic processes required for germination have already begun, but germination has not yet occurred. The seeds are dried to almost their original dry weight.

Harris and others (2007) report that pre-sowing seed priming leads to better corn formation, growth, early flowering, increases its resistance to unfavorable environment and, accordingly, increases yield [8]. A good yield of many crops is associated with pre-sowing seed priming, which leads to accelerated early and more uniform growth, moreover, it is a cheap technology [9]. These positive effects are influenced by factors such as plant species, priming environment, priming duration, temperature, storage conditions and others.

Khan and others (2009) evaluated the results of pre-sowing seed priming in a solution of different NaCl concentrations for early growth and concluded that seed priming in NaCl is a better treatment compared to control variants [10]. Priming improves seed germination in the field, in this respect potassium nitrate (KNO<sub>3</sub>) is a promising substance. The time and speed of seed germination, priming in KNO<sub>3</sub>, shows better results compared to other treatments [11]. Seeds of rape culture treated with osmopriming (in KNO<sub>3</sub> and NaCl) when grown in the field showed that salt priming, especially priming in KNO<sub>3</sub>, reduces germination time and increases the length of seedlings compared to untreated seeds [12]. Seed priming in K<sub>2</sub>SO<sub>4</sub> and KCl shows good potency for increasing germination, hatching, growth and yield of wheat grain [13].

**Materials and methods of research.** For our research, we used barley ("Tselinnaya" sort) which is more resistant to salinization in Kazakhstan. Before growing barley seeds were sterilized in 0, 5% solution of potassium permanganate (10 minutes). To determine the germination of barley seeds, samples of 100 seeds were taken, placed in Petri dishes on wet filter paper, and left at the temperature of 20-25°C in a thermostat for 12 hours. Sprouted seeds was daily counted and results recorded during 10 days, determined the number of sprouted grains, which will be an indicator of the percentage of germination of the tested seeds. All variants were carried out in 3 repetitions. Statistical processing of data groups was carried out in the application ANOVA. The significance of the differences was estimated by p-value ( $p \leq 0.05$ ).

*Method for determination of allantoin.* To 100 µl plants sample (in our case roots) add 100 µl 0.5 M NaOH and 200 µl bidistilled water and boil at 100°C for 8 minutes. Then cool to 0°C for 4-5 minutes. The cooled mixture is added 100 µl 0.65 M hydrochloric acid and boiled again at 100°C for 4 minutes. After cooling, 100 µl of 0.4 M phosphate (Na<sub>2</sub>HPO<sub>4</sub>-KH<sub>2</sub>PO<sub>4</sub>) buffer pH-7.0 and 100 µl of 18 mm phenylhydrazine are added to the mixture. Further, at 0°C temperature, 500 µl of concentrated hydrochloric acid is added to the mixture. For the development of staining, 100 µl of 50.6 mm K-FeCy (potassium ferricyanide) is added and left at room temperature for 15 minutes. To remove possible sediment centrifuged at room temperature 10 min at 10 000g. Measured absorption of transparent supernatant at 535 nm wavelength spectrophotometer [7].

**Research results.** We studied the effect of pre-sowing priming of barley seeds in increasing concentrations of mM solutions of NaCl, KNO<sub>3</sub>, Na<sub>2</sub>MoO<sub>4</sub>, KH<sub>2</sub>PO<sub>4</sub> and in diatomite suspension (variant 7 in

table 1). The suspension mixture was obtained by adding diatomite in an increasing ratio of 1g, 5g, 10g, 15g, 20g, 25g / per 100 ml of H<sub>2</sub>O.

Priming of seeds in these solutions was carried out for 24 hours at a temperature of 7°C in the dark. Then the seeds extracted from the solutions were washed several times with distilled water and left at room temperature until completely dried (another 24 hours). After drying, the seeds were grown at room temperature on filter paper moistened with distilled water and placed in Petri dishes. Initial untreated seeds and seeds after priming in distilled water (variants 5 and 6) served as germination controls. On the seventh day, the number of seedlings was counted (it should be noted that the seedlings in each variant were uneven in length). The results of these experiments are presented in table 1.

Table 1 – Effect of pre-sowing priming of barley seeds in different concentrations of mineral salt solutions and diatomite suspension (in g / 100 ml) on their germination

A salt solution for priming	Concentrations of salt solutions for priming, mM						
	0	25	50	75	100	125	150
NaCl	–	72%	74%	76%	76%	74%	70%
KNO <sub>3</sub>	–	72%	72%	76%	76%	75%	75%
Na <sub>2</sub> MoO <sub>4</sub>	–	72%	72%	73%	73%	69%	65%
KH <sub>2</sub> PO <sub>4</sub>	–	71%	72%	73%	73%	72%	70%
Water	71%	–	–	–	–	–	–
Seeds without priming (control)	64%	–	–	–	–	–	–
Suspension of diatomite	–	*1 g	*5 g	*10 g	*15 g	*20 g	*25 g
Germination (%)	–	73%	75%	78%	78%	78%	78%

As can be seen from table 1, compared with dry barley seeds (variant 6), their pre-sowing priming in distilled water significantly improved seed germination (variant 5). Priming seeds in solutions of these salts further increased their germination. Maximum seed germination was observed after priming in solutions of KNO<sub>3</sub> and NaCl in the range of their concentration of 75-100 mM. Priming in a suspension of diatomite containing above 10 g/100 ml H<sub>2</sub>O showed the highest germination of barley seeds. The effect of priming in solutions of molybdenum and phosphate on seed germination was insignificant.

Further, we conducted experiments to study the effect of pre-sowing priming of seeds in solutions of NaCl, nitrate, molybdenum, phosphate in combination with a suspension of diatomite on the growth and development of barley seedlings and the content of allantoin in the roots of 10-day seedlings (table 2).

Table 2 – Effect of pre-sowing priming on barley seeds in diatomite suspensions (DTM) containing salts of some biologically important elements on their germination and formation of allantoin in them

Pre-sowing seed processing	Germination medium	Number of germinated seeds, pieces	Average weight (mg) of one 10-day seedling	Allantoin content in the roots of 50 seedlings (mcg/g dry weight)
1	2	3	4	5
Seeds without pre-processing	Water	76%	253±0,34	5.6±0,21
	80 mM NaCl solution	49%	165±0,33	6.2±0,31
	80 mM NaCl solution + DTM	62%	221±0,25	6.7±0,15
Water	Water	70%	293±0,22	5.8±0,25
	80 mM NaCl solution	50%	178±0,44	6.8±0,31
	80 mM NaCl solution + DTM	72%	272±0,14	7.7±0,18
Suspension of diatomite (DTM)	Water	80%	298±0,15	6.9±0,35
	80 mM NaCl solution	62%	205±0,25	7.6±0,33
	80 mM NaCl solution + DTM	77%	273±0,34	8.2±0,12

Table 2 continuation				
1	2	3	4	5
75 mM KNO <sub>3</sub>	Water	76%	302±0,42	6.9±0,07
	80 mM NaCl solution	66%	208±0,31	8.8±0,09
	80 mM NaCl solution + DTM	75%	278±0,41	9.2±0,21
Suspension of DTM + 75 mM KNO <sub>3</sub>	Water	80%	321±0,21	7.1±0,34
	80 mM NaCl solution	68%	212±0,15	8.9±0,18
	80 mM NaCl solution + DTM	80%	282±0,18	10.4±0,20
75 mM Na <sub>2</sub> MoO <sub>4</sub>	Water	79%	318±0,17	7.0±0,31
	80 mM NaCl solution	57%	223±0,31	8.9±0,42
	80 mM NaCl solution + DTM	80%	273±0,14	9.2±0,44
DTM + 75 mM Na <sub>2</sub> MoO <sub>4</sub>	Water	80%	318±0,16	7.2±0,41
	80 mM NaCl solution	72%	232±0,18	9.0±0,32
	80 mM NaCl solution + DTM	79%	298±0,19	10.4±0,33
DTM + 75 mM Na <sub>2</sub> WO <sub>4</sub>	Water	75%	298±0,20	7.0±0,35
	80 mM NaCl solution	67%	226±0,24	7.9±0,36
	80 mM NaCl solution + DTM	76%	278±0,23	8.4±0,36
0.5 M KNO <sub>3</sub> + 75mM Na <sub>2</sub> MoO <sub>4</sub>	Water	83%	325±0,51	7.2±0,27
	80 mM NaCl solution	73%	253±0,41	9.2±0,27
	80 mM NaCl solution + DTM	82%	322±0,32	9.7±0,29
0.5 M KNO <sub>3</sub> + 75mM Na <sub>2</sub> WO <sub>4</sub>	Water	72%	320±0,34	7.0±0,12
	80 mM NaCl solution	65%	280±0,36	6.7±0,18
	80 mM NaCl solution + DTM	78%	312±0,12	7.2±0,31
75 mM KH <sub>2</sub> PO <sub>4</sub>	Water	79%	321±0,09	6.9±0,25
	80 mM NaCl solution	67%	275±0,10	9.5±0,17
	80 mM NaCl solution + DTM	80%	315±0,15	10.2±0,09
DTM + 0.5 M KNO <sub>3</sub> + 75 mM Na <sub>2</sub> MoO <sub>4</sub>	Water	83%	325±0,21	8.2±0,15
	80 mM NaCl solution	73%	283±0,28	18.2±0,19
	80 mM NaCl solution + DTM	82%	322±0,05	26.4±0,13
DTM +KNO <sub>3</sub> + Na <sub>2</sub> MoO <sub>4</sub> + KH <sub>2</sub> PO <sub>4</sub>	Water	84%	332±0,25	7.6±0,21
	80 mM NaCl solution	75%	268±0,31	18.6±0,22
	80 mM NaCl solution + DTM	83%	321±0,21	28.8±0,21
DTM + KNO <sub>3</sub> + Na <sub>2</sub> WO <sub>4</sub> + KH <sub>2</sub> PO <sub>4</sub>	Water	79%	320±0,23	7.0±0,25
	80 mM NaCl solution	71%	260±0,41	9.8±0,21
	80 mM NaCl solution + DTM	78%	315±0,35	11.3±0,26

\* Germinated seeds were weighed together with roots and leaves.

Thus, the results of our experiments show an increase in the germination of barley seeds after priming in aqueous solutions. A relatively high seed germination was observed after priming of the suspension of diatomite, containing molybdate, nitrate and phosphate. Accordingly, the mass of seedlings in these variants was greater. The maximum mass of seedlings was observed after priming in a nitrate-containing solution. Pre-sowing priming of seeds in aqueous solutions and cultivation in media containing NaCl and diatomite

significantly increases the content of allantoin in the roots of 10-day seedlings. Pre-sowing priming of barley seeds in diatomite suspensions containing nitrate, molybdenum and phosphate and growing them in a saline environment with diatomite dramatically (almost 3 times) increased the formation of allantoin in the roots of seedlings. However, pre-sowing priming of seeds in suspensions, in which tungstate was added instead of molybdenum, did not increase the formation of allantoin in the roots of seedlings under saline conditions. It is well known that the chemical analogue of molybdenum-tungsten is also easily embedded in the active center of molybdenum enzymes. However, in this case, the enzymes become inactive. As a result of the obtained results, it can be assumed that during pre-sowing priming in a solution of molybdenum and nitrate, the ions of these salts accumulate in barley seeds. During germination, these ions are transported from the seeds to the roots and leaves of the seedlings and activate the enzymes nitrate reductase (NR) and xanthine dehydrogenase (XDH). Nitrate reductase (NR) as an inducible enzyme is synthesized only in the presence of nitrate in the cell. As mentioned above, the combined actions of these enzymes lead to increased urate biosynthesis. Urate in conditions of oxidative stress is converted into allantoin, i.e. during salinization, urate molecules are oxidized by oxygen radicals to form allantoin. Since allantoin is also a strong antioxidant, we do not exclude its oxidation by radicals to form allantoic acid.

Currently, three of the four molybdenum-containing proteins are well studied in plants: xanthine dehydrogenase (XDH), nitrate reductase (NR), aldehyde oxidase (AO) and sulfite oxidase (SO). Nitrate assimilation is a fundamental process in the plant Kingdom and therefore the enzyme HP, which restores nitrate, is seen as a limiting factor in the growth, development, protein formation and final yield of plants. AO catalyzes the conversion of abscisic aldehyde to the corresponding phytohormone abscisic acid (ABA). It is known that adverse environmental factors cause the synthesis of phytohormone adaptation- ABA. For example, when the leaves of mesophytic plants are subjected to drought stress, within 4 hours, the level of ABA increases up to 50 times. Thus, ABA plays an important role in plant resistance to adverse environmental factors [14].

In all molybdenum-containing enzymes of plants, the main component in the active center is the so-called "molybdenum cofactor". The molybdenum atom binds to this cofactor i.e. the molybdenum-cofactor complex is directly involved in the catalytic reactions of these enzymes. However, the molybdenum factor is synthesized together with the apoenzyme molecule and it does not depend on the presence of molybdenum, i.e. in the absence of molybdenum, the place of this metal in the active center will be empty and the molybdenum-free enzymes lose their activity. Therefore, the lack of molybdenum in the growth medium leads to a decrease in the activity of these enzymes. Under *in vivo* conditions with a high concentration of tungsten, a chemical analogue of molybdenum, this metal easily replaces molybdenum in the active center and as a result these enzymes become inactive [15].

As mentioned above, adverse environmental conditions such as salinity, drought and cold cause oxidative stress, i.e. increased formation of reactive oxygen species (ROS). Molybdenum enzymes NR and XDH play an important role in ROS neutralization. When nitrate is reduced, NR uses NADH as an electron donor (after the reaction, NADH is converted to oxidized NAD<sup>+</sup>). In the enzymatic reaction, XDH uses NAD<sup>+</sup> as an electron acceptor. In other words, the more nitrate is assimilated, the more NAD<sup>+</sup> is formed and XDH activity increases, i.e. more antioxidants are formed-uric acid and allantoin. These antioxidants, restoring ROS, increase the resistance of plants to salinity [16]. It was convinced that fertilizing pea seedlings with nitrate as a source of nitrogen increases their salt resistance [17]. Thus, plant molybdenum enzymes play a key role in plant resistance to salinization. And their activity depends on the sufficiency of molybdenum in the soil. According to the results of long-term studies of the Institute of soil science of the Academy of Sciences of the Republic of Kazakhstan, the content of molybdenum in our soils is 3-5 times less than the critical concentration (0.1 mg Mo/kg for temperate soils) necessary for normal growth and development of plants. Therefore, pre-sowing saturation of plant seeds with molybdenum solution should provide plants with this metal for the entire period of growth and development.

Thus, pre-sowing treatment of plant seeds in a combination of diatomite suspension with solutions of biologically important elements dramatically increases the stability of seed germination in saline conditions. Pre-sowing seed treatment by priming is an environmentally friendly and cheap technology of pre-sowing seed treatment for saturation with important elements, which allows to do without fertilization on huge surface. This will provide the plants with important elements from the germination stage to full maturity.

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### АРПАНЫҢ ДӘНДЕРІН СЕБЕР АЛДЫНДА ӘРТҮРЛІ ТҰЗДАРДЫҢ ЕРІТІНДІЛЕРІНДЕ ДИАТОМИТТІ ПЕН БІРЛЕСЕ ПРАЙМИНГТЕУДІҢ ӨРКЕНДЕРДІҢ ТАМЫРЛАРЫНДАҒЫ АЛЛАНТОИННЫҢ МӨЛШЕРІНЕ ТҰЗДАНУ ЖАҒДАЙЫНДА ТИГІЗЕТІН ӘСЕРІ

**Аннотация.** Ауыл шаруашылығы дақылдарының қалыпты өсуі мен дамуы үшін тұқымдардың тез өсуі мен сіңірілуі үлкен маңызға ие, сондықтан тұқым праймингінің маңызы зор. Прайминг-тұқымдарды жылдам және бір мезгілде дамытуға, жақсы өнімге әкелетін жоғары өсу энергиясына қол жеткізу үшін тиімді технология. Бұл тұқымдарды өсіру үшін талап етілетін метаболикалық процестер басталғанша ішінара ылғалданған кезде оңай және арзан суландыру әдісі. Тұқымдар бастапқы құрғақ салмаққа дейін кептіріледі.

Біз арпа тұқымдарының праймингінің NaCl, KNO<sub>3</sub>, Na<sub>2</sub>MoO<sub>4</sub>, KH<sub>2</sub>PO<sub>4</sub> ерітінділерінің өсу концентрацияларындағы және диатомит суспензиясының әсері зерттелді (1-кестеде 7-нұсқа). Суспензиялық қоспаны диатомитті қосу кезінде 1 г, 5 г, 10 г, 15 г, 20 г, 25 г / 100 мл H<sub>2</sub>O өсу қатынасында алынған. Арпаның құрғақ тұқымдарымен салыстырғанда тазартылған судағы олардың алдын ала праймингі тұқымның өнуін едәуір жақсартты. Аталған тұздардың ерітінділеріндегі тұқым праймингі олардың өнгіштігін одан әрі арттыра түсті. 10 г / 100 мл H<sub>2</sub>O жоғары болатын диатомит суспензиясындағы Прайминг арпа тұқымдарының ең жоғары өнгіштігін көрсетті. Молибдат және фосфат ерітінділерінде тұқымдардың өнгіштігіне прайминг әсері шамалы болды.

Біздің тәжірибелеріміздің нәтижелері су ерітінділерінде праймингтен кейін арпа тұқымдарының өнуін көрсетеді. Тұқымдардың салыстырмалы түрде жоғары өнгіштігі молибдат, нитрат және фосфат бар диатомиттің суспензияларындағы олардың праймингінен кейін байқалды. Тиісінше, бұл нұсқаларда көптеген пайғамбарлар көп болды. Нитраты бар ерітіндіде праймингтен кейін өскіндердің ең көп массасы байқалды. Су ерітінділеріндегі тұқым праймингі және құрамында NaCl және диатомит бар орталарда өсіру 10 күндік өскіндердің тамырларында аллантоин мөлшерін едәуір арттырады. Құрамында нитрат, молибдат және фосфат бар диатомиттің суспензияларындағы арпа тұқымдарының себу алдындағы праймингі және оларды тұздалған ортада диатомитпен өсіру бірден (3 есе дерлік) өскіндердің тамырларында аллантоиннің түзілуін арттырды. Алайда, молибдаттың орнына вольфраматты қосқан суспензиялардағы тұқым праймингі тұздану жағдайында пайғамбарлардың тамырларында аллантоиннің түзілуін көтермеді. Молибден-вольфрамның химиялық аналогы молибдоферменттердің белсенді орталығына оңай кіретіні белгілі. Алайда, бұл жағдайда ферменттер белсенді емес. Алынған деректердің нәтижесінде молибдат пен нитрат ерітіндісінде прайминг алдында осы тұздардың ионы арпа тұқымында жиналады деп пайымдауға болады. Өсірілген кезде бұл иондар тұқымнан тамыр және өскін жапырақтарына тасымалданады және нитратредуктаза (НР) және ксантиндегидрогеназа (КДГ) ферменттерін белсендіреді. Нитратредуктаза (НР) индуцибельді фермент ретінде жасушадағы нитраттың қатысуымен синтезделінеді. Жоғарыда айтылғандай, бұл ферменттердің бірлескен әрекеттері ураттың жоғары биосинтезіне әкеледі. Тотығу стресс жағдайында Урат аллантоинге айналады, яғни. урат молекуласының тұздану кезінде аллантоиннің пайда болуымен оттегі радикалдары тотығады. Аллантоин күшті антиоксидант болғандықтан, біз аллантоин қышқылының пайда болуымен радикалдардың тотығуын да жоққа шығармаймыз.

Арпа тұқымдарының егу алдындағы праймингі диатомит суспензиясы биологиялық маңызды элементтердің ерітінділерімен бірге сортаңдану жағдайында тұқымның өсуінің тұрақтылығын күрт арттырады. Сортаңдану және әлеуетті антиоксидант – аллантоин құрамының жоғарылауы жағдайында тұқымдардың ең жоғары өнуі үшін проростоктардың тамырларында *in vivo* құрамында нитратредуктаза (НР) және тұздану жағдайында ксантиндегидрогеназа (КДГ) молибдені бар ферменттердің өзара әрекеттесуімен түсіндіріледі. Диатомиттің рөлін анықтау үшін одан әрі зерттеулер қажет.

Осылайша, биологиялық маңызды элементтердің ерітінділерімен диатомит суспензиясын біріктіріп өсімдік тұқымдарын себу алдында өңдеу тұздану жағдайында тұқымдардың өсуінің тұрақтылығын күрт арттырады. Прайминг әдісімен тұқымдарды себу алдында өңдеу маңызды элементтермен қанықтыру үшін тұқымдарды себу алдында өңдеудің экологиялық таза және арзан технологиясы болып табылады, бұл үлкен егіс алаңдарында тыңайтқыштарды енгізбестен айналып өтуге мүмкіндік береді. Бұл өсімдікті өсіру сатысынан толық жетілуге дейін маңызды элементтермен қамтамасыз етеді.

**Түйін сөздер:** арпа дәндері, аллантоин, себер алдындағы прайминг, нитратредуктаза, ксантиндегидрогеназа.

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### ЭФФЕКТ ПРЕДПОСЕВНОГО ПРАЙМИНГА СЕМЯН ЯЧМЕНЯ В РАСТВОРАХ РАЗЛИЧНЫХ СОЛЕЙ В КОМБИНАЦИИ С ДИАТОМИТОМ НА СОДЕРЖАНИЕ АЛЛАНТОИНА В КОРНЯХ ПРОРОСТКОВ В УСЛОВИЯХ ЗАСОЛЕНИЯ

**Аннотация.** Для нормального роста и развития сельскохозяйственных культур семян большое значение имеет быстрое прорастание и проклевывание, поэтому, предпосевной прайминг семян имеет важное значение. Прайминг является эффективной технологией для достижения быстрого и одновременного развития семян, высокой энергии роста, приводящей к хорошему урожаю. Это простой и дешевый метод замачивания, при котором семена частично увлажняются до того состояния, когда метаболические процессы, требуемые для прорастания уже начинаются, но прорастание еще не происходит. Семена высушиваются почти до первоначального сухого веса.

Нами было изучено влияние предпосевного прайминга семян ячменя в возрастающих концентрациях мМ растворов NaCl, KNO<sub>3</sub>, Na<sub>2</sub>MoO<sub>4</sub>, KН<sub>2</sub>PO<sub>4</sub> и в суспензии диатомита (вариант 7 в таблице 1). Суспензионную смесь получали при добавлении диатомита в возрастающем соотношении 1г, 5г, 10г, 15г, 20г, 25г / на 100мл H<sub>2</sub>O. По сравнению с сухими семенами ячменя их предпосевной прайминг в дистиллированной воде значительно улучшал всхожесть семян. Прайминг семян в растворах указанных солей еще больше повышал их всхожесть. Максимальная всхожесть семян наблюдалась после прайминга в растворах KNO<sub>3</sub> и NaCl в диапазоне их концентрации 75-100 мМ. Прайминг в суспензии диатомита, содержащих выше 10 г/100 мл H<sub>2</sub>O показал самую высокую всхожесть семян ячменя. Эффект прайминга в растворах молибдата и фосфата на всхожесть семян был незначительным.

Результаты наших экспериментов показывают повышение всхожести семян ячменя после прайминга в водных растворах. Относительно высокая всхожесть семян наблюдалась после их прайминга в суспензиях диатомита, содержащих молибдат, нитрат и фосфат. Соответственно, масса проростков в этих вариантах была больше. Максимальная масса проростков наблюдалась после прайминга в нитратсодержащем растворе. Предпосевной прайминг семян в водных растворах и выращивание в средах, содержащих NaCl и диатомит, значительно повышает содержание аллантаина в корнях 10-дневных проростках. Предпосевной прайминг семян ячменя в суспензиях диатомита, содержащих нитрат, молибдат и фосфат и выращивание их в засоленной среде с диатомитом резко (почти в 3 раза) повышало образование аллантаина в корнях проростков. Однако предпосевной прайминг семян в суспензиях, в которых вместо молибдата добавляли вольфрамат, не повышало образование аллантаина в корнях проростков в условиях засоления. Общеизвестно, что химический аналог молибдена - вольфрам также легко встраивается в активный центр молибдоферментов. Однако в этом случае ферменты становятся неактивными. В результате полученных данных можно полагать, что при предпосевном прайминге в растворе молибдата и нитрата ионы этих солей накапливаются в семенах ячменя. При прорастании эти ионы транспортируются из семян в корни и листья проростков и активируют ферменты нитратредуктазу (НР) и ксантиндегидрогеназу (КДГ). Нитратредуктаза (НР) как индуцибельный фермент синтезируется только в присутствии нитрата в клетке. Как было сказано выше, совместные действия этих ферментов приводят к повышенному биосинтезу урата. Урат в условиях окислительного стресса превращается в аллантаин, т.е. при засолении молекулы урата окисляются кислородными радикалами с образованием аллантаина. Поскольку аллантаин тоже является сильным антиоксидантом, мы не исключаем и его окисление радикалами с образованием аллантаиновой кислоты.

Предпосевной прайминг семян ячменя в комбинации суспензии диатомита с растворами биологически важных элементов резко повышает устойчивость прорастания семян в условиях засоления. Для максимальной всхожести семян в условиях засоления и повышения содержания потенциального антиоксиданта – аллантаина в корнях проростков объясняется *in vivo* взаимодействиями молибденсодержащих ферментов нитратредуктазы (НР) и ксантиндегидрогеназы (КДГ) в условиях засоления. Для выяснения роли диатомита требуются дальнейшие исследования.

Таким образом, предпосевная обработка семян растений в комбинации суспензии диатомита с растворами биологически важных элементов резко повышают устойчивость прорастания семян в условиях засоления. Предпосевная обработка семян методом прайминга представляет собой экологически чистый и дешевой технологией предпосевной обработкой семян для насыщения важными элементами, что позволяет обходиться без внесения удобрений на огромных посевных площадях. Это обеспечит растения важными элементами от стадии прорастания до полного созревания.

**Ключевые слова:** семена ячменя, аллантаин, предпосевной прайминг, нитратредуктаза, ксантиндегидрогеназа.

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## INFLUENCE OF NUTRITION COMPOSITIONS ON MICROCLONAL PROPAGATION DIFFERENT GENOTYPES OF THE WALNUT *JUGLANS REGIA L.*

**Abstract.** Walnut is one of the most common nuts in many countries of the world. It is used in cooking and in traditional medicine. Walnut cultivation on an industrial scale in Kazakhstan began only in 2016-2017, so Kazakhstan scientists in this field do not yet have any scientific experience.

The article presents the results of studies on the influence of the nutrient medium compositions Murashige-Skoog and Driver-Kunzhuki on the microclonal propagation of different genotypes of the walnut *Juglans regia L.* Two varieties were selected as mother plants: the Uzbek variety Ideal and the Chinese variety Liaoh-1, adapted in the southeast Kazakhstan. In the course of work, we compared the growth rate of walnut shoots of two varieties on nutrient media Murashige-Skoog (MS) and Driver-Kunzhuki (DKW) with a concentration of 6-benzylaminopurine (BAP) of 1 and 1.5 mg / l. After a month of cultivation of shoots, positive growth dynamics was observed only on MS medium. On plants of both varieties, the growth rate was slow on DKW medium, the plants had yellow leaves, some shoots blackened and perished. To obtain high-quality material, as well as to increase the growth rate of shoots, DKW medium was supplemented with FeEDDHA (119 mg / L) and phloroglucinol (50 mg / L).

As a result of phenological observations: the height of the main shoot, the number of internodes, the formation of additional shoots, and the state of the plants, it was found that the best nutrient medium for microclonal propagation of walnut Ideal and Liaoh-1 is a modified DKW medium. MS can only be used at the initial stage - an introduction to in vitro culture.

**Key words:** microclonal propagation, culture medium, MS, DKW, BAP, IMC, explants, microplants, FeEDDHA, phloroglucinol.

**Introduction.** Walnut *Juglans regia L.* is one of the most common nuts in many countries of the world. It has been known since ancient times for its nutritional and medicinal qualities. It contains a large amount of fats, proteins, minerals, vitamins A, C and group B.

Kazakhstan is located on the northernmost line of the nut growing range; therefore, walnut cultivation on an industrial scale is possible only in the South Kazakhstan, Zhambyl, Almaty and Kyzylorda regions. Walnut flowering in the Almaty region occurs during the period of return frosts in late spring. However, in Saryagash and Kazygurt districts, return frosts occur only one year out of ten, and in Panfilov and Uygur districts of the same Almaty region – two per decade. Therefore, here you can grow both European and Turkish, Chinese varieties of nuts [1]. Walnuts can be grown with seeds, as well as grafting. But these breeding methods cannot guarantee a uniform quality planting material [2]. Industrial cultivation of nuts in Kazakhstan began only in 2016-2017, therefore, Kazakhstan scientists in this field do not yet have any scientific developments. In the USA, China, Iran and some European countries, research has been ongoing for several decades on the microclonal propagation of walnut crops, in particular walnuts, and are successfully being introduced into the production of planting material [3].

This method of plant propagation is to obtain several thousand genetically identical plant microclones per year from one vegetative bud. Walnut in an in vitro tissue culture is a labor-intensive culture. One of the unresolved problems in walnut cultivations includes methods of accelerated reproduction. Microclonal

propagation of walnut is one such method. The results of research by a number of scientists [4–9] demonstrated the feasibility of using tissue culture for Paradox mass reproduction (*J. hindsii* x *J. regia*) and to apply this process on a larger scale to ensure commercial demand for walnut seedlings. They obtained good results on the microclonal propagation of walnuts using DKW growth medium with 1.0 mg / L benzyladenine (BA) and 0.001 mg / L Indolylbutyric acid (IBA).

Intensive walnut shoot proliferation rate was obtained using a modified MS nutrient medium with 1 mg / L BAP and 0.03 mg / L IBA [5-6]. Marques Silva et al. [7] obtained good results in accelerated shoot propagation using DKWC growth medium and 1 mg / L BAP. Navatel and Bourrain [8] used DKW medium with BA (0.2 mg / L) and IBA (0.05 mg / L) to obtain starting material for *in vitro* and further propagation. They increased the concentration of BAP to 1 mg / L and reduced the concentration of IBA to 0.01 mg / L.

Vahdati K. and others studied dwarf, early walnut genotypes, and DKW medium with 4.4  $\mu$ M BAP and 0.05  $\mu$ M IBA was used for microclonal propagation of shoots. In addition, they obtained good results in adaptation of walnut shoots *in vitro*. [9].

According to literature data, scientists K. Kepenek and Z. Kolagasi [10] from Turkey, Rodica Gotea [11] from Romania, as well as Ricardo J. Licea-Moreno [12] from Spain use two nutrient media for microclonal propagation of walnuts - Murashige-Skoog medium (Murashige and Skoog medium) [13] and Driver-Kunijuki Walnut medium [4] some scientists have used the WPM nutrient medium [14].

In particular, different varieties and forms of walnut behave differently on the same nutrient media. Therefore, for the industrial production of walnuts, optimization of nutrient media at all stages of microclonal propagation is required.

**Materials and methods.** Two varieties were selected as uterine plants: the Uzbek variety Ideal and the Chinese variety Liaohe-1. The Ideal variety has already established itself in Kazakhstan with high productivity, early maturity, stunting and increased frost resistance. The tree gives a good harvest: 120 kg (from a 12 year old plant). The average mass of the cores is 10 grams. Variety Liaohe-1 is just beginning to spread in Kazakhstan and has already shown itself as a promising variety for further propagation. This is a low-growing variety that does not need large areas. The fruits of the Liaohe-1 variety with an average weight of 20 g have a kernel yield of at least 50%, which is a high indicator.

The source material was taken from trees growing in open ground, visually free from disease, without frost damage, adapted in the conditions of southeast Kazakhstan (figure 1).



Figure 1 – Uterine Walnut Plant

The overgrown annual shoots were washed with soap in running water. Next, shoots were cut into segments 1.5 - 2 cm in size with 1 kidney. In a flask with a triclosan solution, the segments were incubated on a shaker-incubator at 200 rpm for 1 hour. Then it was washed under running water. Explants were sterilized under sterile conditions of a laminar box. Consistently: 30 seconds in 90% ethanol, 1.5-2 minutes in a 0.1% solution of a sterilizing agent, 10 minutes in 150 ml of sterile water with 2 drops of Tween-80, 2 times for 10 minutes in sterile water. At the end of sterilization, the explants were kept in a 0.3% solution of the ceftriaxone antibiotic before landing on culture media. As nutrient media, MS and DKW media with a concentration of BAP cytokinin in variations of 1 and 1.5 mg / L and auxin IMC at a concentration of 0.01 mg / L were selected (table 1). Before adding agar, the pH of the medium was adjusted to a value of 5.6. All media were autoclaved at 12 ° C for 20 minutes. Explants were cultivated in a light room under fluorescent lamps with a 16-hour lighting period at an air temperature of 24 - 25°C for one month.

Table 1 – The composition of nutrient media used for the propagation of walnuts

Components environment	The concentration in the medium, mg / l	
	Murasige and Skoog	DKW
NH <sub>4</sub> NO <sub>3</sub>	1650	1416
KNO <sub>3</sub>	1900	–
Ca(NO <sub>3</sub> ) <sub>2</sub> *4H <sub>2</sub> O	–	1968
CaCl <sub>2</sub> * 2H <sub>2</sub> O	440	149
MgSO <sub>4</sub> * 7H <sub>2</sub> O	370	740
KH <sub>2</sub> PO <sub>4</sub>	170	265
Na <sub>2</sub> EDTA * 2H <sub>2</sub> O	37,8	45.4
FeSO <sub>4</sub> * 7H <sub>2</sub> O	27,8	33.8
MnSO <sub>4</sub> * H <sub>2</sub> O	22,3	33.5
ZnSO <sub>4</sub> * 6 H <sub>2</sub> O	8,6	17
H <sub>3</sub> BO <sub>3</sub>	6,2	4.8
CuSO <sub>4</sub> * 5 H <sub>2</sub> O	0,025	0,25
Na <sub>2</sub> MoO <sub>4</sub> * 2 H <sub>2</sub> O	0,25	0,39
CoCl <sub>2</sub> * 2 H <sub>2</sub> O	0,025	–
KI	0,83	–
NiSO <sub>4</sub> * 6 H <sub>2</sub> O	–	0,005
Мезо-инозит	100,0	100,0
Никотиновая кислота (PP)	0,5	1,0
Тиамин-НCl (B1)	0,1	2,0
Пиридоксин-НCl	0,5	–
Глицин	2,0	2,0
Сахароза	30000	30000
Агар-агар	8000	9000
pH = 5,6		

**Results and discussion.** The introduction of walnut explants into the culture in vitro and the production of plant material is considered the main stage for the successful cultivation of walnuts. In this regard, the main goal of our study is to obtain a sterile source of plant material and their further microclonal propagation.

At the first stage of the study, pure microshoots from walnut buds were obtained. To do this, kidneys from two varieties of walnuts were planted on a nutrient medium DKW and Murashige-Skoog with the addition of 1.0 mg / l BAP and 0.01 mg / l IMC. On two nutrient media, the growth rate of the meristem was the same; for 4–6 weeks of active growth, the shoots were 1–2 cm in size (figure 2). To increase shoot growth, the concentration of BAP was increased by 1.5 mg / L. Then the plants were transplanted onto fresh nutrient media for propagation. Each passage lasted one month.



Figure 2 – Microplants of walnut after 4 weeks of cultivation from the date of introduction into culture in vitro

Observations of propagated material on nutrient media MS and DKW with BAP at a concentration of 1.5 mg / L showed a significant difference in the quality of the obtained microplants. On the DKW medium, after 4–6 weeks of cultivation, the walnut micro-plants of both varieties had a pale leaf color, which indicates a lack of iron — chlorosis. The increased concentration of BAP 1.5 mg / l also negatively affected the quality of the material: vitrification of plants, slow growth, blackening of leaves and growth points. No additional shoots were formed on all nutrient media. In the Lyaoh-1 variety on the Murashige-Skoog medium, the growth rate was much higher than in the Ideal variety.

According to the literature of the Spanish scientist Ricardo Julian Licea Moreno [12], in vitro iron deficiency in walnut plants can be compensated for with a more active form of iron chelate FeEDDHA, the growth of additional shoots can be achieved with the addition of phloroglucinol in the DKW nutrient medium.

Thus, FeEDDHA at a concentration of 119 mg / L and phloroglucinol at a concentration of 50 mg / L were added to optimize DKW growth media (table 2). Already in the first weeks of cultivation of microplants, improvements in the condition of plants were noticeable: the leaves were saturated in green, the size of the internodes doubled and, accordingly, the height of the main shoot, additional shoots appeared (figure 3)



Figure 3 – Walnut microplants a) Liaohe-1 cultivar and b) Ideal cultivar on modified DKW medium

Table 2 – Dynamics of microclonal propagation of walnut varieties Ideal and Liaohe-1 depending on the composition of nutrient media

Culture medium	Conc. BAP, mg /l	The initial number of plants, pcs.	Number of plants		The height of the main shoot, cm	Amount additional shoots, pcs.	Callus size, cm
			Passage I	Passage II			
Variety Ideal							
MS	1	20	24	29	1,5–2	–	1–1,5
	1,5	31	30	35	1,5–2	–	1–1,5
DKW	1	20	22	28	1,5–2	–	1–1,5
	1,5	23	20	24	1,5–2	–	1–1,5
DKW + FeEDDHA + phloroglucinol	1	25	38	55	3	2	1,5–2
	1,5	21	33	63	4–5	3	1,5–2
Variety Liaohe-1							
MS	1	21	34	51	2–3	–	1–1,5
	1,5	17	22	48	3–4	–	1,5–2
DKW	1	12	20	26	1,5–2	–	1–1,5
	1,5	15	19	23	2–3	–	1–1,5
DKW + FeEDDHA + phloroglucinol	1	22	30	43	3–4	2	1,5–2
	1,5	18	32	69	4–5	4	1,5–2

As can be seen from the table, according to the dynamics of growth and development of walnut, high results were obtained on a nutrient medium DKW + FeEDDHA + phloroglucinol. In the Ideal cultivar, the number of plants was 63, Liaohe-1 was 69, in both varieties the height of the main shoot was 5.0 cm and the number of additional shoots was Ideal-3, Liaohe – 4.

**Conclusion.** The data obtained as a result of research shows that the use of Murashige-Skoog nutrient medium with BAP cytokinin (1 mg / L) and IMA auxin (0.01 mg / L) is possible only for introduction into in vitro culture. DKW medium supplemented with FeEDDHA and phloroglucinol at a concentration of 119 and 50 mg / L, respectively, BAP (1.0 mg / L), IMA (0.01 mg / L), can be used in microclonal propagation of walnut varieties Ideal and Liaohe-1. The modified DKW medium leads to a significant increase in in vitro material not only due to an increase in the size of the main shoot, but also due to the formation of additional shoots.

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### ГРЕК ЖАҢҒАҒЫНЫҢ *JUGLANS REGIA* L. ӘРТҮРЛІ ГЕНОТИПТЕРІН МИКРОКЛОНДЫҚ КӨБЕЙТУГЕ ҚОРЕКТИК ОРТА ҚҰРАМЫНЫҢ ӘСЕРІ

**Аннотация.** Грек жаңғағы – әлемнің көптеген елдерінде ең көп таралған жаңғақтың түрі. Ол тағам ретінде және халық медицинасында кеңінен қолданылады. Қазақстан жаңғақтың өсу ареалының ең солтүстік аумағында орналасқан, сондықтан өнеркәсіптік масштабта жаңғақ өсіру тек Оңтүстік Қазақстан, Жамбыл, Алматы және Қызылорда облыстарында мүмкін. Алматы облысында грек жаңғағының гүлденуі көктемнің аязды кезеңінде болады. Алайда, Сарыағаш және Қазығұрт аудандарында қайтып келетін аяз оннан бір жылдың ішінде, ал сол Алматы облысының Панфилов және Ұйғыр аудандарында - он жылда екі рет болуы

мүмкін. Сондықтан, мұнда жаңғақтардың еуропалық және түрік, қытай сорттарын өсіруге болады. Қазақстанда грек жаңғағын өнеркәсіптік ауқымда өсіру тек 2016-2017 жылдардан бастап қолға алынды, сондықтан елімізде грек жаңғағын биотехнологиялық жолмен өсіру туралы ғылыми әзірлемелер жоқ.

Мақалада Мурасиге-Скуг және Драйвер-Кунжуки қоректік орталар құрамының грек жаңғағының *Juglans regia L.* әртүрлі генотиптерін микроклонды көбейту жағдайына тигізетін әсерін зеттеудің нәтижелері ұсынылған.

Бастапқы материал ретінде грек жаңғағының екі сорты алынды: өзбекстандық сорт Идеал және қытайлық сорт Ляхоэ-1. Идеал сорты Қазақстанда жоғары өнімділігімен, ерте пісіп жетілуімен, аязға төзімділігімен ережеленеді. Өнімділігі өте жоғары: 120 кг (12 жылдық өсімдіктен). Жемістердің орташа салмағы 10 грамм. Ляхоэ-1 Қазақстанда енді ғана тарала бастаған жаңа сорт болса да өзін әрі қарай көбейтуді қажет ететін перспективалық сорт ретінде көрсетті. Бұл үлкен аумақтарды қажет етпейтін, аласа өсетін сорт. Ляхоэ-1 сортының жемістерінің орташа салмағы 20 г, ядро шығымдылығы 50% -дан кем емес, бұл жоғары көрсеткіш.

*In vitro* жағдайына енгізуге қажетті материалды Қазақстанның оңтүстік шығысына бейімделген, ашық танапта өсіп тұрған ағаштардан көзге көрінетін аурулары жоқ, үсікке шалдықпаған бұтақтары алынды. Экспланттарды зарарсыздандыру ламинар-бокс жағдайында жүргізілді. Зарарсыздандыру осы ретпен жүргізілді: 30 сек 90% этанолда шайылды, 1,5-2 мин 0,1% зарарсыздандыратын ерітіндіде жуылып, 10 мин 150 мл 2 тамшы Твин-80 қосылғын зарарсыздандырылған суда сосын 2 рет 10 минуттан зарарсыздандырылған суда шайылды. Зарарсыздандырудың соңында эксплантты отырғызар алдында цефтриаксон антибиотигінің 0,3% ерітіндісінде ұсталды. Қоректік орта ретінде цитокинин БАП 1 және 1,5 мг/л концентрациясы және ауксин ИМК 0,01 мг/л концентрациясы қосылғын MS және DKW қоректік орталары алынды. Агар қосаардын алдында қоректік ортаның рН қорсеткіші 5,6 жеткізілді. Қоректік орталар 121°C температурада 20 мин уақыт бойы автоклавта зарарсыздандырылды. Экспланттар жарық бөлмесінде люминесцентті лампаның астында 16 сағат жарықта, ауа температурасы 24 – 25°C жағдайда бір ай уақыт бойы өсірілді.

Грек жаңғағының экспланттарын *in vitro* жағдайына енгізу және зарарсыздандырылған өсімдік материалын алу грек жаңғағын ары қарай өсірудің алғашқы кезеңі болып табылады. Осыған байланысты біздің зерттеуіміздің негізгі мақсаты – микроклондық көбейтуге қажетті бастапқы зарарсыздандырылған өсімдік материалын алу. Зерттеудің алқашқы кезеңінде грек жаңғағының бүршіктеінен таза өркендер алынды. Ол үшін грек жаңғағының екі сортынан алынған бүршіктер БАП 1, мг/л және 0,01 мг/л ИМК қосылған Мурасиге-Скуг, DKW қоректік орталарына отырғызылды. Екі қоректік ортада да меристемалардың өсу қарқындылығы бірдей деңгейде болды. Белсенді өсудің 4-6 аптасынан кейін өркендердің биіктігі 1-2 см болды. Келесі тәжірибеде өркендердің бойының биіктігін арттыру мақсатында БАП концентрациясы 1,5 мг/л көбейтілді. Өсірудің бір ай уақытынан соң өркендер өсуі тек MS қоректік ортасында байқалды. DKW қоректік ортасында екі сорттың өсімдіктерінің де жапырақтары сарғыш түсті болып, өркендері қарайып, тіршілігін жойды. Сапалы отырғызу материалын алу және өркендердің өсу жылдамдығын арттыру мақсатында DKW қоректік ортасы FeEDDHA (119 мг/л) және флороглюцинол (50 мг/л) қосу арқылы оңтайландырылды.

Фенологиялық бақылаулар нәтижесінде: негізгі сабақтың ұзындығы, қосымша өркендердің түзілуі, буынаралықтар саны және өсімдіктің өсу жағдайы бойынша, грек жаңғағын Идеал және Ляхоэ-1 сорттарын микроклондық көбейтуге ең қолайлы қоректік орта болып модификацияланған DKW қоректік ортасы анықталды. MS қоректік ортасын экспланттарды *in vitro* жағдайына енгізу кезінде пайдалануға болатыны ұсынылды.

**Түйін сөздер:** микроклондық көбейту, қоректік орта, MS, DKW, БАП, ИМК, экспланттар, микроөсімдіктер, FeEDDHA, флороглюцинол.

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## ВЛИЯНИЕ СОСТАВОВ ПИТАТЕЛЬНЫХ СРЕД НА МИКРОКЛОНОЛЬНОЕ РАЗМНОЖЕНИЕ РАЗНЫХ ГЕНОТИПОВ ГРЕЦКОГО ОРЕХА *JUGLANS REGIA L.*

**Аннотация.** Грецкий орех – один из самых распространенных орехов во многих странах мира. Грецкий орех применяется в кулинарии и в народной медицине. Казахстан находится на самой северной линии ареала произрастания орехов, поэтому выращивание грецкого ореха в промышленных масштабах возможно только в Южно-Казахстанской, Жамбылской, Алматинской и Кызылординской областях. Цветение ореха в Алматинской области приходится на период возвратных заморозков в конце весны. Однако в Сарыагашском и Казыгуртском районах возвратные заморозки случаются всего лишь один год из десяти, а в Панфиловском и

Уйгурском районах той же Алматинской области – два на десятилетие. Поэтому здесь можно выращивать как европейские, так и турецкие, китайские сорта орехов.

Выращивание грецкого ореха в промышленных масштабах в Казахстане началось лишь в 2016-2017 гг., поэтому научных работ по биотехнологическому размножению грецкого ореха у казахстанских ученых пока нет.

В статье изложены результаты исследований влияния составов питательных сред Мурасиге-Скуга и Драйвер-Кунжуки на микрклональное размножение разных генотипов грецкого ореха *Juglans regia L.*

В качестве маточных растений выбраны два сорта: узбекский сорт Идеал и китайский сорт Ляохэ-1. Сорт Идеал уже зарекомендовал себя в Казахстане высокой урожайностью, скороспелостью, низкорослостью и повышенной морозостойчивостью. Дерево дает хороший урожай: 120 кг (с 12 летнего растения). Средняя масса ядер – 10 грамм. Сорт Ляохэ-1 только начинает распространение в Казахстане и уже показал себя как перспективный сорт для дальнейшего размножения. Это слаборослый сорт, не нуждающийся в больших площадях. Плоды сорта Ляохэ-1 при средней массе 20 г имеют выход ядра не менее 50%, что является высоким показателем.

Исходный материал для *in vitro* брали с деревьев, растущих в открытом грунте, визуально свободных от болезней, без морозных повреждений, адаптированных в условиях юго-востока Казахстана.

Стерилизацию эксплантов проводили в стерильных условиях ламинар-бокса. Последовательно: 30 сек в 90% этаноле, 1,5-2 мин в 0,1% растворе стерилизующего агента, 10 мин в 150 мл стерильной воды с 2 каплями Твин-80, 2 раза по 10 мин в стерильной воде. В конце стерилизации перед посадкой на питательные среды экспланты выдерживались в 0,3% растворе антибиотика цефтриаксон. В качестве питательных сред выбраны среды MS и DKW с концентрацией цитокинина БАП в вариациях 1 и 1,5 мг/л и ауксина ИМК в концентрации 0,01 мг/л. Перед добавлением агара pH среды доводили до значения 5,6. Все среды автоклавировались при 121°C в течение 20 мин. Экспланты культивировали в световой комнате под люми-несцентными лампами с 16 часовым периодом освещения при температуре воздуха 24 – 25°C в течение одного месяца.

Введение в культуру *in vitro* эксплантов грецкого ореха и получение растительного материала считается основным этапом для успешного культивирования грецкого ореха. В связи с этим основная цель нашего исследования – получение стерильного исходного растительного материала и дальнейшее их микрклональное размножение. На первом этапе исследований получены чистые микропобеги из почек грецкого ореха. Для этого почки из двух сортов грецкого ореха были посажены на питательную среду DKW и Мурасиге-Скуга с добавлением 1,0 мг/л БАП и 0,01 мг/л ИМК. На двух питательных средах скорость роста меристемы были одинаковы, за 4 – 6 недель активного роста побеги имели размеры 1 – 2 см. Для увеличения роста побегов концентрация БАП было увеличено на 1,5 мг/л. Далее растения пересаживались на свежие питательные среды для размножения. Каждый пассаж длился один месяц. В ходе работы сравнивали интенсивность роста побегов грецкого ореха двух сортов на питательных средах Мурасиге-Скуга (MS) и Драйвер-Кунжуки (DKW) с концентрацией 6-бензиламинопурина (БАП) 1 и 1,5 мг/л. Через месяц культивирования побегов положительная динамика роста наблюдалась только на среде MS. На среде DKW у растений обоих сортов скорость роста была медленной, растения имели желтый цвет листьев, некоторые побеги чернели и погибали. Для получения качественного материала, а также увеличения скорости роста побегов среда DKW была дополнена FeEDDHA (119 мг/л) и флороглюцинолом (50 мг/л).

В результате фенологических наблюдений: высота основного побега, образование дополнительных побегов, количество междоузлий и по состоянию растений установлено, что лучшей питательной средой для микрклонального размножения грецкого ореха Идеал и Ляохэ-1 является модифицированная среда DKW. Среду MS можно использовать только на начальном этапе – введении в культуру *in vitro*.

**Ключевые слова:** микрклональное размножение, питательная среда, MS, DKW, БАП, ИМК, экспланты, микрорастения, FeEDDHA, флороглюцинол.

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E-mail: viktoryagmirya@ukr.net**LEGAL PRINCIPLES OF RURAL MEDICINE DEVELOPMENT  
IN THE CONTEXT OF MEDICAL REFORM IN UKRAINE**

**Abstract.** Legal support for the constitutional right of citizens to health care and medical care is an important condition for the realization of the principle of recognition the individual on the highest social value. The state guarantees everyone the right to protection of health, medical care and medical insurance; creates the conditions for effective and affordable medical care for all citizens. At the same time, the low level of provision of modern medical equipment, machinery and medicines makes it virtually impossible to provide timely and high-quality medical services in rural areas. The quality of primary health care in rural areas is in terrible condition and the people who live there, and this is more than 30 % of the total population of Ukraine, were very looking forward to changes in this area. After all, most of the old buildings and medical equipment are in poor condition. Medical institutions do not have a complete set of equipment, medical supplies and equipment necessary for primary care. The state of the legal regulation of providing medical care to the rural population of Ukraine objectively needs to be improved. Despite the adoption of numerous normative legal acts, the issues of providing health facilities located in rural areas with the necessary modern equipment and technology remained unresolved until recently.

The goal of the article is to investigate the current problems of the legal support for providing medical care in the rural settlements. Particular attention is paid to the reform of the network of the rural health facilities and the problems of staffing.

According to the results of the study it is established that from January 1, 2018, the implementation of the rural health reform began in Ukraine. This was due to the need to improve the availability of medical services for the population living in rural areas, to increase the efficiency and effectiveness of the use of funds allocated for the development of health care in the village, to bring the network of healthcare institutions in rural areas and their material and technical support into line with the needs of the population. Rural medicine reform is the lengthy process that requires not only careful adherence to legislation, but also a preliminary assessment of the real state of medicine in the remotest corners of Ukraine in order to prepare a platform for change. It is determined that the implementation of medical reform in cities is perceived better, and therefore much faster is happening, what not to say about the countryside. The prompt and timely solution of the problems of reforming rural medicine is possible with the assistance of the state authorities and local self-government, domestic businesses, foreign investors and financial donors, without which it is extremely difficult to cope with decentralization.

**Key words:** medical reform, rural medicine, health care, medical care, rural social development.

**Introduction.** The state guarantees everyone the right to health care, medical care and health insurance; creates conditions for effective and accessible health care for all citizens (Article 49 of the Constitution of Ukraine). At the same time, in 1983, the World Medical Association established that the rural population has the same rights to receive medical care as residents of cities. Although there may be economic and other factors affecting the number of health services available in rural areas, then there should be no difference in their quality [1]. In Ukraine, the availability and quality of health care in rural areas have always been lower than in comparison to the similar assistance received by the city residents. Territorial remoteness from health care facilities, difficulties with transport services, and the mismatch between the logistical base of the rural health care facilities and the modern requirements – all these circumstances create insurmountable obstacles to obtain medical services in the rural areas.

In this regard, the reform of medicine in general and rural medicine in particular has become a pressing issue. The conditions in which the medicine functioned were absolutely unacceptable, starting with the quality of health care and ending with the motivation of the healthcare provider. Previous reforms in the field of health care have not produced the desired result due to the fact that they were inconsistent, mostly fragmented, in general, without changing the outdated system of health care since the time of the planned economy, which made it impossible to adapt it to market relations [2, p. 108].

Since 2018, rural health reform has been implemented in Ukraine, arising by the requirement to improve the availability of health care to the rural population, increase the efficiency and effectiveness of spending on rural health development, and in line with the network of rural health facilities and their logistics to the needs of the population.

**Analysis of recent researches and publications.** Among scientific research dedicated to the research of social problems of rural development should be allocated leading scientists working in the field of agricultural law, such as: V.M. Yermolenko, M.I. Kozyr, O.O. Pogribniy, V.I. Semchyk, A.M. Stativka, N.I. Titova, V.Yu. Urkevich, V.Z. Yanchuk. However, the legal problems of peasants' access to medical care are poorly researched, which determines the relevance of the chosen topic of the article.

The **purpose** of the article is to investigate the current problems of the legal support for the provision of health care in the rural settlements. Particular attention is paid to the reform of the network of rural health facilities and the problems of staff.

**Main results of the study.** The low level of availability of modern medical equipment, automotive equipment and medicines makes it practically impossible to provide timely and high-quality medical and preventive services in the countryside. The quality of primary care in rural areas is in a terrible state and the people live there, more than 30 % of the total population of Ukraine, expect changes in this area. After all, the vast majority of the old facilities and medical equipment are low level. Health facilities do not have the full set of equipment, medical supplies and supplies required to provide primary care.

Despite the adoption of numerous regulations, the issue of providing rural health facilities with the necessary modern equipment and technology has not been solved until recently.

In 2017, the Verkhovna Rada of Ukraine has initiated a medical reform and adopted the Law of Ukraine On Improving the Accessibility and Quality of Rural Health Care, which defined the legal, economic and organizational principles and directions of regulation of rural health care development to ensure guarantees of equal treatment, access of peasants to quality and effective health care. In 2017–2018 years 5 billion UAH were allocated for reform of rural medicine, aimed for building new modern medical dispensaries in the rural areas and developing transport infrastructure. The State Budget for 2019 provides another 1 billion UAH in subsidies to local budgets for the implementation of measures aimed at developing the health care system in the rural areas. This money should be spent on the construction of the new medical facilities, equipment for doctors' offices, the purchase of transport and the construction of roads from remote villages to hospitals.

The state has committed itself for ensuring performing of measures to improve the availability and the quality of health care in the rural areas in the following areas: bringing quality healthcare to the public by facilitating the development of health care facilities of all types of ownership in the rural areas, improving the health care network; introduction of the modern technologies for health care in the rural areas, in particular using telemedicine; development and implementation of the rural health programs; introduction of effective mechanisms for involvement of the qualified medical and pharmaceutical workers in the rural areas; development of the transport infrastructure to provide timely medical assistance in rural areas; attraction of investments in the development of health care in rural areas, etc. (Article 4 of the Law of Ukraine On enhancing the availability and quality of health care in rural areas). This is exactly how rural medicine should look like starting from 2018.

The Law of Ukraine On the Priority of Social Development of the Village and the agroindustrial Complex in Agriculture stipulates that the village is favored over the city (per capita) in the construction of educational, cultural, sports and health care facilities (Art. 8), however, rural residents are constantly experiencing restrictions on access to health care services. This is primarily due to the scarcity of the network of relevant health facilities in the rural areas.

At the legislative level, it is ensured that the network of public and communal health care institutions is formed taking into account the needs of the population in health care, the need to ensure the proper quality

of such care, timeliness, accessibility for citizens, efficient use of material, labor and financial resources (Article 16 of the Law Ukraine Fundamentals of the legislation of Ukraine on health care). But the statistics showed otherwise, in particular, the provision of medical and obstetric points in 2010 amounted to only 2 %, dispensaries – 52.5 %, outpatient clinics – 12.1 %, pharmacies – 9.7 % [3, p. 516].

The absence in the villages of medical stations, dispensaries, pharmacies, medical centers and obstetric centers is one of the negative factors that «push» the population out of settlements, increasing the rate of migration [4, p. 244]. Despite the prohibition on the reduction of the existing network of medical institutions (Article 49 of the Constitution of Ukraine and Article 16 of the Law of Ukraine Fundamentals of the legislation of Ukraine on health care), a number of measures aimed at reducing the number of health care facilities located in the countryside and their hospital beds.

The National Program for the Development of Primary Health Care on the Basis of Family Medicine for the Period up to 2011, approved by the Law of Ukraine of January 22, 2010, indicated the requirement to continue the work on creating a network of family medicine outpatient clinics in the rural areas through reorganization health. The State Goal Program for the Development of the Ukrainian Village, approved by the Cabinet of Ministers of Ukraine on September 19, 2007 No.1158, envisaged the restructuring of the network of primary medical (health care) facilities with the introduction of paramedics and obstetricians' points as the part of the rural medical units (item 7, Article II). This approach of the legislator has created the conditions for the destruction of the existing network of the rural health care facilities. It is a well-known fact that a district hospital with the nine and day clinic for 20 persons was closed in the village of Mykolaivka-1 in Dnipropetrovs'k region, which serviced more than 7,000 residents of this village and surrounding villages. The outpatient clinic for family medicine was created instead of the hospital. In this regard, the closest to the village hospital with the nine and day clinic was allocated 70 km away [5].

An analysis of the legislation in this area, which was in force until 2017, evidences about the gradual tendency to reduce the mandatory number of the health facilities in the rural areas. Thus, by the Decree of the President of Ukraine On Comprehensive Measures to Improve Health Care for Rural Population for 2002–2005 of January 3, 2002, No. 8, it was envisaged to continue the establishment of the general practice dispensaries in the rural settlements with more than 1 thousand people – family medicine (p. 4). That is, according to this normative legal act, for every 1 thousand rural population 1 outpatient clinic should operate. But the Order of the Ministry of Health of Ukraine dated September 10, 2013 No. 793 established a standard of provision for outpatient clinics for rural population, which determines the proportion between the number of the rural population and the number of outpatient clinics and specifies the minimum required number of outpatients per 10 thousand rural population:  $NAmbC = 3,3$ . For comparison in the European countries, the availability of health facilities is 4.9 per 10 thousand people, regardless of the city or village [6].

Thus, even adherence to the said standard did not ensure access of the rural people to health care at an adequate level.

In addition, not only the construction but also the repair of medical facilities were carried out in the rural areas. According to the envisaged by the State Goal Program for the Development of the Ukrainian Village for the period up to 2015, projected indicators for the construction, reconstruction and repair of 1,9 thousand medical dispensaries and 5,4 thousand medical and obstetric points, 10 physician and obstetric units during 2008–2011 that were affected by the flood in 2008 in Chernivtsi region were put into operation [7, p.9].

Thus, it was a hidden liquidation of the network of health care facilities in the rural areas. According to the State Statistics Service of Ukraine, as of 2015 (since 2000), the number of hospitals (with beds) has decreased more than 12 times (from 1007 to 74), self-contained outpatient clinics and clinics more than 4 times (from 2321 to 525), paramedics and obstetric points – by almost 3000 (from 16113 to 13205) [8]. In order to stop this process, the Law of Ukraine of February 23, 2014 introduced a moratorium on the liquidation and reorganization of healthcare facilities. But it was soon found invalid. That is to say, contrary to the law, the right of rural residents to health continued to be violated.

In accordance with resolution WHA 62.12 Health Assembly Primary Health Care, including the strengthening of the health system and other relevant resolutions the secretariat of the World Health Organization has developed a framework for integrated, socially-oriented health services. It provides for the necessity of reforms with a view to reorienting health services so that they were completely focused on the needs of individuals, families, careers and communities and receive support from responsive services that

more fully meet their needs and would coordinate their work within the framework of the health sector and beyond, regardless of the context or status of development of the country [2, p. 107].

Approaching quality healthcare to the public by facilitating the development of health care facilities of all types of ownership in the rural areas, improving the network of the health care facilities, including primary health care centers, and the material and technical base of such facilities are one of the measures to increase accessibility and quality of health care in rural areas in the context of medical reform (Article 4 of the Law of Ukraine «On enhancing the availability and quality of health care in the rural areas»).

The Ministry of Health of Ukraine, together with the Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine, developed and approved the Order of Formation of Capable Primary Care Assistance Networks of February 6, 2018 No. 178/24, which defined the mechanism and conditions for the formation of capable supply networks primary care as well as the procedure for developing and approving a plan for a capable primary care network. The capable primary care network provides an organizationally integrated set of health care facilities (primary care providers) capable of providing quality, comprehensive, continuous and patient-centered primary care in accordance with the socio-demographic characteristics of the population, planning territory. By early 2019, the co-operative network of rural primary care facilities across Ukraine was established in conjunction with the regions, numbering just over 4,200 institutions, as well as technical requirements for the types of premises concerned.

Significant changes also take place in the structure of the rural health care network. Previously, it was formed within the administrative district on an inter-community basis. It consisted of a central district hospital, district and district hospitals, medical dispensaries, as well as medical and obstetric and paramedical points, central district pharmacies, general-purpose pharmacies, pharmacy kiosks and pharmacy points I and II groups (item 5.4. Order of the Ministry of Construction and Architecture of Ukraine Planning and Construction of Rural Settlements DBN B.2.4-1-94 dated January 5, 1994 No. 6).

Today, the provision of medical assistance to the population should be based on the priority development of primary care on the basis of family medicine. Primary health care is provided by the health care institutions and individuals – entrepreneurs who have been licensed in the manner prescribed by law. Primary care is provided by the general practitioners – family doctors, doctors of other specialties and other medical professionals who work under their direction (Article 35-1 of the Law of Ukraine On Fundamentals of the Legislation of Ukraine on Health Care). Rural health care is provided by healthcare facilities, including central district hospitals, primary care centers, paramedics, outpatient clinics, medical centers, medical offices, mobile medical offices etc.

In villages with more than 15,000 people are envisaged primary care centers (type «C») with house family doctors, therapists, pediatricians and nurses. Primary care services, laboratory testing and instrumental examinations will be provided here. In the villages with a population of 3 thousand people Group practice outpatient clinics (type «AG») will be established. At least two doctors must be admitted here and undergo the same diagnosis as at the Primary Care Center. Where approximately 1.5 thousand people live, there will be Mono-Practice Outpatient Clinics (type «AM») where only one doctor will be admitted daily. Another type of healthcare facility is a Health Center (a type of «software»). Such points will be in small villages with a population of less than 750 people. Nurses and paramedics will be served at the health center. Also on the days of your doctor's visit it will be possible to make a diagnosis of diseases. The doctor should come at least twice a week. Where it is unprofitable to build health centers, the local authority must arrange transport that will go to the medical institution at least four times a day (paragraph 3 of the 3rd Order of the Ministry of Health of Ukraine, Ministry of Regional Development, Construction and Housing and Communal Services Economy of Ukraine On Approval of the Procedure for Formation of Capable Primary Care Assistance Networks dated February 6, 2018 No. 178/24).

In 2018–2019 it was planned by the Government of Ukraine to build 517 rural health facilities with the purchase of new medical equipment. At the initial stage of construction, there are 300 outpatient clinics, leading the Kirovograd region, which already has 10 new healthcare facilities. Dnipropetrovsk, Donetsk, Luhansk, Mykolaiv, Rivne, Kharkiv and Khmelnytsky regions are recognized by leaders by volume of construction [9].

Another crucial issue for rural medicine reform is staff. After all, the formation of a network is possible only with its clear provision of medical staff. In Ukraine, there has been a catastrophic situation with the provision of rural settlements to doctors, which is primarily due to the aging of the staff of rural doctors.

Rural youth, even after graduating from medical institutions of higher education and having received appropriate education, does not hurry to return to the village. Given the physicians' earnings in rural areas, living conditions and working conditions, young professionals categorically refuse to be allocated to the rural medicine. The number of full-time positions of primary care physicians is often lower than the normative one, with a staffing level of 76.6 %. The burden on primary care physicians in rural areas in some places reaches 5–6 thousand of the attached population [6]. In order to encourage young professionals to work in rural areas, the decision of the Ministry of Health Board of Ukraine of April 29, 2010 «The current state, reform and further development of primary health care» was scheduled to amend by July 1, 2010 to the Resolution of the Cabinet of Ministers of Ukraine of September 26, 2006 No. 1361 «On providing one-time financial assistance to certain categories of graduates of higher educational establishments» concerning the classification of graduates of higher medical educational establishments who are directed to work in the countryside, in the list of graduates who provided one-time financial assistance to five times the minimum wage (para. 3.1.2). The implementation of this clause remained on paper.

With the start of the rural health reform in 2017, the Government of Ukraine has put in place effective mechanisms for attracting qualified medical and pharmaceutical workers to rural health care. In particular, additional pay guarantees and appropriate working conditions are created for such employees, including provision of necessary medical equipment and special transport, motivational packages are developed and implemented, including providing housing, transport, mobile communication, preferential (mortgage) loans for construction or purchase of housing, compensation for housing and communal services and energy, other promotional activities, as well as the continued promotion of professional knowledge and practical skills of these workers (Article 4 of the Law of Ukraine On improving the availability and quality of health services in the rural areas).

The availability of motor transport is of particular importance for ensuring that primary health care is adequately accessible to the rural residents. According to this indicator, there are significant interregional differences: from 5.2 vehicles per 10 thousand rural population in Kharkiv region to 1.3 cars in Ternopil, Ivano-Frankivsk and Rivne regions. According to the data from Ministry of Health of Ukraine, the primary care fleet is worn out by 80 % or more in all regions [6]. In such circumstances, there is a doubtful possibility to observe the standard of arrival of emergency (ambulance) brigades to the location at the applications belonging to the category of emergency, which is in settlements outside the city – within 20 minutes from the moment of the application to the dispatcher of the operational-dispatching service of the center emergency and disaster medicine. Taking into account meteorological conditions, seasonal features, epidemiological situation and road conditions, the specified standard may be exceeded, but not more than 10 minutes (clause 2 clause 1 of the Cabinet of Ministers of Ukraine Decree «On the standard of arrival of emergency (ambulance) brigades for venue» dated November 21, 2012 No. 1119).

Development of the transport infrastructure, creation of conditions for use of aviation, water, automobile special and specialized sanitary vehicles, including those equipped with resuscitation, for rendering medical aid in rural areas – is one of the directions of medical reform in the rural areas.

It is envisaged the purchase of the business transport for doctors – for simplification of logistics, timely arrival on call to the patient home and so on as the general European practice. The doctor does not have to wait, the residents will come to his clinic for an appointment. It sets the admission schedule not only in the dispensary but also in its controlled settlements. In order to implement this area of rural medicine reform in 2019, UAH 0.26 billion was allocated for the purchase of 514 units of official transport [10].

Another innovation is telemedicine. Very often in the rural areas, distance and time are critical factors for primary care. In this regard, the Law of Ukraine «On Improving the Availability and Quality of Rural Health Care» provides for the introduction of modern technologies for rural health care, in particular the use of telemedicine, and the provision of adequate resources (telemedicine consulting, telemedicine consultancy, telemetry and home teleconsulting). In the near future, telemedicine is to be launched in rural dispensaries of Kirovograd, Kharkiv, Vinnytsia, Dnipropetrovsk and Poltava regions [11].

**Conclusions.** New institutional conditions for the functioning of the health system require the development of the health system based on the development of new ideas, legal norms, regulatory procedures and the mechanisms that implement them, and, on the whole, qualitative systemic transformations of the health sector [12, p.90].

On January 1, 2018, rural health reform has begun in Ukraine. It is too early to talk about certain results. But, as practice shows, the transition period is the most difficult. Experience has shown that the implementation of medical reform in cities is perceived better, and so much faster is happening, except the countryside.

Since the adoption of the Law of Ukraine «On Improving the Availability and Quality of Rural Health Care» in 2017 only 10 rural dispensaries were commissioned from 517 promised by the authorities. In 190 rural dispensaries from the 517 planned, construction has not even begun. Today in Ukraine there are 4 thousand rural dispensaries and 13 thousand rural obstetric and obstetric points: 80 % of them are in an emergency state, 71 % of them have no water supply, 75 % have no drainage [13]. Instead of giving social guarantees to rural doctors, the authorities provide informational textbooks to the regions of Ukraine – a technical task for the introduction of telemedicine in rural dispensaries.

The experience of the foreign countries shows that reforming the medical sector is the lengthy process that requires not only careful adherence to legal requirements, but also a preliminary assessment of the real state of medicine in the remotest corners of Ukraine in order to prepare a platform for change. Prompt and timely resolution of certain problems is possible with the assistance of state authorities and local self-government, domestic business, third-party investors and financial donors, without which it is extremely difficult to cope with decentralization.

The experience of Germany is useful at the present time, which proves the expediency of establishing non-governmental insurance funds (like the German sickness funds) that are purchasers of health services from state or private health care institutions, which will increase the level of competition between them, will facilitate more operational provision of medical care, and the increase in the number of private medical institutions. The main measures for the introduction of an optimal model of the organization of the health care system in Ukraine should be further coverage of the whole working population with the health insurance [14, p.715]. EU members have direct access to medical care in any EU country, with a European Health Insurance Card and identity document. The insurance institute is the main means for citizens to exercise their right to health care in EU [15, p.1339].

It will take time to achieve the desired results and change the existing system. In the meantime, there is still an opportunity to influence and change the situation for the better. The quality of life of the population of the state as a whole, in particular the rural population, is an integral characteristic that gives an idea of the life of a person and society [16, p. 104], therefore improving the quality of life of the valley is the main task and criterion for the activities of state authorities.

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**УКРАИНАДАҒЫ МЕДИЦИНАЛЫҚ РЕФОРМА КОНТЕКСІНДЕ  
АУЫЛДЫҚ МЕДИЦИНАНЫ ДАМУДЫҢ ҚҰҚЫҚТЫҚ НЕГІЗДЕРІ**

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**ПРАВОВЫЕ ОСНОВЫ РАЗВИТИЯ СЕЛЬСКОЙ МЕДИЦИНЫ  
В КОНТЕКСТЕ МЕДИЦИНСКОЙ РЕФОРМЫ В УКРАИНЕ**

**Аннотация.** Правовое обеспечение конституционного права граждан на охрану здоровья и медицинскую помощь является важным условием реализации принципа признания человека высшей социальной ценностью. Государство гарантирует каждому право на охрану здоровья, медицинскую помощь и медицинское страхование; создает условия для эффективного и доступного для всех граждан медицинско-го обслуживания. При этом низкий уровень обеспечения современным медицинским оборудованием, техникой и медикаментами

практически делает невозможным предоставление своевременных и качественных медицинских услуг в сельской местности. Качество оказания первичной медицинской помощи в сельских населенных пунктах в ужасном состоянии и люди, которые там проживают, а это более 30% всего населения Украины, очень ожидали изменений в этой сфере. Ведь подавляющее большинство старых помещений и медицинского оборудования находятся в неудовлетворительном состоянии. Медицинские учреждения не имеют полного набора оборудования, препаратов медицинского назначения и инвентаря, необходимых для оказания первичной помощи.

Кроме того, состояние правового регулирования оказания медицинской помощи сельскому населению Украины объективно нуждается в совершенствовании. Несмотря на принятие многочисленных нормативно-правовых актов, вопросы обеспечения учреждений здравоохранения, расположенных в сельской местности, необходимым современным оборудованием и техникой, до недавнего времени оставались нерешенными. В связи с этим, реформирования медицины в целом и сельской медицины в частности стало очень актуальным вопросом. Условия, в которых функционировала медицина, были абсолютно неприемлемыми, начиная от качества медицинского обслуживания и заканчивая мотивацией медицинского работника.

Целью статьи является исследование современных проблем правового обеспечения оказания медицинской помощи в сельских населенных пунктах. Особое внимание обращается на реформирование сети учреждений здравоохранения в сельской местности, а также проблемы их кадрового обеспечения.

По результатам исследования установлено, что 1 января 2018 г. в Украине началось внедрение медицинской реформы в сельских населенных пунктах. Верховной Радой Украины принят Закон Украины «О повышении доступности и качества медицинского обслуживания в сельской местности», который определил правовые, экономические и организационные основы и направления регулирования развития здравоохранения в сельской местности для обеспечения гарантий равного доступа сельских жителей к качественному и эффективному медицинскому обслуживанию. Это было обусловлено потребностью в улучшении доступности медицинского обслуживания для населения, проживающего в сельской местности, увеличении результативности и эффективности использования средств, выделяемых на развитие здравоохранения в селе, приведении в соответствие сети учреждений здравоохранения в сельской местности и их материально-технического обеспечения с потребностями населения.

О некоторых результатах говорить пока еще рано. Но, как показывает практика, переходный период является самым сложным. С момента принятия Закона в 2017 г. из обещанных властью 517 сельских амбулаторий всего лишь 10 сельских амбулаторий введены в эксплуатацию. В 190 сельских амбулаториях с 517 запланированных пока даже не началось строительство. 80 % сельских амбулаторий и фельдшерско-акушерских пунктов – в аварийном состоянии, в 71 % из них нет водоснабжения, 75 % – не имеют водоотведения.

Реформирование сельской медицины – это длительный процесс, который требует не только тщательного соблюдения законодательных предписаний, но и предварительной оценки реального состояния медицины в самых отдаленных уголках Украины, чтобы подготовить платформу для изменений. Определено, что внедрение медицинской реформы в городах воспринимается лучше, а потому происходит значительно быстрее, чего не скажешь о сельской местности. Оперативное и своевременное решение проблем реформирования сельской медицины возможно при содействии органов государственной власти и местного самоуправления, отечественного бизнеса, инвесторов и финансовых доноров, без которых в условиях децентрализации справиться крайне сложно.

**Ключевые слова:** медицинская реформа, сельская медицина, здравоохранение, медицинская помощь, социальное развитие села.

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## SOME RESULTS OF PHENOLOGICAL OBSERVATIONS OVER THE MAIN NECTARIFEROUS-POLLINIFEROUS PLANTS OF THE CHUVASH REPUBLIC

**Abstract.** It has been proven that favorable prerequisites for the development of bee colonies and the production of high honey flow are created in cases when the apiary is fully surrounded by nectariferous lands (landscapes): forests, meadows, gardens, fields and forest belts with biodiversity of nectar-pollen flora, i.e. a continuous honey flow appears or a flower-nectar conveyor is created. During the phenological observations, beekeepers assured themselves that in order to clearly and fully utilize the nectar-pollen flora, it is necessary to have information from many years of research on the progression of the flowering of the presented plants, starting from early spring and ending in the fall at the end of the beekeeping season. Accurately compiled data of perennial phenological records and a calendar of flowering of entomophilous plants guarantee the beekeeper's opportunities to more rationally control their actions in doing the beekeeping business and improving the honey flow by including newly introduced plants in the flower conveyor that more completely fill the non-honey flow periods. It is safe to hope that, based on the analysis of regular perennial phenological records, each apiary beekeeper can predict the honey flow and make an adjustment to the technology of keeping and caring for the bee colonies.

The beekeepers of the apiary of OOO Pchelovodcheskoe of the Kravsnnoarmeysky district of the Chuvash Republic have become convinced that by knowing the beginning and end of the full flowering of nectariferous-polliniferous plants, its duration can be determined. Depending on the strength of the honey flow, there are: a no honey flow period, when the bee colony on the control weights shows a decrease in the total mass; supporting honey flow, when the scales show from 0 to 0.6 kg of profit, while the honey in bee colonies does not increase in the direction of profit and does not accumulate in an amount sufficient for pumping the marketable honey; productive honey flow, when reference scales show from 1 kg or more of nectar profit per day. In this case, the amount of ripe honey in colonies will be sufficient for selection and pumping. It should be noted that the main honey flow is the strongest productive honey flow when from each main wintering colony, full unopened honeycomb frames from several honey chambers or shells are pumped out, which is the eventual result of the economic efficiency of the apiary.

Analysis of the results of phenological observations allows us to note the shift of the period of the beginning and the end of flowering in other plant species. It should be noted that in both 2017 and 2018, the species composition of the flora in the investigated area has blossomed continuously, ending in August and September: in European goldenrod (*Solidago virgaurea*) - 01/09/2017 and 28/08/2018; in common globe thistle (*Echinops sphaerocephalus*) - 09/05/2017 and 08/20/2018.

**Key words:** bee colony, phenology, biodiversity, entomophilous plants, Manchurian linden, nectar-pollen, attendance, honey flow, flower conveyor.

**Introduction.** The Chuvash Republic is located in the center of the European part of the Russian Federation - the Volga-Vyatka region. In the western part, it borders on the Nizhny Novgorod region, in the north - on the Republic of Mari El, in the east - on the Republic of Tatarstan, in the southern part - on the Republic of Mordovia and the Ulyanovsk region (figure 1). According to specialists, this geographical

location has determined the most important characteristics of the climatic conditions, floristic and faunistic features [1,2].

Gafurova M.M. (2014), in one of her works, wrote that floristic and phytocenotic diversity in Chuvashia is caused, first of all, by its geographical location - at the junction of the European broadleaved, Eurasian taiga and steppe botanical-geographical regions, boreal and continental bioregions. Also, the author noted that for all the time of research in this area it was revealed 1586 species of natural flora from 573 genera, 126 families, 77 orders, 6 classes, 5 departments. However, the above-mentioned characteristics increasing number of a population largely determine the degree of economic development of the territory, on the dominant part of which the natural landscape is almost completely disturbed [1].

It should be noted that the current situation on the transformation of natural landscapes not only in the Chuvash Republic but also in many other regions of Russia leads to a reduction in flora populations or their complete disappearance. The reasons contributing to these processes are: deforestation, ploughness of steppes, reclamation works, livestock grazing, violations of geo technology, land alienation during construction, industrial and transport emissions (ecotoxicants), recreational pressure and other factors [2,3,4].

Madebeikin I.N. and Madedekin I.I. (2015) wrote that over the past 50 years in the Chuvashia meadows horehound (*Elsholtzia cristata*) has disappeared, and on the verge of extinction, there are nectariferous plants like Valeriana officinalis (*Valeriana officinalis*), spurge olive (*Daphne mezereum*) and others. Looking into questions of the transformation of ecosystems of various levels in the republic, they noted a decrease in the number of insects (Wallace's giant bees (*Megachile*), burrowing bees (*Andrena*), Osmia (*Osmia*), bumblebees (*Bombus*)), on which the biopotential of entomophilous wild and cultivated plants depends [9,10,5].

One of the ways to solve the displayed problems is to expand the network of farms engaged in beekeeping, the main task of which is the raising and maintenance of honey bees (*Apis mellifera*). From the point of view of chronology, the connection between the bee and the flower was discovered as early as in 1750 by A. Dobbs, and in 1793 K. Sprengel proved the beneficial properties of honey bees and the need for them to preserve the flora. Currently, it is estimated that 75-85% of all flower visitors are honey bees. It is estimated that indirect benefit to agriculture from bees, during pollination, exceeds the direct benefits of collecting honey in about 10 times [6].

Favorable prerequisites for the development of bee colonies and the obtaining of high honey flow are created when a variety of nectariferous lands (landscapes) surround the apiary: forests, meadows, gardens, fields and forest belts. On such areas, during the entire beekeeping season, continuous flowering of natural and cultivated nectariferous plants is observed, as a result, there is a continuous honey flow or a flower-nectar conveyor. At the same time, for the correct and full use of the honey-making base, it is necessary to have information about the progression of the flowering of the presented plants, starting in spring and ending in fall.

To study and characterize the local honey-collecting conditions, annually observe over the terms of the flowering of nectariferous and polliniferous plants in the apiary bees' productive flight zone or phenological observations over the apiary are conducted [7,8]. In general, it can be noted that phenology is a science that studies periodic phenomena in the development of the organic world, due to seasonal changes. Accurately compiled perennial phenological records or calendar of the flowering of entomophilous plants enable the beekeepers to more rationally control their farming activities and improve the honey flow by including new plants into the flower conveyor filling the non-honey flow periods. Based on the analysis of long-term phenological records, the beekeepers can predict honey flow and make adjustments in the technology of keeping and caring for bee colonies. [9,10,11,12,14].

**The aim of the work** is to establish the terms of flowering of the principal spring entomophilous plants and small-leaved linden producing nectar in the middle of summer, as well as determining the attendance of flowers by honey bees (*Apis mellifera*), in the vicinity of the Vurmankasy-Shatma village of the Pikshik rural settlement of the Krasnoarmeysky district, the Chuvash Republic.

**Object, methods of the research.** The work was carried out at a stationary apiary in the village Vurmankasy-Shatma, Krasnoarmeysky district of the Chuvash Republic and at the department of general and private zootechnics of the Chuvash State Agricultural Academy (2015-2018). The objects of the research were the species composition of nectar-pollen plants on the above-mentioned apiary, and honey bees (workers) - *Apis mellifera*.

The methodological-theoretical basis of the research is the scientific works and developments of domestic scientists, in particular, R&D of I.N. Madebeikin, as well as two-year results of phenological observations. Attendance of flowers by bees was determined by the 5-point system proposed by I.N. Madebeikin, 2001: 1 point - there is no insect on the flowers; 2 points - on average, less than one bee could be found on 1 m<sup>2</sup> of the flowering area; 3 points - on 1 m<sup>2</sup> of the flowering area there are from one to two bees; 4 points - 3-4 bees on 1 m<sup>2</sup>; 5 points - on 1 m<sup>2</sup> of flowers 5 or more bees can be found.

According to the accepted methods, the beginning of flowering is considered the appearance of the first flowers on plants. In defining the beginning of the flowering of plants, in which flowers are collected in inflorescences, the efflorescence of the middle (fruited) flowers is taken into account, rather than the marginal flowers (unfertile). In herbaceous species, flowering begins with the appearance in the area of several (5-7 pieces) plants with opened flowers. The beginning of the mass flowering of nectariferous trees and shrubs is considered as the period when about one third or one-fourth of all available flowers bloom; in herbaceous plants - when there is at least one-third of the plants of the area with flowers. The end of mass flowering is a condition when a tree has no more than 25% of all flowers, herbaceous plants - no more than 30% [10].

In the identification of plants, the Guide to higher plants of the Chuvash ASSR by Z.M. Kudanova (1965), as well as the monograph "Vascular Plants of the Chuvash Republic" by M.M. Gafurova (2014) were used [1,15].

**Research results.** It is on record that knowing the beginning and end of the full flowering of plants, it is possible to determine its duration. Depending on the strength of the honey flow, there are: a no honey flow period, when the bee colony on the control weights shows a decrease in the total mass; supporting honey flow, when the scales show from 0 to 0.6 kg of profit, while the honey in bee colonies does not increase in the direction of profit and does not accumulate in an amount sufficient for pumping the marketable honey; productive honey flow, when reference scales show from 1 kg or more of nectar profit per day. In this case, the amount of ripe honey in colonies will be sufficient for selection and pumping. It should be noted that the main honey flow is the strongest productive honey flow, when from each main wintering colony, full unopened honeycomb frames from several honey chambers or shells are pumped out, which is the eventual result of the economic efficiency of the apiary of the central regions of the Russian Federation, including the Chuvash Republic.

The results of phenological observations of some aspects of the biology of the main nectar-pollen plants and the attendance of flowers by honeybees (workers) are presented in the table.

Results of phenological observations over the flowering of the main nectar-pollen plants and their attendance by honeybees in the vicinity of Vurmankasy-Shatma village of the Krasnoarmeysky district of the Chuvash Republic

Name of plants	2017				2018			
	flowering			attendance, points	flowering			attendance, points
	beginning	end	duration, days		beginning	end	duration, days	
1	2	3	4	5	6	7	8	9
Coltsfoot ( <i>Tussilago farfara</i> )	04.04	30.04	26	3	10.04	04.05	24	3
Basket willow ( <i>Salix viminalis</i> )	08.04	19.04	11	5	14.04	26.04	12	5
Hazel, hazelnut tree ( <i>Corylus avellana</i> )	11.04	19.04	8	3	11.04	18.04	7	3
Goat willow ( <i>Salix caprea</i> )	12.04	34.04	12	5	18.04	28.04	10	5
Caspian willow ( <i>Salix daphnoides</i> )	13.04	23.04	10	5	21.04	30.04	9	5
Unspotted lungwort ( <i>Pulmonaria obsuera</i> )	24.04	14.05	20	4	25.04	16.05	21	4
Osier willow ( <i>Salix viminalis</i> )	27.04	08.05	11	4	24.04	14.05	10	5
Grey willow ( <i>Salix cinerea</i> )	28.04	08.06	11	4	04.05	14.05	10	4
Crack willow (yellow) ( <i>Salix fragilis</i> )	03.05	16.05	13	5	09.05	20.05	11	5

Table continuation								
1	2	3	4	5	6	7	8	9
Norway maple ( <i>Acer platanoides</i> )	09.05	19.05	10	4	15.05	26.05	11	4
Sphery willow ( <i>Salix fragolis</i> )	09.05	18.05	9	5	11.05	21.05	11	5
White willow ( <i>Salix alba</i> )	14.05	24.05	9	5	13.05	23.05	10	5
Almond-leaved willow ( <i>Salix triandra</i> )	15.05	30.05	15	4	13.05	26.05	13	5
Common dandelion ( <i>Taraxacum officinale</i> )	15.05	15.06	30	3	13.05	12.06	29	3
Long-leaved violet willow ( <i>Salix acutifolia</i> )	18.05	27.05	9	4	24.05	03.06	9	5
Gooseberry ( <i>Ribes uvacrispa</i> )	18.05	08.06	20	5	18.05	09.06	21	4
Purple willow ( <i>Salix purpurea</i> )	17.05	27.05	10	4	11.05	20.05	9	4
Black thorn ( <i>Prunus spinosa</i> )	21.05	30.05	9	4	27.05	06.06	9	3
Apple tree ( <i>Malus</i> )	22.05	02.06	10	4	18.05	28.05	10	4
Rowan tree ( <i>Sorbus aucupria</i> )	30.05	12.06	12	3	20.05	02.06	12	3
Black chokeberry ( <i>Aronia melanocarpa</i> )	01.06	11.06	10	4	24.05	05.06	11	3
White clover ( <i>Trifolium repen</i> )	06.06	06.07	30	3	02.06	03.07	31	3
Greater celandine ( <i>Chelidonium majus</i> )	20.05	18.07	58	5	26.05	25.07	59	3
Common barberry ( <i>Berberis vulgaris</i> )	09.06	09.07	10	4	01.06	10.07	9	3
Tartarian honeysuckle ( <i>Lonicera tatarica</i> )	07.06	19.06	12	4	13.06	24.06	11	4
Andrean lupin ( <i>Lupinus mutabilis</i> )	10.06	30.06	20	3	16.06	07.07	21	3
Red raspberry ( <i>Rubus idaeus</i> )	26.06	17.07	21	5	02.07	22.07	20	5
Rosebay willowherb ( <i>Epilobium angustifolium</i> )	26.06	30.07	44	4	23.06	28.04	35	3
Yellow sweet clover ( <i>Melilotus officinales</i> )	30.06	07.08	38	4	24.06	30.06	36	4
Motherwort ( <i>Leonurus cardiaca</i> )	23.06	18.08	45	4	10.06	05.08	45	4
Blueweed ( <i>Echium vulgare</i> )	20.06	30.07	40	4	20.06	02.08	42	3
Lilac sage ( <i>Salvia verticillata</i> )	30.06	05.08	35	4	06.07	08.08	31	3
Birds-foot trefoil ( <i>Lotus corniculatus</i> )	10.07	20.08	40	3	25.06	30.07	40	3
Field scabious ( <i>Knautia arvensis</i> )	10.07	30.08	50	4	16.07	06.08	50	3
Large-leaved linden ( <i>Tilia platyphyllos</i> )	10.07	24.07	14	5	29.06	12.07	14	4
Small-leaved linden ( <i>Tilia cordata</i> )	16.07	29.07	13	5	04.07	18.07	14	5
Compass plant ( <i>Silphium perfoliatum</i> )	20.07	21.10	89	4	20.06	28.09	88	4
Snowberry ( <i>Symphoricarpos</i> )	30.06	05.08	35	5	06.07	16.08	40	5
Manchurian linden ( <i>Tilia mandshurica</i> )	28.07	10.08	12	5	16.07	29.07	13	4
European goldenrod ( <i>Solidago virgaurea</i> )	01.08	01.09	30	3	25.07	28.08	30	3
Common globe thistle ( <i>Echinops sphaerocephalus</i> )	04.08	05.09	31	3	19.07	20.08	31ë	5
Artichoke ( <i>Helianthus tuberosus</i> )	14.08	30.09	45	3	30.07	24.09	54	3

The results of phenological observations over the main nectar-pollen plants on a stationary apiary in Vurmankasy-Shatma, Krasnoarmeysky district allow us to note that there is availability for bee colonies of spring, transitional, summer and late honey flow (nectar and pollen brought to the bee colony from the surrounding plants). The research made it possible to establish the distinctive features during the periods of beginning and end of flowering in 2017-2018 in all representatives of flora in the apiary and adjacent territories, which is most likely due to the cyclicity of their development in nature. The distinctive features of the attendance of flowers by honeybees in plants within the same taxonomic group, as well as in different groups, which are associated with biomorphological traits, as well as microclimatic conditions for development, have been revealed. The group of plants, with the attendance pf 3 points is early flowering

and not large-scale, which may have affected this indicator. At the same time, attendance is affected by temperature indicators that affect the sugar content and thus control the effect of attractiveness for bees.

The group with 4 and 5 points of attendance consists of mostly mass-flowering species, which explains the high scores. The distinctive features between years may be related to the same biological cyclicality in plant development or weather conditions [17]. In general, it can be noted that high honey flow and other bee products are closely related to the presence of a forage base characterized by high biodiversity of entomophilic plants. Herewith, in order to conduct annual activities on the use of nectariferous resources in the apiary and adjacent areas, it is necessary to carry out regular phenological observations over the flowering of plants supporting and the main nectar pollen, which will be an analytical material for the creation of a regional predictive information base.

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### **ЧУВАШ РЕСПУБЛИКАСЫНЫҢ НЕГІЗГІ ШІРНЕЛІ ТОЗАҢДЫ ӨСІМДІКТЕРІН ФЕНОЛОГИЯЛЫҚ БАҚЫЛАУДЫҢ КЕЙБІР НӘТИЖЕЛЕРІ**

**Аннотация.** Мақалада Чуваш Республикасының Красноармейка ауданының Вурманкасы-Матьма ауылы маңайындағы бал араларының негізгі шірнелі тозаңды өсімдіктерінің гүлденуіне фенологиялық бақылау нәтижелерінің теориялық және тәжірибелік деректері берілген. Негізгі көктемгі энтомофильді өсімдіктердің гүлдену мерзімдері, жаздың ортасында шырынды өндіретін ұсақ жапырақты және интродукцияланған жөке түрлерінің жапырақтары белгіленген.

Омартаны балды алқаптар (ландшафттар) тығыз қоршаған жағдайларда ара ұяларын дамыту және жоғары бал жинағыштарды алу үшін қолайлы алғышарттар жасалатыны дәлелденді. ормандар, шабындықтар, бақтар, алқаптар және шірнелі-тозаңды флораның биоәртүрлілігі бар орман алқаптары, яғни үздіксіз медициналық жинау пайда болады немесе гүл-шірнелі конвейер құрылады. Фенологиялық бақылау барысында бал ара өсірушілер шірнелі-тозаңды флораны нақты және толыққанды пайдалану үшін ерте көктемнен бастап және күзде ара маусымының соңында аяқталатын ұсынылған өсімдіктердің гүлдену кезектілігі туралы көпжылдық зерттеулер мәліметтерінің болуы қажет екеніне көз жеткізді. Көп жылдық фенологиялық жазбалардың дұрыс жасалған деректері және энтомофильді өсімдіктердің гүлдену күнтізбесі бал ара ұясына омарта шаруашылығын жүргізу бойынша өз іс-қимылын ақылға қонымды үйлестіруге және гүл конвейеріне жаңа интродукцияланған өсімдіктерді қосу жолымен медосбордтарды жақсартуға кепілдік береді. Тұрақты көпжылдық фенологиялық жазбаларды талдау негізінде омартаның әрбір омартасы бал жинағын болжай алады және бал араларының отбасыларын күтіп-ұстау және күту технологиясына түзетулер енгізе алады деп сеніммен үміттенуге болады.

Чуваш Республикасының Красноармейск ауданының "Пчеловодческое" ЖШҚ омартасының ара өсірушілері шірнелі-тозаңдылардың толық гүлденуінің басталуы мен аяқталуын біле отырып, оның ұзақтығын анықтауға болатынына көз жеткізді. Бал жинау күшіне байланысты бөлінеді: бақылау таразыларында ара ұясы жалпы массаның төмендегенін көрсететін медосборды; таразы 0-ден 0,6 кг-ға дейін пайда көрсеткенде қолдаушы медосборды, бұл ретте Бал ара ұяларындағы бал пайда жағына ұлғаймайды және тауарлық бал түрінде сору үшін жеткілікті мөлшерде жинақталмайды; бақылау таразылары күніне 1 кг және одан да көп пайда көрсеткенде өнімді медосборды. Бұл жағдайда отбасында піскен бал саны іріктеу және сору үшін жеткілікті мөлшерде болады. Айта кету керек, басты бал жинау – ең жақсы өнімді бал жинау кезеңі. Бұл кезде әрбір негізгі қыстық тұқымдас ара ұяларынан не корпустарынан жапсырылған қақпақтарымен балауызды бал алынады, өз кезегінде ол омартаның экономикалық тиімділігінің соңғы нәтижесі болып табылады.

Алынған мәліметтерден көрініп тұрғандай, зерттелген аумақта және өнімді бал жинау аймағында әртүрлі түрлердің болуына байланысты өсімдіктердің гүлдену мерзімділігі анықталды. Сонымен қатар, бір таксономиялық топ шегінде әр түрлі гүлдену кезеңдері анықталды. Мысалы, тал, қызылтал тұқымдары, сәуір айының ортасында гүлдейді, сарытал – мамыр айының басында, ал қаракөк тал – мамыр айының аяғында гүлдейді. Айта кету керек, сәуір айында ерте көктемде гүлдей бастаған ең ерте шірнелі-тозаңдыларға өгей-шөп, сондай-ақ қызылтал, жібек тал және ешкі тал жатады. Зерттеу кезеңінде ұсынылған өсімдіктердің гүлденуінің басталуы 2017 жылдан 2018 жылға 6 күнге ауысуымен ерекшеленді. Сонымен қатар, егер 2017 жылы олардың гүлденуінің басталуы 04.04-ден (өгейшөп, *Tussilago farfara*), 08.04-ден (сабау тал, *Salix viminalis*), келесі жылы – 10.04 (өгейшөп), 14.04-ден (сабау тал).

Фенологиялық бақылаулардың нәтижелерін талдау өсімдіктердің гүлдену, аяқталу кезеңінің және басқа түрлерінің жылжуын атап өтуге мүмкіндік береді. Айта кету керек, 2017 және 2018 жылдары зерттелген аумақтағы флораның түрлік құрамы тамыз бен қыркүйекті аяқтай отырып, үздіксіз гүлдеді: алтыншыбық (*Solidago virgaurea*) – 01.09.2017 ж. және 28.08.2018 ж.; жұмырбас лакса (*Echinops sphaerocephalus*) – 05.09.2017 ж. және 20.08.2018 ж.

**Түйін сөздер:** бал ара ұясы, фенология, биоәртүрлілік, энтомофильді өсімдіктер, маньчжурлі жөке, шірнелер бүршігі, бару, бал жинау, гүл конвейері.

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### **НЕКОТОРЫЕ РЕЗУЛЬТАТЫ ФЕНОЛОГИЧЕСКИХ НАБЛЮДЕНИЙ ЗА ОСНОВНЫМИ НЕКТАРОПЫЛЬЦЕНОСНЫМИ РАСТЕНИЯМИ ЧУВАШСКОЙ РЕСПУБЛИКИ**

**Аннотация.** Представлены теоретические и экспериментальные данные результатов фенологических наблюдений за цветением основных нектаропыльценосных растений и посещаемостью их медоносными пчелами в окрестностях д. Вурманкасы-Шатьяма Красноармейского района Чувашской Республики. Установлены сроки цветения основных весенних энтомофильных растений, липы мелколистной и интродуцированных видов лип, продуцирующих нектар в середине лета.

Доказано, что благоприятные предпосылки для развития пчелиных семей и получения высоких медосборов создаются в тех случаях, когда пасеку вплотную окружают медоносные угодья (ландшафты): леса, луга, сады, поля и лесополосы с биоразнообразием нектаропыльценосной флоры, т.е. появляется непрерывный медосбор или создается цветочно-нектарный конвейер. В ходе фенологических наблюдений пчеловоды убедились, что для четкого и полноценного использования нектаропыльценосной флоры необходимо иметь сведения многолетних исследований о последовательности цветения представленных растений, начиная с ранневесеннего периода и заканчивая осенью в конце пчеловодного сезона. Правильно составленные данные многолетних фенологических записей и календарь цветения энтомофильных растений гарантируют возможность пчеловоду разумнее координировать свои действия по ведению пасечного хозяйства и улучшать медосбор путем включения в цветочный конвейер новых интродуцированных растений, полнее заполняющих безмедосборные периоды. С уверенностью можно надеяться, что на основе анализа регулярных многолетних фенологических записей каждый пчеловод пасеки может спрогнозировать медосбор и вводить корректировку в технологию содержания и ухода за семьями пчел.

Пчеловоды пасеки ООО «Пчеловодское» Красноармейского района Чувашской Республики убедились и им известно, что, зная начало и конец полного цветения нектаропыльценосов, можно определить его продолжительность. В зависимости от силы медосбора различают: безмедосборный период, когда пчелиная семья на контрольных весах показывает снижение общей массы; поддерживающий медосбор, когда весы показывают от 0 до 0,6 кг прибыли, при этом мед в пчелиных семьях не увеличивается в сторону прибыли и не накапливается в количестве, достаточном для откачки в виде товарного меда; продуктивный медосбор, когда контрольные весы показывают от 1 кг и более прибыли нектара в день. В этом случае количество зрелого меда в семьях окажется в достаточном количестве для отбора и откачки. Следует отметить, что главный медосбор – это самый сильный продуктивный медосбор, когда от каждой основной зимовалой семьи откачиваются полномедные запечатанными крышечками сотовые рамки от нескольких магазинных надставок или корпусов, что и является конечным результатом экономической эффективности пасеки.

Как видно из полученных данных, на исследованной территории припасечного участка и в зоне продуктивного медосбора выявлена периодичность цветения растений, благодаря наличию различных видов. В то же время, в пределах одной таксономической группы также выявлены различные периоды цветения. Например, в роду ивы, верба зацветает в середине апреля, ива пурпурная – в начале мая, а ива пятитычинковая – в конце мая, с чем связана посещаемость цветов ивы пчелами. Следует отметить, что к самым ранним нектаропыльценосам, которые начинают цвести ранней весной в апреле месяце относились мать-и-мачеха, а также верба, ива-бредина и ива волчниковая. Начало цветения представленных растений за период исследований отличался смещением на 6 дней с 2017 на 2018 год. При этом, если в 2017 году начало их цветения охватило период с 04.04 (мать-и-мачеха, *Tussilago farfara*), с 08.04 (ива прутовидная, *Salix viminalis*), то в следующем году датировка была – 10.04 (мать-и-мачеха), 14.04 (ива прутовидная).

Анализ результатов фенологических наблюдений позволяет отметить смещение периода начала цветения и окончания у остальных видов растений. Следует отметить, что как в 2017, так и 2018 гг. видовой состав флоры на исследованной территории цвел непрерывно, заканчивая августом и сентябрем: золотарник обыкновенный (*Solidago virgaurea*) – 01.09.2017 г. и 28.08.2018 г.; мордовник шароголовый (*Echinops sphaerocephalus*) – 05.09.2017 г. и 20.08.2018 г.

**Ключевые слова:** пчелиная семья, фенология, биоразнообразие, энтомофильные растения, маньчжурская липа, нектаропыльценос, посещаемость, медосбор, цветочный конвейер.

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## **ANALYSIS OF MATHEMATICAL MODELS OF INVESTMENT STRATEGIES IN THE UNIVERSITY ON CYBER SECURITY SYSTEMS**

**Abstract.** The article provides an overview and analysis of mathematical models for choosing investment strategies in cybersecurity systems of informatization objects (IO) as a particular example of educational information systems (IS). The purpose of the work is the analysis and comparison of known and new investment models for the IO protection. It is shown that previous researches have often purely economic nature and do not take into account the trends relating to the introduction of innovative information technologies in the control and decision-making procedures of the IO cybersecurity tasks. It is shown that the optimal value of resources allocated for the IO protection and cybersecurity depends not only on the vulnerabilities of IS, but also on the cost of information should be protected. All this makes it relevant to develop new models for the decision-making support on the IO protection and cybersecurity investment. The task, in particular, can be solved through the use of new information technologies and computer-based decision support systems (DSS). As a variant, it was proposed to use as a basic mathematical model for DSS the models based on game theory.

**Key words:** cybersecurity, information and educational environment of the university, investment, model, decision support system.

**Introduction.** Nowadays, information is the most valuable asset for any company or educational institution. Information and information technologies (IT) have become the basis of all educational and business processes in educational institutions. Modern universities today are at the forefront of innovative developments and projects in all areas of human activity[1]. Weak information security in the information and educational environment of the university (IEEU) can be a serious problem for the reputation and financial condition of universities.

Modern cyber attacks on important IS, in particular, on the IEEU have contributed to the development of researches that are associated with the intellectualization of calculations in the field of decision support for IP and cybersecurity (CS).

Investments in innovative projects, for example, in IT and CS, in many cases are determined by a high probability of inaccurate calculations. Created in recent years by various decision support systems (DSS) companies in IT and CS investment tasks have received good responses. Some of these DSSs provide an opportunity to optimize procedures related to the search for multivariate strategies for the financial investment of projects in the field of IEEU CS [1,2].

**The purpose of the article.** The purpose of the work is the analysis and comparison of known and new investment models for the protection of the information and educational environment of universities (IEEU).

**Main part.** The most common practical model was proposed by American researchers Lawrence Gordon and Martin Loeb of the Maryland University in 2002 [3]. The paper describes an economic model



that determines the optimal amount of investments in order to protect a given set of information. The model takes into account the information vulnerability for security hacking and the potential loss in case of such hacking. It is shown that for a given potential loss, a company does not necessarily have to focus its investments on information sets with the highest vulnerability. Since extremely vulnerable sets of information may be prohibitively expensive in protection, the companies should better focus their power on information sets with medium-level vulnerabilities. The analysis also suggests that in order to maximize the expected benefits from investments in order to protect information, a company must spend only a small part of expected losses due to a security breach [3].

The model structure is static - decisions and results come at the same time, and dynamic effects, including the dependence of money on time, are not taken into account. An information set can take various forms, such as a customer list, a payables book:

$\lambda$  – monetary loss caused by the security breach of the information set;

$t$  – probability of attack,  $t \in [0,1]$ ;

$\nu$  – the vulnerability of information, which means the probability that in condition of investment absence the attack will be successful for  $\lambda$ ;  $0 \leq \nu \leq 1$ ;

$z$  – information security costs.

For the model  $\lambda = const$ , although in practice  $\lambda = \lambda(t)$  the value  $t$  is a single attack (the simultaneous attacks are not considered).

Other values are also considered:

$\nu t$  – probability of loss as a result of attacks;

$L = t\lambda$  – potential losses associated with an information asset;

$S(z, \nu)$  – probability of security breach.

The nature of information vulnerability and information security leads to consideration of the following assumptions (A1, A2, A3) regarding  $S(z, \nu)$ :

**A1.**  $S(z, 0) = 0$  for all  $z$ . That is, if the set of information is completely invulnerable, it will remain ideally protected for any amount of investments in security, including zero investment.

**A2.** For all  $\nu$ ,  $S(0, \nu) = \nu$ . That is, if there is no investment in information security, the probability of a security breach due to the realization of a threat will remain unchanged.

**A3.** For all  $\nu \in (0,1)$  and all  $z$ ,  $S_z(z, \nu) < 0$  and  $S_{zz}(z, \nu) > 0$ , where  $S_z$  determines the partial derivative according to  $z$  and  $S_{zz}$  denotes the partial derivative from  $S_z$  with respect to  $z$ . Therefore, as investments in information security increases, information becomes more secure. In addition, there is an assumption that for all  $\nu \in (0,1)$ ,  $\lim_{z \rightarrow \infty} S(z, \nu) \rightarrow 0$ , as  $z \rightarrow \infty$ , therefore, due to the security investment the probability of a security breach is  $t$  times  $S(z, \nu)$  that is, it can reach a zero [3].

The expected benefits from investments in information security, referred to as EBIS (Expected Benefits of an Investment in Information Security), are equal to the reduction of the expected losses of the company related to additional security:

$$EBIS(z) = [\nu - S(z, \nu)]L. \quad (1)$$

The expected net income from an investment in information security (Expected Net Benefits from an Investment in Information Security, ENBIS) is equal to the difference of EBIS and the costs of investments:

$$ENBIS(z) = [\nu - S(z, \nu)]L - z. \quad (2)$$

The optimal size of investment is  $z^*(\nu)$  at which  $ENBIS(z)$  reaches the maximum value.

In [3] there were proposed two classes of vulnerability functions that meet the conditions of A1 – A3.

**The first class of exponential functions:**

$$S^I(z, \nu) = \frac{\nu}{(\alpha z + 1)^\beta}, \quad (3)$$

where the parameters  $\alpha > 0$ ,  $\beta \geq 1$  are the measures of information security performance (for the given  $\nu$  and  $z$  the probability of a security breach decreases for both,  $\alpha$  and  $\beta$ ). From the condition  $ENBIS'_z(z^*) = 0$  it follows that the optimal amount of investments can be calculated as follows:

$$z^{I*}(\nu) = \frac{(\nu\beta\alpha L) \frac{1}{\beta+1}}{\alpha}. \quad (4)$$

That is, from (4) it follows that  $z^{I*}(\nu) = 0$  is for  $0 \leq \nu \leq 1 / \alpha\beta L$ . Therefore, the optimal investments in security for the first class is zero until such the value  $\nu$  does not increase up to  $\nu = \frac{1}{\alpha\beta L}$ . With a further increase of the  $\nu$  threats probabilities, the value  $z^{I*}(\nu)$ , in accordance with (3), increases with decreasing speed.

**The second class of exponential functions:**

$$S^{II}(z, \nu) = \nu^{\alpha z + 1}, \quad (5)$$

where the parameter  $\alpha > 0$  - the measure of information security performance. From the condition  $ENBIS'_z(z^*) = 0$  we obtain:

$$z^{II*}(\nu) = \frac{\ln\left(\frac{1}{-\alpha\nu L(\ln \nu)}\right)}{\alpha \ln \nu}. \quad (6)$$

From (6) it follows that for the second class of functions  $S(z, \nu)$ , the function  $z^{II*}$  firstly increases and then decreases with increasing of  $\nu$ .

Despite the fact that the Gordon-Loeb model after publication was recognized in the scientific community and supplemented, both by other authors [4,5,6] and by Lawrence Gordon and Martin Loeb [7], many issues should still be resolved. The indisputable fact is that the authors of the model for the first time thoroughly examined the problem and identified the vulnerability function, which is a key indicator of information security.

We can distinguish the following disadvantages of the model:

1. It depends on the constant growth of cash receipts, the model is a single-phase, so it should not be used to evaluate companies whose cash receipts can vary considerably. For such companies it is better to use a multi-phase model. Based on the above mentioned, we can conclude that this model is more suitable for evaluating large companies that have already exhausted all the opportunities for the growth.

2. Too susceptible to input information, does not take into account changes in dividend policy, share repurchases, and others.

3. Focuses mainly on the study of the optimization aspects of risks control, which almost minimizes the possibility of taking into account the real risk object.

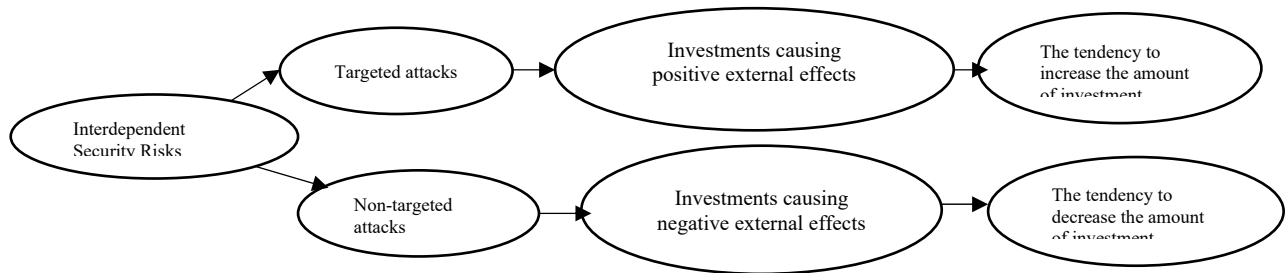
4. Discounted rate is greater than the growth of dividend payments.

Wuhenn Shim, on the basis of the work of Gordon-Loeb [3], developed his model of interrelated risks for two identical enterprises [8]. The author demonstrated that the optimal amount of investments in cybersecurity with negative external effects will be greater or equal to the optimal amount of investments with independent risks, and the area of zero investments will be less. If the cooperation of enterprises creates positive external effects, then the optimal amount of investments in cybersecurity will be greater or equal to the optimal amount of investments with independent risks, and the area of zero investments will be identical to the model with independent risks.

In addition, Shim [9] theoretically and empirically proved that financial investments for resisting untargeted attacks and aimed at damaging the maximum possible amount of susceptible systems will cause positive external effects, because an increase of financial investments of an organization will reduce the

risks of other companies connected to the system of this company. As a result, a relationship was depicted among external effects problems and types of attacks, as shown on figure.

Both of the models discussed above have disadvantages. None of them takes into account the calculation of the optimal solution in a dynamic mode, in particular the effect of financial investments. For example, they do not analyze how the intruder changes the strategies of his attacks after the appearance of additional financial investments in cybersecurity. For each of these models, there is the difficulty of obtaining data, such as quantitative losses evaluation, threats probability evaluation and evaluation of the system susceptibility to the intruders attacks. The model of interrelated risks is only suitable for the same enterprises, therefore it is not suitable for all organizations. Both models are based on two classes of information system vulnerability functions.



Communication between external effects and types of attacks

In the work of **V.K. Zadiraky and co-authors** [10] there was considered a version of the model for determining the amount of information protection costs that could be useful for organizations in order to create or to improve their own information security system.

The total expected amount of information security losses  $V$  can be expressed as the sum of expenses  $S$  and potential losses  $b(S)$ :

$$V = S + b(S). \tag{7}$$

Function (7) can be represented as a targeted one, which should be minimized:

$$V(S) = S + b(S) \rightarrow \min. \tag{8}$$

Investment of the information protection costs  $S$  should reduce the amount of expected losses  $b(S)$  from a security breach, larger values of  $S$  corresponds to smaller values of  $b(S)$ :

$$0 < S_1 < S_2 \Rightarrow b(S_2) < b(S_1) < b(0) = B. \tag{9}$$

The formula (9) means that the function  $b(S)$  is monotonically decreasing, and therefore the rate of change  $b'(S)$  of expected losses of costs is negative:

$$b'(S) < 0. \tag{10}$$

Maximum value of  $S$  – costs we obtain in the following way:

$$S_{\max} = \frac{\nu B^{1-\nu} - B^{1-\nu}}{(\nu - 1)(\nu B^{1-\nu}) \frac{\nu}{\nu - 1}} = \frac{(B^{1-\nu})^{\frac{1}{\nu-1}}}{\nu \frac{\nu}{\nu - 1}} = \frac{B}{\nu^{\frac{\nu}{\nu-1}}}. \tag{11}$$

In the work of **Glushak-Novikov** [11, 12] there was proposed an approach in order to solve the problem of creating an information protection system with the condition of the complex nature of the attacks and with the limited resources of the protector in order to create a protection system. According to the developed model, there was formed an optimization task to decrease the costs for the creation of a protection system at the presence of information about the attacker and vulnerabilities in the system.

The object of the study is a distributed information and communication system (ICS) with an open architecture, which consists of  $C$  interacting components involved in information processing. Each component is described by a set of characteristics, including information processing technology, operating environment, and others. The specified parameters of the components determine their value for the system, which will be denoted by  $q_c$ .

Taking into account the nature of the computing environment, each of the components is vulnerable to certain threats with  $A$  acceptable threats. It is assumed that the information about the architecture of the ICS is opened and is known to the sides of the conflict. In addition, there is given the probability of successful realization of a threat  $\alpha$  against a component of the system  $C$ , as well as the probability of neutralizing the threat by establishing protection mechanisms  $p$ . Therefore, random factors that need to be considered at modeling are influencing the effectiveness of decisions made by an attacker or protector.

Relationships between the protector and the attacker can be formalized using the risk function. The attacker, by damaging the system, tries to maximize the risk. At the same time, the protector, opposing the attacker, establishes protection mechanisms, seeking to reduce the risk to a zero. In conditions of limited financial and technical resources, according to a predetermined model of an attacker, the protector needs to distribute the means and protection measures so that the risk in ICS was minimal. In terms of game theory, the risk function is a payment function. The quantitative value for risk assessment is the caused damage  $Q_c$ , which is expressed in the form of costs and lost benefits. Therefore, the damage value  $Q_c$  is caused by a certain component  $c$  equivalent to the value of this component  $q_c$  for the functioning of the system as a whole. In general, the ratio for the information security risk function  $R_{ac}$  can be written as the composition of the probability  $P_{ac}^-$  of the threat realization  $\alpha$  and the caused damage during the realization of this threat  $Q_c$ . The variable  $V_{ac}$  describes the probability of neutralizing the threat using the established additional protection mechanisms [11]:

$$R_{ac} = P_{ac}^- * Q_c * (1 - V_{ac}). \quad (12)$$

One of the features of the confrontation between the protector and the attacker is dynamic character, since the attack is usually preceded by monitoring the system and intelligence, which must be taken into account in the model. Therefore, the state of conflict can change over time.

The creation of an information protection system (IPS) according to the developed approach [12] can be divided into the following stages:

1. Collection and analysis of initial information using expert assessment methods - structure analysis, vulnerability analysis, threat analysis.

2. Synthesis of the information security system structure. We substitute the initial data obtained at the first stage into the model. As a result the solution of the obtained problem using the method simplex was obtained by the relative value of risk  $R$ , as well as a set of protection mechanisms that will be optimal during the confrontation.

The model of confrontation between the two sides, developed within the framework of the RAND company, is the **model of Gross** [13], designed to simulate tactical military operations. According to this model, the conflicting sides have the resources  $X$  and  $Y$ , and the result of their opposition is determined by the objective function, which linearly depends on the difference of the invested resources and leads to the linear programming problem:

$$i(x, y) = \sum_{k=1}^l i_k(x_k, y_k) = \sum_{k=1}^l g_k \max(x_k - y_k, 0), \quad (13)$$

where  $k$  – object number,  $x_k$  and  $y_k$  – attack and protection resources at  $k$  object,  $g_k$  – a weight coefficient which expresses the importance of objects or their vulnerability.

The value  $\max(x_k - y_k, 0)$ , the value of which is the larger of the two numbers  $x_k - y_k$  and 0, is the part of the unit  $x_k$  that is able to penetrate the protection to the object. Therefore, the value  $g_k \max(x_k - y_k, 0)$  characterises the success of the attack on the  $k$  object. For the applying to information

security tasks,  $g_k$  expresses the relative value of information at the  $k$  object, and  $g_k \max(x_k - y_k, 0)$  - the damage caused by information leakage. Since the damage cannot be greater than its cost, it should be  $i(x, y) = 1$  at  $x - y \geq 1$ . Consequently, the function  $i(x, y)$  has a piecewise linear character. The entire interval of a variable  $x$ , with a constant value of  $y$ , can be divided into three zones, bounded by two limiting values  $x_1$  and  $x_2$ , at  $x < x_1$  we have  $i(x, y) = 0$ , at  $x > x_1 - i(x, y) = 1$ , at  $x_1 < x < x_2$  - the function  $i(x, y)$  grows linearly with an angular coefficient  $g$ . Taking into account the above considerations, the objective function, which expresses the damage caused by the information leakage, takes the form [13]:

$$i(x, y) = \sum_{k=1}^l g_k (x_k - y_k), \quad (14)$$

$$\text{where } x_k - y_k = \begin{cases} 0 & \text{at } x_k - y_k \leq 0; \\ x_k - y_k & \text{at } 0 < x_k - y_k \leq 1; \\ 1 & \text{at } x_k - y_k > 1. \end{cases}$$

The task of Gross, which arose during the planning of military operations, has a number of differences from the considered tasks. Firstly, the objective function has a discrete nature, since it determines the amount of units that broke through the protection or that destroyed the attack or protection. Secondly, these units in each episode of confrontation are the same for attack and, accordingly, for protection. The uniformity of objects greatly simplifies the solution of the problem, but limits the conditions of the confrontation. However, the main disadvantage of the Gross model is the piecewise linear character of its objective function, which, of course, cannot correspond to real conditions. For this reason, the Gross model, at its simplicity, is used only to approximate the objective function and to obtain results at the first approximation [13].

The research [14] describes the study of cyber attack on the information sphere by **Grischuk R. V.** An assessment of the cyber attacker's capabilities during cyber attacks is carried out using game methods for cyber attacks analysis.

The author reviewed the non-cooperative cyber attack  $A$  of  $n$  cyber attack players on information systems:

$$A = \langle N, \{x_i\}_{i \in N}, \{f_i(x)_{i \in N}\} \rangle, \quad (15)$$

where  $n$  - the amount of cyber attack players that is defined on the set  $N$ ,  $n \in \{N\}$ ,  $N = \{1, 2, \dots, n\}$ ;  $i$  - the number of cyber attack player,  $i \in \{N\}$ ;  $x_i$  -  $i$  cyber attack player strategy,  $x_i \in \{X_i\}$ ;  $f_i(x)$  - a fee of  $i$  player of the cyber attack  $A$  at choosing by  $n$  players their own strategies  $x$  of the cyber attack  $x \in \{X\}$ .

The fee for a successful cyber attack of the  $i$  player has the form of a quadratic function:

$$f_i(x) = xM^{(i)}x^T, \quad (16)$$

where  $M^{(i)}$  - symmetric scalar quadratic matrix,  $x^T$  - column vector.

The aim of a cyber attack for  $i$  player in a cyber attack is to choose such a strategy  $x_i \in X_i$  when the success of the implementation will be greatest:

$$f_i(x) \rightarrow \max. \quad (17)$$

This model does not take into account the impact of investments on the choice of the optimal solution, however, the researchers demonstrate how the developed game analysis methods allow to evaluate both single and group cyber attacks. This allows to receive guaranteed and reliable estimates of the information security level from cyber attacks on the information sphere.

Works **O. E. Arkhipov** [15, 16] study the use of "attack-protection" economic value models for risk assessment and research of the effectiveness of investments in information security.

There was considered the situation that arises when an attacker  $A$  implements a threat  $T$  with respect to a certain information resource  $I$  that belongs to the side  $B$ . It is assumed that  $D$  - the total cost of

expenses of the attacking side  $A$  for the implementation of the threat  $T$ ,  $g$  - the resulting "benefit", the value of which is determined by the value of the resource  $I$  for the attacker. The damage incurred in this situation by the side  $B$  (the owner of the resource  $I$ ), that is, the cost of the resource from the point of view of its owner, is estimated by him as  $q$ , and the total cost of the implemented complex of protective measures is equal to  $c$ .

On the basis of this information, it is possible to create a logical-heuristic scheme for expert estimation of probabilistic characteristics used to calculate information risks. The net income of the attacker in case of a successful threat  $T$  is  $Q = g - D$ . If the value  $g$  of the resource  $I$  for the attacking side  $A$  is significant, in particular, if  $g \gg D$  it can be assumed that the attacker will try to use any chances to realize this threat. On the contrary, for small values of  $g$  the economic motives for the occurrence of a threat  $T$  are practically absent: at  $Q = 0$  (or  $g = D$ ) an attack of a resource becomes impractical, in this case  $P_t = 0$ . For  $g < D$  an attempt to realize the threat  $T$  loses all economic sense. Based on these considerations, in [15] there is proposed a relationship:

$$P_t = \frac{Q}{g} = 1 - \frac{D}{g}, \quad (18)$$

which can be used to estimate the approximate values of the activation probability (occurrence) of the threat  $T$ . In the general case, the probability of a threat  $T$  realization is a composition of:

$$P_T = P_t P_v, \quad (19)$$

where  $P_v$  - the probability of use by an attacker successfully the information system vulnerabilities (IS or IO) containing an information resource  $I$ . The probability value  $P_v$  depends on the degree of IP protection, which, in turn, is determined by the volume of investments in IPS, which with a certain approximation is taken into account by the relation [16]:

$$P_v = \frac{q}{q + sc}, \quad (20)$$

where  $s$  - the coefficient by which the level of investments efficiency  $c$  in the information protection system is determined, namely: the larger the value  $s$  is, the lower, under the condition of the same investment volume of  $c$ , the probability value  $P_v$ . From the formula (20) it is obvious that at the absence of critical information in IS (that is  $q = 0$ ) the probability is  $P_v = 0$ . When the cost  $q$  of a resource  $I$  is high or very high, however, the costs on the creation and operation of IPS are low, that is  $q \gg sc$ , the probability is  $P_v \rightarrow 1$ . If the owner of the resource  $I$  pays enough attention to its protection, the values  $q$  and  $sc$  are proportionate,  $P_v < 1$ . In general, the probability value  $P_v$  at  $q = const$  grow with a decrease in the level of IPS investment  $c$  and vice versa, increase with the growth of their volume. Formulas (18), (20) allow to create an optimization scheme, according to which it will be possible to draw conclusions about the effectiveness and feasibility of investing in IPS. For this, it is assumed in [16] that with a zero investment in IPS  $P_v = 1$  the output information risk is  $R_1 = P_t q$ . Investing in IPS the costs  $c$  (under the condition of rational costs of these funds for the needs of protection) leads to the fact that the probability of successful execution of vulnerability becomes less than 1, that is  $P_v < 1$ . The residual risk in this case will be equal to  $R_t = P_t P_v q$ , the amount of losses that could be prevented -  $R_1 - R_t = P_t q - P_t P_v q = (1 - P_v) P_t q$  and the corresponding "income" -  $\Delta_R = R_1 - R_t - c = (1 - P_v) P_t q - c$ .

The economic value model is based on the results of the analysis of the real indicators of the organization's information system security level, information security requirements, requiring the use of real information risk control mechanisms, taking into account economic trends, and then allows to hope to

achieve more objective results at assessing the optimal investment volume in the information protection system.

The cost-based “attack-protection” models also provide an opportunity, on the basis of specific information about a real organization, to check whether the funds invested in the information security of this organization are sufficient in volume.

**Levchenko and co-authors** in works [17,18,19,20] proposed a mathematical model that provides for the use of the objective function  $i(x; y)$ , where  $i$  is assigned to the total amount of the lost information cost,  $x$  and  $y$  is the  $i$  attack and protection resources, respectively. This function in general terms has the form:

$$i(x, y) = \sum_{k=1}^l i_k(x, y) = \sum_{k=1}^l g_k p_k q_k(x, y) f_k(x, y), \quad (21)$$

where  $k = \overline{1, l}$  – the object number;  $g_k$  – amount of information on the object;  $p_k$  – probability of attack on an object;  $q_k(x, y)$  – the probability density of allocation of attacks resources  $x$  on  $k$  object;  $f_k(x, y)$  – dependence of the share of lost information on the ratio of  $x$  and  $y$ , which can be considered as the probability of information loss at given values  $x$  and  $y$ .

Two classes of functions are proposed as dependencies.  $f_k(x, y)$ :

$$\text{range } f(x, y) = \frac{\alpha(x/y)^n}{b(x/y)^n + c}, \quad (22)$$

$$\text{exponential } f(x, y) = d(1 - e^{-m(x/y)^n}), \quad (23)$$

where the parameters  $\alpha, b, c, d, n, m$  take positive values and determine the position and slope of the curves.

The work [17] proposed two possible types of dependencies  $q(x)$  in the form  $q(x) = Nx^n e^{-h^2 x^2}$ : the Maxwell distribution  $q_M(x) = Nx^2 e^{-h^2 x^2}$  and the Rayleigh distribution  $q_p(x) = Nx e^{-h^2 x^2}$ , where  $N$  is the normalization coefficient and the constants  $n, h$  determine the position of the dependence maximum and the degree of its asymmetry. Comparing these distributions, their essential difference lies in the fact that for the  $q_M(x)$  in the initial area  $x > 0$  the convexity is directed downwards and for  $q_p(x)$  - upwards.

The given values allow the managers of a company or an educational institution to conclude that the allocated funds are sufficient or expedient to increase them. This depends, of course, on the permissible values  $i(x, y)$ , which, in turn, are determined from the subjective assessment of the top manager and his risk tendency.

Also, in order to invest cybersecurity, there are created new models based on game theory. One of these models is the Akhmetov-Malyukov model.

The **Akhmetov-Malyukov model** [21] describes a model for cybersecurity systems investment. The pure strategy of the first ally-player is the function  $u: T \cdot [0, 1] \cdot [0, 1] \rightarrow [0, 1]$ , setting to the state of the information (position)  $(t, (z_1(0), z_2(0)))$  the value  $u(t, (z_1(0), z_2(0)))$ :  $0 \leq u(t, (z_1(0), z_2(0))) \leq 1$ , where  $u$  is the control parameter of the first investor;  $t$  - time parameter;  $z_1$  - the value of the financial resource of the first investor;  $z_2$  - the value of the financial resource of the second investor. With regard to the awareness of the opponent player (within the framework of the positional game scheme), no assumptions are made, which is equivalent to the fact that the opponent player chooses his control action  $u(t)$  based on any information.

For any moment of time  $t$ , following conditions are met:  $\alpha_1(t) = \alpha_1$ ;  $\alpha_2(t) = \alpha_2$ ;  $\beta_1(t) = \beta_1$ ;  $\beta_2(t) = \beta_2$ ;  $r_1(t) = r_1$ ;  $r_2(t) = r_2$ . We denote:  $q_1 = (1 - \beta_1) \cdot (a_1 + r_1) - 1$ ;  $q_2 = (1 - \beta_2) \cdot (a_2 + r_2) - 1$ ,

where  $\alpha_1$  – the coefficient determining the interest fee for the financial resource of the second investor to the first investor;  $\alpha_2$  - the coefficient determining the interest fee for the financial resource of the first investor to the second investor;  $\beta_1$  - the coefficient determining the share of repayment of the debt of the first investor to the second investor;  $\beta_2$  - the coefficient determining the share of repayment of the debt of the second investor to the first investor;  $r_1$  - the coefficient determining the share of return of the financial resource of the second investor to the first investor;  $r_2$  - the coefficient determining the share of return of the financial resource of the first investor to the second investor;  $q^*$  - the coefficient that determines the equilibrium beam.

In [21], there was proposed a model for a decision support system module for mutual investment in the cybersecurity systems of a situational transport center. The model allows to predict the results of investment and to find strategies for investment process managing. Unlike the existing solutions, the proposed model gives specific recommendations at choosing strategies in the investment process of a protected situational center creation. With an unsatisfactory forecast, a flexible adjustment of the parameters of the investment process is possible in order to achieve an acceptable financial result by the sides [21].

Analysis of mathematical models of investment strategies for cybersecurity systems showed that fixed assets and forces are applied to the issues of determining the amount of investment in order to protect information systems (table). In addition, existing models rarely take into account how the intruder changes his cyber attack tactics in response to additional investments in information security. There are difficulties in obtaining data for models, such as a numerical assessment of the caused damage, the probability of threats and vulnerabilities.

Mathematical models of investment strategies for information security

Comparison criteria	Gordon-Loeb model	Wuhenn Shim model	Arkhipov model	Levchenko-Prus model	Zadiraky model	Akhmetov-Malyukov model
Calculation of the optimal solution in a dynamic mode	-	-	+	+	-	+
Object Vulnerability Accounting	-	-	+	+	-	-
Resource allocation optimization	+	+	-	+	-	+
Security means accounting	+	+	+	+	+	-
Attacking means accounting	-	-	+	+	-	-
The difference between positive and negative effects	-	+	-	-	-	-
Accounting of the cost of each protection	-	-	+	-	-	-

**Conclusions.** It is shown that the disadvantage of most of the considered models is the lack of specific recommendations on the formation of strategies for financial investments in protection and cyber security systems.

There is justified the need to develop new models of DSS, which will allow finding optimal strategies for financial investments in information protection and cybersecurity of the information and educational environment of universities.

It is shown that the DSS in the investment problems of IEEU CS can be created on the basis of the application of mathematical models of game theory, which make it possible to find rational investment strategies.



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### **УНИВЕРСИТЕТТЕРДІҢ КИБЕРҚАУІПСІЗДІК ЖҮЙЕСІНЕ ИНВЕСТИЦИЯЛАУ СТРАТЕГИЯЛАРЫНЫҢ МАТЕМАТИКАЛЫҚ МОДЕЛЬДЕРІН ТАЛДАУ**

**Аннотация.** Мақалада оқу орындарының ақпараттық жүйелерінің (АЖ) жеке мысалы ретінде ақпараттандыру объектілерінің (АОБ) киберқауіпсіздік жүйесіне инвестициялау стратегиясын таңдау үшін математикалық модельдерге шолу және талдау жасалған. Білім беруде алдыңғы қатарлы цифрлық технологияларды жылдам игеретін оқу орындарының ақпараттық жүйелерінің жұмысына деструктивті араласу санының өсуі жағдайында бәсекеге қабілеттілік және табысты дамудың негізгі шарты ақпаратты сауатты құрылған қорғау ақпараттары болуы мүмкін.

Жұмыстың мақсаты - АОб-ін қорғауға инвестициялаудың белгілі және жаңа үлгілерін талдау және салыстыру. Алдыңғы зерттеулер жиі таза экономикалық сипатқа ие және АОб-нің киберқорғау міндеттерін бақылау және шешімдер қабылдау рәсімдеріне инновациялық ақпараттық технологияларды енгізуге қатысты үрдістерді ескермейді.

Ақпараттандыру объектілерінің және университеттердің киберқауіпсіздігіне қаржы салымдарын бағалау есебінде пайдаланылатын негізгі модельдерге жан-жақты талдау жасалды. Гордон-Лоуба моделі талданды, ол қауіпсіздікті бұзу үшін ақпараттың осалдығын және осындай бұзу жағдайында жоғалту ықтималдығын ескереді. Сонымен қатар өзара байланысты тәуекелдер үшін В. Шим модельдері, В.К. Задирак, Глушак-Новикова модельдері зиянкестің шабуылдарының кешенді сипаты және қорғау жүйесін құруға қорғаушы ресурстарының шектеулілігі шартымен ақпаратты қорғау жүйесін құру бойынша міндеттерді шешу әдісі ұсынылған. Әр түрлі авторлардың басқа да модельдері қарастырылған.

Университеттің ақпараттық-білім беру ортасындағы (ББАЖ) мәліметтердің әлсіз қорғалуы университеттердің беделі мен қаржылық жағдайы үшін маңызды проблемалардың пайда болуына себеп болуы мүмкін екені анықталды.

АОб-ін қорғау мен киберқауіпсіздігіне бөлінетін ресурстардың оңтайлы мәні ақпараттық жүйенің осалдықтарына ғана емес, қорғауға жататын ақпараттың құнына да байланысты екендігі көрсетілді. Осының барлығы ақпараттандыру объектілерін қорғау мен киберқауіпсіздігіне инвестициялау бойынша шешімдер қабылдауды қолдау үшін жаңа модельдерді әзірлеуді өзекті етеді. Міндет, атап айтқанда, жаңа ақпараттық технологиялар мен шешімдерді қабылдауды қолдаудың компьютерлік жүйелерін (ШҚҚЖ) қолдану негізінде шешілуі мүмкін. Нұсқа ретінде ұсынылған, шешім қабылдауды қолдау жүйесі үшін базалық математикалық модель ретінде, ойын теориясының негізінде модельді пайдалану.

Ақпаратты қорғау жүйесіне және ақпараттандырудың әртүрлі объектілерінің киберқауіпсіздігіне, оның ішінде оқу орындарының ақпараттық жүйелеріне инвестициялау тиімділігін бағалау үшін қолда бар модельдерге талдау жасалды.

Осы саладағы зерттеулердің көпшілігі қорғау жүйесіне қаржы қаражатын салудың оңтайлы стратегияларын іздестіру міндетін экономикалық тұрғыдан қоюға ғана назар аударылғандығы және инвестициялық жобалар үшін бақылау және шешімдер қабылдау рәсімдеріне ақпараттық технологияларды енгізуге қатысты үрдістерді ескермегені көрсетілген.

**Түйін сөздер:** киберқауіпсіздік, университеттің ақпараттық-білім беру ортасы, инвестициялау, модель, шешім қабылдауды қолдау жүйесі.

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### **АНАЛИЗ МАТЕМАТИЧЕСКИХ МОДЕЛЕЙ СТРАТЕГИЙ ИНВЕСТИРОВАНИЯ В СИСТЕМЫ КИБЕРБЕЗОПАСНОСТИ УНИВЕРСИТЕТОВ**

**Аннотация.** В статье выполнен обзор и анализ математических моделей для выбора стратегий инвестирования в системы кибербезопасности объектов информатизации (ОБИ), как частного примера информационных систем (ИС) учебных заведений. Показано, что в условиях роста количества деструктивных вмешательств в

работу ИС учебных заведений, которые стремительно осваивают передовые цифровые технологии в образовании, основополагающим условием конкурентоспособности и успешного развития может послужить грамотно выстроенная защита информации.

Цель работы – анализ и сравнение известных и новых математических моделей инвестирования в защиту объектов информатизации. Показано, что предшествующие исследования часто носят чисто экономический характер и не учитывают тенденции, касающиеся внедрения инновационных информационных технологий в процедуры контроля и принятия решений в задачах киберзащиты ОБИ.

Выполнен всесторонний анализ основных моделей, используемых в задаче оценки финансовых вложений в кибербезопасность ОБИ, и университетов, в частности. Проанализированы модель Гордона-Лоеба, которая учитывает уязвимость информации для взлома безопасности и потенциальную потерю в случае такого взлома. Также рассмотрены модели В. Шима для взаимосвязанных рисков, модель В.К. Задираки, модель Глушака-Новикова, в которой предложен подход к решению задачи по созданию системы защиты информации с условием комплексного характера атак злоумышленника и ограниченности ресурсов защитника на построение системы защиты. Рассмотрены и другие модели различных авторов.

Установлено, что слабая защищенность данных в информационно-образовательной среде университета (ИОСУ) может послужить появлением серьезных проблем для репутации и финансового состояния университетов.

Показано, что оптимальное значение ресурсов, выделяемых на защиту и кибербезопасность ОБИ, зависит не только от уязвимостей ИС, но и от стоимости информации, которая подлежит защите. Все это делает актуальным разработку новых моделей для поддержки принятия решений по инвестированию в защиту и кибербезопасности ОБИ. Задача, в частности, может быть решена на основе применения новых информационных технологий и компьютерных систем поддержки принятия решений (СППР). Как вариант предложено, использовать в качестве базовой математической модели для СППР, модели на основе теории игр.

Выполнен анализ имеющихся моделей для оценивания эффективности инвестирования в системы защиты информации и кибербезопасности различных объектов информатизации, в том числе, информационных систем учебных заведений.

Показано, что большинство исследований в данной области акцентировано лишь на экономической постановке задачи поиска оптимальных стратегий вложения финансовых средств в системы защиты и не учитывают тенденции, касающиеся внедрения информационных технологий в процедуры контроля и принятия решений для инвестиционных проектов.

**Ключевые слова:** кибербезопасность, информационно-образовательная среда университета, инвестирование, модель, система поддержки принятия решений.

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## **THE CONCEPT OF "PLANTS" IN KAZAKH AND ENGLISH TOPONYMIC SPACE**

**Abstract.** The purpose of this paper is to present and exploit fundamental information, such as semantic meanings and geographical features, of phytotoponyms (a type of toponym that includes plant names) in Kazakhstan and the UK (United Kingdom). Toponymy data for this study were obtained from the place names database of Kazakhstan and the UK (United Kingdom). The results showed that the most common plant names recognisable in place names are common plants that have a close connection with daily life and positive morals in Kazakh and English culture and literature. The occurrence of plant names can reflect the characteristic plants of a city. The vegetation coverage rate where phytotoponyms are located is higher than that in non-phytotoponym areas. Altitude has a stronger correlation with the number of phytotoponyms than slope and vegetation coverage degree. The toponymic image of the world can be characterized from two sides as the relation to the ethnos (nation, nationality) and to the person (toponymic person, representative of the nation). A phytotoponym is also defined as a unit of vocabular relating to the area of spatial relationships and reflecting the location of a particular specified object.

**Key words:** Kazakh, English, toponymy, phytotoponymy, culture, concept, plants.

**Introduction.** The RK President writes: "Even largely modernized societies have cultures and traditions which are rooted long in the past. The first condition for successful modernization is the preservation of national culture and tradition" [1,165]. Thus, relevance of the topic is determined by presence of the "national code" on the basis of toponymys of English and Kazakh nations.

Modern directions of research of Kazakh and English toponyms are characterized by the possibility of comparative study of Kazakh and English toponymys from the point of view of ethnolinguistic, linguocultural, semiotic, cognitive, functional and other scientific paradigms. A word having a status of concept naming is lingual symbol fully and exactly defining the content of a concept [2,177]. Depending on the complexity and versatility of onym units, it is advisable to investigate to some extent the polyparadigmatic phenomena of the Kazakh and English onyms, since polyparagatism allows to identify and describe complex and diverse phenomena associated with the dialectical relations of language and culture, language and consciousness, language and Ethnology, language and semiotic systems in proper names.

In many cases, toponymical data give an idea of the distribution of various plant formations and species of flora. Being an important natural direction, as well as being one of the main sources of the population's survival, the plants are reflected in the toponymy of many regions of the earth [3,90].

In the work A.V. Superanskaya: "onomastic space can be divided into different fields within itself (anthroponymy, toponymy, zoonymy, phytonymy, cosmonymy, astronomy)" [4,9].

The famous Soviet zoologist A. "the Geographical map of Kazakhstan is speckled with Kazakh names of rivers, lakes and tracts associated with the names of various plants, which indicates the great role that flora played or plays in the life of the country's landscapes" [5,149].

In the esthetic world of the world of plants, the potential of plants is the most important place - they are the measure of the life, the life of the beast [6,163].

In addition, one of the features of English place names is its flora. Such place names often originated in ancient English and modern forms have undergone linguistic changes. Elements of ancient English place names called plants were used in the forms Old English language. Therefore, toponyms from the names of plants were difficult to determine without studying their etymology [7,1].

Among the toponyms created by the name of flora and fauna of the Kazakh and English peoples, there are names of civilizations in which there is history and life.

In Kazakhstan and the UK's different landscape and climatic zones and mountains, spacious plains, hilly plateaus and steppe desert, scaly sands and fields of lakes, along the river, know the property of every plant that is needed to cattle that growing in the forest regions, because of the large number of plants' name in the Kazakh language, setting the names of land and water has a lexical basis. The landmarks and tokens of the nomads' living environment include natural sites - mountains, groves, prominent trees. There is no rigid boundary between a nomad and a surrounding environment, the ethnos and nature relationship can be found not 'in just a cultural adaptation to the habitat, but also in value-based orientations related to its protection' [8,104-105]. The names of plants, which are considered on the onomastic level, are most often found in Kazakh toponyms. From a cognitive point of view, phytotoponyms can't only be considered as related to animal husbandry, because land and water names and many other linguo-cultural concepts, notions, motivational foundations which are connected with plant are also considered. In general, there are various cognitive information related to beliefs, animal husbandry, aesthetic taste, geographical positivism (the language of physical and geographical features of the natural object), mythical knowledge, etc. in the multilevel structure of the onomastic "plant" concept. The disclosure of the encoded type of this information, identification origin of plant names on the onomastic level, names and to find their cognitive bases-is to analyze the lingua onomastic concept of "plant".

**Materials and methods.** One of the multilayered levels of the concept of "plant" is mythological (mythical) level or layer. At this level there are two mythophytes - Baiterek and Shokterek. About these poplars many legends and stories are mentioned in modern fairy tales, epos, and myths.

According to cognitive concepts, it is possible to assume that such as the phytonyms Baiterek and Shokterek appeared of the ontological basis of toponyms such as Zhalgyzta, Terek, Terekty, Aulieagash, Jidely, Baysin. Equation person (the father, the grandfather, the man, the girl (for example, the name of Shynar), with Baiterek and tree may be related with function and the meaning of the tree as "life-giving". As for Kondybai's research: "The tree that grows is not just the" global tree ": there are other mythical functions that give mythological cognition to the tree, and other names. One of them is the "tree of life", a tree that gives life, saves life or creates life. This is also a global tree, but the main focus is on its function of "give a life". So the tree has the following properties and functions.

1. It is the Creator, Greatest mother. That is, a woman is the woman's femininity.
2. It is a living warehouse, so the soul of a human being (the common living creatures) are saved on that tree (branch, leaf, etc.) Wood disseminates the genes (live) by certain method.
3. It is the guide of life time (general time). He determines how many years do people live, how they live that life and he save his note what happened.
4. It is the human's old ancestor.

In general, the image of the tree of the universe is related to marital relations, continuity of generations, and genealogy [9,477].

Within the aforementioned concepts, toponyms associated with the "tree" must have originated very early, but after a long time the main motivational motives are forgotten or other motivational bases which is connected with "tree" were appeared (for example, Yemenbay – "with the superstition to be strong and huge like oak tree," etc.).

In ancient "traditional" toponymy, the names of land and water which is taken from the names of plants in shortly may be explained "connected" with "poplar" (or pine tree, ling, spirea, sage etc.) and other names of plants. So from cognitive point of view, the motivational basis of those toponyms were not considered and analyzed.

In Kazakh toponymy the cult of trees and the beliefs connected with a tree (poplar, jide, pines, trees, etc.) created the oldest mythical layer and it was a sensational cause for appearance of some phytotoponyms. If we taking into account, the concept of "plant" is multilayered cognitive model or a structure, we do not doubt that the oldest layer is a layer of mythical cognition.

From a diachronically (chronological) point of view, "historic" layer take place after the mythical layer in the concept of "plant". The main features of the conditional "historical" layer, in our opinion, from the point of view of the need for people's lives to look at the common flora.

The phytotoponyms of Kazakhstan are also mentioned in the names of settlements. For example, Almaty toponymy- the first data about the toponim are found in Oirat (Dzhungar) chronicles of the 17th century. At the time this region of modern Kazakhstan was under the Dzhungarian administration. Gurban-Alimatai ("three apple-growing gorges") form can be considered as a witness of that historical period. Karaganda-city's name comes from the Kazakh word: "қараған", which means "acacia" and in this translation "acacia" means bush plant. Taldykorgan-name of city is translated as "hills are surrounded by trees". Shymkent - a component of the "shim/chim" in history versions were available like "чем", "чеменген", "чиминь", "чиминьген" and In Iranian language it means "grass". Saryagash is the "yellow tree", the form of the types' name of Barbaris tree in the Kazakh language.

The next layer of the Kazakh toponyms (gray, flax, cypress, etc.), which were made in connection with plant names. There are possible no names to create several concepts. Only the Baikumbyr toponym, probably bai+kum+byr, should be united. It images to some maps as Baikumker. For that you need to understand the original meaning of the word. If the original name is incorrect, it is so hard revealing its meaning. For example, in the encyclopedic reference book, "The Name of the Earth- Country Letter." Baiturasai toponym is written as Baiturasai in some data. The Berikornneu> Barkorneu, the Berikernaya Orion, belonging to the Almaty suburb system, does not dispute that the name Berktorneu is the name of the "all-round high hill". The adjective "raggy", like all adjectives, can only be fully understood when it is combined with noun: "raggy calf, raggy wool, raggy dog, raggy carpet, raggy whiskey" [10,101]. It is not difficult to notice that meaning of the word "raggy" in the phrase is "woolly, wool, mopyy". So it means the word "raggy" participate in toponomy with this meaning. However there are no many toponomies that made with adjectives in analytical way. This is what we are considering together with the four colors names - due to the presence of rare specimens. Barak + kol (Akmola region, Sandyktau district) Barak + Sor (Dzhangildin district, Kostanay region) Barak + shikan (588 m, EKR, Zharma district). Since Barrak anthroponyms were actively used, because of these three samples may also be anthroponym. If it is not made by person's name it is quite possible to be in the meaning of the Barakkol is a "reed and large lake of the shade"; Baraksor "herbaceous herb" Barakshian "vegetable, cherry-shaped hill". 192 Spatial examples of land and water names. 6) The name Baia + a noun in the southern regions of the country there is a dialect for the leaf "vegetable leaf grows high, year" [11,175]. It should be based on the word "plant stem" [12,643]. So this substance can be used as a geographical term for the toponymy in the local area.

The toponymic system of England is distinguished by inertia, conservatism, and being archaic.

The earliest English phytotoponyms based on phytonymic names are related to the period during which rivers or small areas are planted in the forest and people are completely dependent on nature. As a result, the designating terms of natural objects were transferred to different settlements. According to Abregov, exploring toponymy which is associated with the flora, we can identify interesting facts about replacement names from other territories and about the lost features of the landscape of a certain place [13,90].

Plants played an important role in the Anglo-Saxons life which is the English people's ancestors. The vast majority of Anglo-Saxons lived in rural areas and engaged in agriculture, but urban residents were very dependent on plants. Plants have been an important source of food and human life. Anglo-Saxons lived in wooden houses, which keep the heat in winter, they burn the fuel, traveled on wooden boats and cart and they ate their own food with wooden bowls. In agriculture also provided textile and linen, and able to produce the threads needed for thousands of purposes.

Phytotoponyms, made in the ancient English language of Great Britain consists of the following elements: «ac, acc, ock» oak will be reflected in the names of the following settlements: Accrington, Acomb, Acton, Matlock; "firth, frith" -can be noticed in their names of wood, such as forest locations, Holmfirth, Chapel-en-le-Frith; "Shaw" - forest Openshaw, Wythenshawe, Shaw; "weald, wold" - high wooden forest Wealdstone, Stow-on-the-Wold, Southwold, Easingwold, Methwold, Cuxwold, Hockwold;

A large group of toponyms in the Shropshire County of England consist of names that go out of plants and trees names. If we see the different names of trees in the county territory, we can notice that there were different trees. For example, in the ancient English language "ash" tree is named four different names: Nash, Aston, Ashfields, and Ash Magna. In its turn, these names are found in the list of toponymys. Anchovy trees

have also grown in this area, which can be noticed in the list of English toponymy as Betton ← in Old English language *bēce* "ambush" + old English language *tūn* certifies toponymy like "address". Toponyms found on the territory of Shropshir include the names of such trees as sponges, oaks, wicker, olive trees and hawthorns which grow in that area: For instance, Linley ← old English language *lind* "lime tree" + *lēah* "territory"; Acton ← old English language *āc* "oak" + old English language *tūn* "address"; Bromfield ← old English language *bróm* "wicker" + old English language *feld* "pasture"; Ollerton ← old English language *alor* "alder" + old English language *tūn* "address"; Great wytheford ← language *withig* "willow" + old English language *ford* "ford" [14,442-618].

English toponyms contain the toposystems, which includes the names of other plants, particularly the names of various herbs, besides the toponymic names of the trees. For instance, Oykonym Farlow, old English language *fearn* "fry (fern)" and *hlāw* "hole". Thus, it is possible to say that there are the Kirikkulak plants. Another plant species that grown in the land of Shropshire in ancient times was Klever (*Trifolium*): Claverley ← old English language *clæfre* "Trifolium" + language *lēah* "Tree plot". Name as Benthall ← language *beonet* "sails" + old English language *Halh* "land plot" indicates the presence of wild grass as steppe. In addition to the names of the wild plants, names of which are being studied by the toponymic material, have been found in one of the most thought-provoking plants: Leighton ← language *lēac* "onion pore" or "garlic" + i.e. old English language *tūn* "address". Hence, the ancient inhabitants of Shropshire can be known for planting such herbs [15,151-153].

In addition, the English translation of Cranberry Township (Cranberry "Cranberries") and Grove City ("grove") were reflected in the study. According to these names, cranberry plantations and the names of the toponymy of forest planting in these places exist.

In the English language, another layer of phytotoponyms forms the water names in the UK, Scotland. They include phytotoponyms with the loch element of the Celtic language. For example: Reed (in the Celtic tribes, these names refer to water and lake location: Loch na Cuilc "reed lake" / "reed or rush loch" [16,250], willow tree (local people believed that the tree had magic of the moon: Loch an t-Seitlich "lake or wood lake" / "the willow loch" [17,96], the pine forests (Loch Orroid, "loch of the bog-myrtle" [18, 401], "Wetlands of pitch-pine" [16,251].

We also note that a special grass grows in Scottish lakes with long, strong and wide, like corn, leaves - barranach, a version of the translation into Russian of which we did not find in any source or in the dictionary: Loch a 'Bharranaich "grass lake" / "Loch of barranach" [19,197].

The lakes are considered as the symbol of Scotland. The names of the lakes present Scotland's history, culture, and lifestyle, revealing the nature of Scotland. And the Scottish toponymic layer encompasses the toponymy of the Great Britain that is English language.

English-language toponyms in socio-linguistic aspect the phytonimic body of the English Toponymy is a well-organized set of names representing local landscape, flora and fauna, and one of the sources of linguistic, social, cultural and ethno-cultural enrichment.

Thus, the lexical toponymic layer of the English language has a high regional and figurative potential, ethno-cultural semantics, since toponyms, on the one hand, represent specific geographical objects, and on the other hand, are closely related to the history and culture of a certain people [20,33].

For example, Caledonia-the poetic name of Scotland, Cambria-the poetic name of Wales, the Land of Rose-great Britain.

Sometimes place names give rise to stereotypical communities, for example, the East End in London is one of the areas of SOHO in London, the dome of which has recovered and the student district of London Bloomsbury [21,123].

The study of tools for verbalization of the concept of "plant" (the main concepts of this branch) will allow it to respond in partial. Comparative analysis of phytotoponyms in Kazakh and English allows understanding the concept in terms of various features of linguistic cultures.

In the context of the above-mentioned terms, the toponymy may have been due to the concept of "plant" in the very earliest times, but the main motives were forgotten by the time.

Research has been made by comparative and contrastive analysis of different languages. Information about the culture relevant to national values was analyzed via lingual and cultural and lingual and lingual-conceptological research methods.

**Results and discussion.** According to the concept of "plant", beliefs are the most ancient mythological layer in the Kazakh and English toponymy, and it is a sensational reason for the appearance of some phytotoponyms. Bearing in mind that the concept of "plant" is a multi-layered cognitive model or structure, we cannot doubt that the most ancient layer is mythical cognition.

The concept is believed as the most important and topical category of cognitive linguistics and linguoconceptology, we have identified a set of conceptual and spatial concepts of Kazakh and English onomastics. In onomastic concept, there are different toponyms of ethno-cultural (linguocultural), social, political and other toponyms such as mental and cognitive concepts related to their characteristics.

The connotation of plant concepts in the onyms of the Kazakh and English languages is generally the same in both languages. In the course of linguo-cultural and linguo-cognitive analysis of the two languages, it was found that they have features and similarities of the national outlook. What coincides with the internal cultural and cognitive connotation is connected with the concept of the national worldview, its commonality to the worldview of the two peoples. And the peculiarity of the national outlook, its expressiveness in language is explained by the fact that language phenomena are associated with the history of its development, various natural environments, customs, life, economic forms, etc. [22,109].

The toponymic concepts of the two languages are summarized on the basis of the mental-toponymic stereotypes and describe the toponymy of the world. Routine and radial cognitive models are used to describe the toponymic image of the world.

In general, toponymic concepts of two languages and fundamental features of concepts, types of concepts and typologies have been defined.

Principles of categorization of universal space, toponymic space, as well as the principles of classification of the toponymic and cultural space in ideological zones formed in the Kazakh and English toponymy were compared.

The study of toponymic information includes: 1) address (address) information; 2) language information; 3) ethnocultural information; 4) scientific information; 5) historical and factual information; 6) linguistic social information.

Cognitive matrix models of ethnographic toponyms have been structured and new results have been achieved. Thus, lexicographical-theoretical, historical-cognitive, cultural-philosophical, encyclopedic, associative, axiological potentials of Kazakh and English in the concepts were clarified and models of frames at the core of these concepts were developed.

**Conclusion.** Depending on the symbolic nature of the toponyms, the concept of "plants" reflects different aspects of the ethnos' outlook.

The toponyms, which have been created in the past, have the same kind of two-dimensional form. The ethno-cultural heritage of two languages speaks of the ethno-cultural component of the toponymy.

According to the concept of "plant", beliefs are the most ancient mythological layer in the Kazakh and English toponymy, and it is a sensational reason for the appearance of some phytotoponyms. Bearing in mind that the concept of "plant" is a multi-layered cognitive model or structure, the most ancient layer is mythical cognition.

In the toponymic concept of ethnos level, in the context of the content of the concept, all the actual semantics of the population cognitive base (language structures), the historical and literary, historical-linguistic, encyclopedic knowledge and concepts, associations, and the periphery organize a toponymy complex of knowledge concentrated objectively;

The system of organized toponymic units in the ethnographic space is recognized as the only mark of ethnical and national identity through the close connection with the national consciousness - the language marker of the people, their cultural, spiritual identity, value system, and general mentality of their creatures.

While analyzing of linguocognition and linguocognitive approach to the toponymy of the two languages, national identity and identity of each of these two languages have been identified, and the conjuncture of the conclusions has been equally authentic. The inner work of the traditional matinee is based on an understanding of ethnicity and its connection with the two worlds. The uniqueness of the ethnic world, its appearance in the language, its own wisdom, diversity of languages, traditions, lifestyles, and so forth can be explained as the significance of the events.



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### ҚАЗАҚ ЖӘНЕ АҒЫЛШЫН ТОПОНИМИКАЛЫҚ КЕҢІСТІКТЕГІ "ӨСІМДІКТЕР" КОНЦЕПТІСІ

**Аннотация.** Мақалада Қазақстан мен Ұлыбритания фитотопонимдерінің семантикалық мәні мен географиялық ерекшеліктері (өсімдіктер атауларын қамтитын топонимнің түрі) сияқты іргелі ақпараттары зерттеледі. Осы зерттеуге арналған топонимикалық деректер Қазақстан мен Ұлыбритания (Ұлыбритания) топонимдерінің деректер базасынан алынды. Нәтижелер топонимикада танымал өсімдіктердің ең көп таралған атаулары қазақ және ағылшын мәдениеті мен әдебиетінде күнделікті өмірмен және жағымды моральмен тығыз байланысы бар өсімдіктер атаулары болып табылатыны көрсетіледі. Өсімдіктер атауларының пайда болуы елді мекеннің орналасу жеріне тән өсімдіктерін көрсете алады. Фитотопонимдер орналасқан жерлерде өсімдік жамылғысының деңгейі фитотопонимдер болып табылмайтын аудандарға қарағанда жоғары. Фитотопонимдер санында өсімдік жамылғысының күшті корреляция бар. Дүниенің топонимиялық бейнесін этносқа (ұлтқа, халыққа) қатысты және жеке адамға (топонимикалық тұлғаға, ұлт өкіліне) қатысты ретінде екі тұрғыдан қарастырып, сипаттауымызға болады. Сондай-ақ, фитотопоним кеңістіктік байланыстар саласына қатысты және нақты аталған объектінің орналасуын көрсететін вокабуляр бірлігі ретінде анықталады.

Топонимикалық деректер көптеген жағдайларда әртүрлі өсімдік формациялары мен флора түрлерінің таралуы туралы түсінік береді. Маңызды табиғи бағыт ретінде, сондай-ақ халықтың өмір сүруінің негізгі көздерінің бірі бола отырып, өсімдіктер жердің көптеген өңірлерінің топонимиясында көрініс тауып отырған.

Қазақстан мен Ұлы Британияның түрлі ландшафттық-климаттық аймақтарында төрт түлік малын өсірген асқар таулар мен кең жазықтарда, адырлы үстірттер мен далалы шөлейттерде, шағыл құмдар мен айдын көлдердің алқаптарында, өзендер жағалауында, орманды өлкелерде өсетін малға керек болатын әрбір өсімдіктің қасиетін жақсы білген, өсімдік атаулары қазақ тілінде орасын көп болғандықтан, жер-су аттарының қойылуына лексикалық негіз болған. Ономастикалық деңгейде қарастырылатын өсімдік атаулары негізінен қазақ топонимдерінің құрамында кездеседі. негізінен қазақ топонимдерінің құрамында кездеседі. Когнитивтік тұрғыдан қарағанда фитонимдік топонимдер тек мал шаруашылығына қатысты деп есептеуімізге болмайды, себебі өсімдіктерге байланысты жер-су аттарында басқа да көптеген лингвоментальді ұғымдар, түсініктер, уәждік негіздер жатыр. Жалпылап айтқанда, ономастикалық «өсімдік» концептісінің көп деңгейлі құрылымында наным-сенімдерге, мал шаруашылығына, эстетикалық талғамдарға, географиялық позитивизмге (табиғи нысанның физика-географиялық ерекшелігінің тілде көрсетілуі), мифтік танымға т.б. байланысты түрлі когнитивтік ақпараттар бар. Осы ақпараттардың кодталған түрін айқындап ашып беру, өсімдік атауларының ономастикалық деңгейде пайда болуын анықтау, олардың когнитивтік негіздерін табу – «өсімдік» лингвономастикалық концептісін талдап беру болып табылады.

Англияның топонимикалық жүйесі инерттілігімен, консервативтілігімен және болмыс көнелілігімен ерекшеленеді.

Фитонимикалық атауларға негізделген ең ерте ағылшын фитотопонимдері адамдар табиғатқа толығымен тәуелді және өзендердің бойымен немесе орманда егілген шағын учаскелерде қоныстануға тырысатын кезеңге жатады.

Әлеуметтік-лингвистикалық аспектіде ағылшын тілді топонимияны зерттеу ағылшын халқының топонимиясының фитонимикалық корпусы – бұл жергілікті ландшафтты, флораны және фаунаны көрсететін және лингвистикалық, сондай-ақ әлеуметтік-мәдени және этномәдени тұрғыдан тілді байытудың бір көзі болып табылатын атаулардың жақсы ұйымдастырылған жиынтығы екенін көрсетеді.

«Өсімдік» концептін вербализациялау құралдарын зерттеу (осы саланың негізгі тұжырымдамалары) оған ішінара жауап беруге мүмкіндік береді. Ал қазақ және ағылшын тілдеріндегі фитотопонимдерді салыстырмалы талдауы осы тұжырымдаманы әртүрлі лингвомәдениеттердегі берілу ерекшелігін түсінуге мүмкіндік береді

Осы жоғарыда аталған ұғымдардың аясында «Өсімдік» концептісіне байланысты топонимдер өте ерте кездерде туындаса керек, бірақ уақыт, заман оза келе негізгі уәждік мотивтер ұмытылып кеткен.

«Өсімдік» концептісіне байланысты наным-сенімдер қазақ және ағылшын топонимиясында ең көне мифологиялық қабатты құрап біраз фитотопонимдердің пайда болуына ментальді себеп болғанын байқаймыз. «Өсімдік» концептісінің көп қабатты когнитивтік (танымдық) модель немесе құрылым екенін ескерсек, соның ең көне қабаты мифтік таным қабаты екеніне күмән келтірмейміз.

**Түйін сөздер:** қазақ, ағылшын, топонимия, фитотопонимия, мәдениет, концепт, өсімдіктер.

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### КОНЦЕПТ "РАСТЕНИЯ" В КАЗАХСКОМ И АНГЛИЙСКОМ ТОПОНИМИЧЕСКОМ ПРОСТРАНСТВЕ

**Аннотация.** Цель данной статьи – представить и использовать фундаментальную информацию, такую как семантические значения и географические особенности фитотопонимов (тип топонима, включающий названия растений) в Казахстане и Великобритании. Топонимические данные для данного исследования были получены из базы данных топонимов Казахстана и Великобритании. Результаты показали, что наиболее распространенными названиями растений, узнаваемыми в топонимике, являются обычные растения, имеющие тесную связь с повседневной жизнью и позитивной моралью в казахской и английской культуре и литературе. Появление названий растений может отражать характерные растения города. Уровень растительного покрова там, где расположены фитотопонимы, выше, чем в районах, не являющихся фитото-понимами. Высота имеет более сильную корреляцию с количеством фитотопонимов, чем наклон и степень покрытия растительностью. Топонимический образ мира можно охарактеризовать с двух сторон как отношение к этносу (нации, народности) и к человеку (топонимическому лицу, представителю нации). Фитотопоним также определяется как единица вокабуляра, относящаяся к области пространственных отношений и отражающая местоположение конкретного заданного объекта.

Топонимические данные в большинстве случаев дают представление о распространении различных видов растительных формаций и видов флоры. Как важное естественное направление, а также являясь одним из основных источников жизнедеятельности населения, растения находят отражение в топонимии многих регионов Земли.

В разных ландшафтно-климатических зонах Казахстана и Великобритании, выращенные в четырех продуктивных горах и просторных равнинах, в пустынных платях, в пустынных песках и долинах озер, на побережье рек, в лесах, существовали лексические основы для закладки земноводных лошадей, так как названия растений на казахском языке имеют много мест. Названия растений, рассматриваемые на ономастическом уровне, встречаются в основном в составе казахских топонимов в основном в составе казахских топонимов. С когнитивной точки зрения нельзя считать, что фитонимные топонимы относятся только к животноводству, так как в земноводных названиях, связанных с растениями, лежат многие другие лингвоментальные понятия, понятия, мотивационные основы. В целом, в много-уровневой структуре ономастического концепта «растительность» содержится разнообразная когнитивная информация, связанная с убеждениями, скотоводством, эстетическими вкусами, географическим позитивизмом (указание физико-географических особенностей природного объекта на языке), мифическим познанием и др. Раскрыть кодированную форму данной информации, определить происхождение наименований растений на ономастическом уровне, найти их когнитивные основы – проанализировать лингвоономастический концепт «*ecim*».

Топонимическая система Англии отличается инертностью, консервативностью и устремленностью бытия.

Наиболее ранние английские фитотопонимы, основанные на фитонимических названиях, относятся к периоду, когда люди полностью зависят от природы и пытаются заселять вдоль рек или небольших участков, высаженных в лесу.

Изучение английскоязычной топонимии в социально-лингвистическом аспекте показывает, что фитонимический корпус топонимии английского народа – это хорошо организованная совокупность названий, отражающих местный ландшафт, флору и фауну и являющихся одним из источников обогащения языка как лингвистического, так и социально-культурного и этнокультурного характера.

Исследование средств вербализации концепта «растительность» (основные концепции данной области) позволит ему дать частичный ответ. Сравнительный анализ фитотопонимов на казахском и английском языках позволяет понять особенности передачи данной концепции в различных лингвокультурологических аспектах

В рамках этих вышеупомянутых понятий топонимы, связанные с концептом «растение», должны возникать в очень ранние времена, но время, время, опережающее основные мотивационные мотивы были забыты.

В связи с концептом «растительность» мы видим, что убеждения в казахской и английской топонимии стали ментальной причиной появления некоторых фитотопонимов, образующих самый древний мифологический слой. Учитывая, что концепт «растительность» является многослойной когнитивной (познавательной) моделью или структурой, мы не сомневаемся в том, что самый древний слой – слой мифического познания.

**Ключевые слова:** казахский, английский, топонимия, фитотопонимия, культура, концепт, растения.

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## **DEVELOPMENT OF ASSESSMENT SYSTEM IN SCHOOL EDUCATION**

**Abstract.** This article discusses the history of assessment as an important component of the content of education. Updates in the content of education in the Republic of Kazakhstan are directly related to changes in the assessment system. Therefore, this problem is one of the urgent problems. The article analyzes the interpretation of the definitions "assessment" and "mark" in various pedagogical and psychological studies of scientists. The advantages and disadvantages of the traditional assessment system are considered while investigating the prerequisites for the introduction of criteria-based assessment. The five-point assessment system introduced in 1944 is characterized by its simplicity, clarity, consistency and versatility. But long-term practice of teachers also revealed its shortcomings. The authors highlight some of the main shortcomings of this system of assessment and give detailed explanations. In conclusion, the recommendations of various researchers on the modernization of the five-point assessment system are given. Conclusions are made about the necessity of transition to the model of criteria-based assessment including the quality of traditional assessment and assessment based on criteria.

**Keywords:** assessment, history of assessment, five-point system of assessment, criteria-based assessment.

B. G. Ananiev (1980) wrote about assessment: “When there is no assessment, this is the worst type of assessment, since this effect is not orienting, but disorienting, not positively stimulating, but depressing, forcing a person to build their own self-esteem not on the basis of an objective assessment, which reflects his real knowledge, but on very subjective interpretations of hints, half-understandable situations, the behavior of the teacher and students” [1, p.54]. Assessment has been and remains the main stimulating tool for learning. The introduction of criteria-based assessment has created new opportunities for collaboration between teacher and student. Based on a trusting relationship with the student, the teacher monitors and controls the student’s learning process through assessment. Today, assessment is a continuous process of motivation, goal setting, dialogue between teacher and student (J. Raven (2008), Hawkins, Peter; Smith, Nick (2007), Clarke S (2005), John A. Ross (2006), Elizabeth Hammerman (2009)).

Assessment now has several important goals:

1. Increase motivation. Assessment is one of the main stimulating tools. Bertram H. Raven (2008) notes that motivation affects a person’s activity and behavior more than his ability [2, p.5].

2. Organization of effective feedback. Different authors offer many methods for organizing effective feedback. For example, Hawkins, Peter; Smith, Nick (2007) proposed the CORBS methodology (clear, owned, regular, balanced, specific) [3], Laura Reynolds proposed 20 ways to ensure effective feedback, and Juva et al. (2004) developed 7 rules for organizing effective feedback [4].

3. Identifying student needs. During the assessment process, information is accumulated on the student's academic performance and poor performance, which helps to shape the trajectory of its development. According to Clarke S, this is not a listing of students’ mistakes, but helping them move forward [5].

4. Increasing self-evaluation skills of students. John A. Ross (2006) argues, that teachers might benefit from self-assessment to the extent that making assessment criteria explicit to students might help teachers clarify their intentions and distinguish essential from less important features of student performance. More focused teaching might result [6].

5. Development of responsibility for their own learning in students. According to Elizabeth Hammerman (2009), formative assessment is goal centered; that is, it focuses attention on successful teaching and learning of important learning goals and standards. This approach involves students in the teaching process and offers opportunities for them to take responsibility for learning by setting personal goals and selecting strategies for meaningful learning [7, p.34].

These goals, in our opinion, are basic, but they can be supplemented depending on the scale of the study.

Throughout all stages of the development of pedagogical science, monitoring and assessment have been and remain a necessary part of the educational process. The history of school education shows that since the emergence of these important categories, attempts have been made repeatedly to improve and change approaches to school monitoring and evaluation of students' achievements, which is also characteristic of the modern period of development of education.

The system of assessment of students' knowledge points originated in Germany in Jesuit schools of XVI-XVII centuries and gradually transformed from a three-point to a five-point assessment. In Russia, the scoring system originated in the XVI century, but only in 1846 officially introduced a five-point rating scale. In 1861, an article by K. D. Ushinsky was published, in which for the first time the existing testing and evaluation of knowledge in schools were criticized. He proposed to replace the scores in the form of figures with detailed written comments on the behavior and success of students [8, p.152]. In the period of reforming Russian schools in 1918, the national Commissariat on Education adopted a resolution On "abolition of the stamp" and the period best matches training.

This period is characterized by the emergence and functioning of such important concepts as "self-control" (the main form of control), "student achievement", which have not been used for a long period and have gained new relevance at the present time. Forms and means of control and assessment activities, which are used in this period, and today have not lost their relevance [9, p.9]. These are tests, conversations with students on the studied topic, oral and written reports, reports of students about books or articles read, works performed by the student according to his personal taste and choice, keeping working diaries that perform the function of self-control and reflection. Despite the positive aspects of this form of assessment, education without marks soon found its weaknesses: the widespread decline in the quality of knowledge, level of training, discipline; priority to the study of the school community, to the detriment of the individual. Since 1944, all schools of the USSR, including Kazakhstan introduced a digital five-point system of assessment of students' knowledge (SNK RSFSR resolution of 10.01.1944.)

Ideas related to the value of students' knowledge assessment were first summarized in the classic work of B. G. Ananyev "Psychology of pedagogical assessment" in 1934, but today they are relevant. The scientist considers evaluation as an important stimulating tool, "affecting the affective-volitional sphere, through the experience of success and failure, the formation of claims and intentions, actions and relationships", as well as a orienting tool – affecting the mental work of the student, "contributing to the awareness of the student of the process of this work and understanding of their own knowledge" [10, p.131].

The main characteristics of the monitoring and evaluation system include the following: 1) the interpretation of the basic concepts included in this system; 2) the backbone component of the monitoring and evaluation system are formulated for this period of development of the country goals and objectives of school education; 3) the functions of control and evaluation activities; 4) in primary school, non-marking education is maintained in the first half of the first class; 5) control and evaluation activities are carried out taking into account the level of differentiation.

The most important categories in the system of control and evaluation activities are the concepts of control, evaluation and evaluation. Most researchers consider and study control as a procedure for obtaining information about activities and their results in order to detect deficiencies, gaps and errors. At the same time, A. B. Vorontsov, V. V. Repkin, G. A. Zuckerman consider control within the framework of the concept of developmental education of V. V. Davydov and D. B. Elkonin, according to which control is an independent action. P. Ya. Galperin, S. V. Kobyl'nica, N. F. Talyzina I think that control is the basis of voluntary attention and interpret it in the context of a system of actions that allows the learner to manage their own learning and cognitive activity (DFC).

In textbooks and programs of the USSR centrally managed the process of training and education without taking into account the specific features of the nation. As a result, national consciousness and

cultural values were damaged, and a generation that forgot its native language appeared. Today, its completion is not easy. Therefore, the teacher of the new time should master the scientific and pedagogical foundations that can study the best practices of folk pedagogy and meet modern requirements. Now in the Republic of Kazakhstan in order to enter the world educational space educational reforms are implemented, new educational standards are adopted.

On this issue in Kazakhstan, many pedagogical scientists conduct research, the results of which are implemented in the educational process. In particular, G. Karaev, M. Zhanpeisova, G. Uralsk Zhanpeisova, M. Zhadrina, G. Kobdikova, T. B. scientists support the need to implement a system of integrated phased assessment of the content of education, including multi-level forms of assessment of the quality of education, through differentiation. Scientists of the Kazakh Academy of education conducted a qualitative analysis of the orientation of education quality assessment of the final result (M. Adrina, N. Orozakunov, others). Their works reflect the transition to a multi-level system of assessing the quality of education, the definition of its didactic conditions. From this point of view, scholars of the Republican Institute for improvement of education (G. Kordikova, G. Gatapova, etc.) identified the need to improve the methodical system of education quality assessment and put in the agenda the need of technologization of the educational process on the basis of new pedagogical technologies.

The main functions of the control system are: information, educational, diagnostic, motivational, prognostic. As a result of the analysis of the researches connected with control and estimated activity, it is established that the fundamental concept "assessment" is interpreted from the point of view of various aspects of this activity and is considered most often as process.

Various definitions of the terms "assessment" and "evaluation» (score) in psychological, pedagogical and methodical literature:

- Y. I. Perovsky (1960): Assessment is an expression of the relationship between what the student knows about the program and what he or she needs to know about these issues by the time the course is completed. Score (mark) is the outcome of the assessment process. Assessment is a process and a result;

- L.M.Friedman, (1983): Assessment – the result of control, expresses the degree of compliance of the results of the student's actions checked the parameters of these actions. Score (mark)– comparison of educational actions of the student: a) with the past actions of the same student; b) with similar actions of other students; C) with the established norm (sample) of these actions;

- Sh. A. Amonashvili, (1984), A. B. Khutorsky (2001), N. L. Stephanova (2008), N. S. Podhodova (2014): Assessment is a process, action (activity) of evaluation, which is carried out by a person;

- B. M. Polonsky (2001): Assessment is a systematic process of determining the degree of compliance of existing knowledge, skills with pre-planned. Can be qualitative, quantitative, include personal judgment;

- G. U. Ksenzova (2002): Assessment is the process of correlating real results with planned objectives;

- A. U. Kodzhaspirov, G. M. Kodzhaspirova (2005): Assessment – the process of correlating the result of the activity or behavior of the pupil or the course of the activity with a predetermined standard;

- A. Mukhanbetzhanova, B. Moldagaliev, O. Ernyazov (2005): Assessment is a teacher's tool to motivate, inspire and influence a person;

- T. I. Shamova (2007): Assessment – the expression of the teacher in the evaluative judgments, in conventional signs-points of the degree of development of students ' knowledge, skills established by the program. Assessment – the process of correlating the progress and results of activities with the target standard;

- B. I. Zagvyazinsky (2008): Assessment – judgment on the quality of the work performed, on the successes and shortcomings in the activities of students; it should also contain a constructive part that allows eliminating the shortcomings;

- N. F. Efremova (2012): Assessment (mark) is the process of determining achievement against specified criteria or requirements or benchmarks;

- A. Z. Tursynbayev (2015): Assessment is a method for determining the learning outcome and is a factor in correcting shortcomings when a student learns a certain topic and enhances its effectiveness;

- K. S. Abdiev (2015): Assessment of knowledge is the process of determining compliance with pre-planned knowledge and skills. Teacher's assessment can be organized in the form of oral and written comments (satisfactory, good, very good). Each comment corresponds to a specific rating.

Score - shows only a digital characteristic of the student's educational process.

This definitions of scientists published before 2015. In addition, some researchers interpret the concept of assessment as a result (L. M. Friedman) and as a unity of process and result (E. I. Perovsky); a number of scientists in the interpretation of this concept clearly do not indicate either the process or the result (V. I. Zagvyazinsky, T. I. Shamov).

The concept of assessment is closely related to the category of "score". Note that this term is considered by those researchers who interpret assessment as a result, distinguishing the concepts of assessment and evaluation. In this case, the assessment – the process of comparison, correlation, determination of the student's actions with the norm, the standard. Explorers like Sh. A. Amonashvili, G. M. Kodzhaspirov, G. Yu. Ksenzova, N. L. Stefanova, V. M. Polonsky, A. V. Khutorskoy equate the terms "score" and "assessment". According to the table, since 2008 in the works of scientists, the definition of the terms "assessment" and "score" began to be perceived in a different sense. Instead of being perceived as a process of comparison, these terms begin to be perceived as a process of forming certain values through constructive comments to achieve certain goals.

Within the framework of the new model of criteria-based assessment, which was introduced in Kazakhstan from 2016-2017 academic years, the assessment refers to such forms of activity of the training and students, assessing, including themselves, which provide information for feedback and modification of the teaching and learning process. This definition corresponds to the interpretation of evaluation in the International baccalaureate [11, p.107].

As a result of the analysis of researches it is possible to draw a conclusion that modern tendencies in researches of control and estimated activity in school education in works of the Kazakhstan and Russian researchers are characterized by the following directions:

- 1) search for opportunities to replace marks with other forms of assessment;
- 2) go to besomeone learning in elementary school;
- 3) replacement of a five-point scale of assessment on ten-point or twelve-point;
- 4) the formation of action of goal-setting, self-monitoring, self-evaluation in schoolchildren;
- 5) focus on comparing the achievements of the student with his past results;
- 6) the presentation of open requirements for the assessment of students and the transition to criteria-based assessments.

The study identified the main disadvantages of a five-point assessment system, which was considered in the works of Sh. A. Amonashvili, S. I. Arkhangelsky, V. P. Bepalko, T. S. Gorbunov, Z. Zh. Zhanabaev, M. V. Kaluga, M. V. Karnaukhov, A. A. Kasprzak, A. V. Kochergin, E. A. Krasnovsky, A. A. Kuznetsov, V. P. Mezentsev, O. A. Mitina, B. A. Mukushev, V. Naumenko, A. A. Pinsky, V. V. Usanov, M. A. Choshanov etc.

These disadvantages include the following main:

The study identified the main disadvantages of a five-point assessment system, which was considered in the works of Sh. A. Amonashvili, Z. Zh. Zhanabaev, M. V. Karnaukhov, A. B. Vorontsov, Zh. Qaraev, V. V. Voronov, S. I. Arkhangelski, V. M. Polonsky and others.

These disadvantages include the following main:

*Subjectivity of assessment.* Almost all researchers have noted this deficiency. However, it is clear that he is not associated with the system of assessment and procedure of evaluation. While the school has adopted an expert assessment of educational achievements, based on the subjective opinion of the teacher, this deficiency will be an integral feature of any assessment system.

*Low differentiation capacity.* The current practice has led to the fact that the five-point system is almost everywhere degenerated into a four-point, due to the extremely rare use of "one". So V. I. Zvonnikov, M. B. Chelyshkova even refuse the term "a five-point scale," calling her "four-point". The inability to accurately express the level of knowledge mark leads to teachers using additional marks derived from the basic, such as "five minus", "four plus" [12, p.54].

*Focus on fixing flaws.* The most important reason why advanced teachers criticized the school mark has always been that it embodies the ideology of punishment as the most important pedagogical technique. In the standard five-point system, the idea of subtraction is realized, in which all attention is focused not on achievements, but on fixing errors.

*Low informative level.* The transition from a qualitative, meaningful assessment to a mark is inevitably accompanied by irreversible loss of information (if, of course, a scale with a reasonable number of different

marks is used). "The score hides the object of assessment, that is the material for which it was obtained, and without qualitative analysis it is impossible to judge the student's progress" [13, p.56].

*The lack of clear rules for the output of the final (quarter, semester and annual) marks.* This shortcoming leads to many conflicts, as the same situation can be interpreted by teachers, students and parents in different ways. So the student, having received a quarter of 3, 4, 5, and 5, may hope for the final five. The teacher may have a different opinion. The lack of provisions clearly dealing with such cases, forces teachers to mark, focusing on their opinion.

*Equal weight of any marks.* According to accepted practice and mark for a small answer, and mark for the control work are reflected in the journal in the same way: one digit. And since both teachers and students often use the averaging operation when calculating the final mark, this equalizes the weight of all marks. Although the value of these marks is obviously different.

*Top Scale Limitations.* In the accepted system, the highest mark is "excellent". The impossibility of using a standard scale to adequately assess the exceptional success in the subject, as well as the resulting equalization of good and brilliant students was also noted by researchers.

It is also necessary to indicate the shortcomings of the five-point assessment, which are significantly less frequent or not at all noted by researchers of this problem. They are:

- a load of bad marks, due to the fact that they strongly affect the final mark, lowering it, and sometimes - irreversibly;
- lack of "insurance" student achievements, expressed in the possibility of "spoil" the final mark at the last moment;
- the complexity of the "breakthrough", improve the final mark, the mood of the system to fix only a noticeable improvement in educational achievements, which is expressed in improving the level of not less than "one point". This drawback follows from the low differentiating ability of the system;
- the lack of a system of accounting not only the result, but also the efforts made;
- the inadequacy, the incompleteness marks the academic achievements of the students, who missed classes;
- archaic system of fixing marks. "The weak link of this system should be considered the account of the results of the test, which does not have the necessary visibility: the study of class journals to determine the dynamics of the study of an individual student or class team as a whole is an extremely time-consuming process" [14, p.103].
- low transparency of reporting documentation.

These shortcomings have become a necessary and sufficient reason for the reform of the evaluation system in our country.

As a result, the analysis of the functioning of the five-point and criteria-based assessment systems of evaluation revealed four main factors affecting the nature of the evaluation system: the scope of assessment, the relationship between teacher and student, the student's attitude to the subject and the availability of the necessary tools to manage the educational process. From the analysis of the works of scientists in this area, we came to the conclusion that the new model of assessment should combine ungraded assessment and five-point assessment. So S. I. Arkhangelsky asserts: "Point gradation of educational activity is a well-established and quite effective system of assessing the current results of the educational process in the school. A clear description of the levels of ranking of fundamental features can serve as a legitimate basis for the search for functional relationships between the objective indicator of student learning and their subjective score given by teachers, experts in their field" [15, p.8]. Such a conclusion is drawn by such a serious researcher of the evaluation system as M. V. Karnaukhova: "...numerous experiments on the implementation of the traditional domestic model of didactic control have shown that it has internal reserves and is quite accessible for optimization" [14, p.103]. The conclusion of Z. A. Abasov does not seem unexpected: "Despite all the shortcomings, it has not yet been possible to find an alternative to the five-point system. So I think we should talk about her perfection, avoiding errors at estimation of knowledge of students" [16, p.65].

The conducted research in the framework of assessment and control systems allows us to conclude that the elimination of the shortcomings of the modern scoring system should not go through its abolition, but through the modernization and introduction of the criteria-based assessment system.



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### МЕКТЕПТЕГІ БІЛІМ БЕРУ ҮДЕРІСІНДЕ БАҒАЛАУ ЖҮЙЕСІНІҢ ДАМУЫ

**Аннотация.** Берілген мақалада білім беру мазмұнындағы маңызды компонент болып табылатын – бағалаудың тарихы сипатталған. Қазақстан Республикасындағы білім беру мазмұнының жаңаруы бағалау жүйесіндегі түбегейлі өзгерістермен тікелей байланысты болғандықтан, бұл мәселе өзекті мәселелердің қатарына еніп отыр. Бұрын сабақ үстіндегі бағалау тек мұғалімнің сабақ қорытындысы бойынша оқушының сабақ бойынша жұмысының нәтижесі ретінде қабылдана, бүгінде бағалау сабақ барысында үнемі үзіліссіз жүріп отыратын үдеріс. Яғни мұғалімнің әрбір әрекеті, пікірі, ойы білім қалыптастырушы сипатқа ие және бағалау ретінде қабылданады.

Авторлар «баға» және «бағалау» ұғымдарының анықтамаларына талдау жасай келе түрлі зерттеушілердің пікірлеріне жүгінеді. 1960 жылдан бастап, 2015 жылға дейін Кеңес Үкіметі және Қазақстан Республикасы зерттеушілерінің бағалау және баға ұғымдарына берген анықтамаларын зерделеу арқылы түйінді қорытындылар жасалады. Бақылау-бағалау қызметіндегі ең маңызды санаттар – бақылау, баға және бағалау ұғымдары сараланады. Бақылау-бағалау қызметімен байланысты зерттеулерді талдау нәтижесінде «баға» фундаментальді түсінігі осы қызметтің әртүрлі аспектілері тұрғысынан түсіндіріледі және жиі үдеріс ретінде қаралатыны анықталады. «Баға» және «бағалау» анықтамасының мәні мен мағынасына жылдар тізбегінде өзгерістер ене бастағанын айқындап, зерттеушілер бағалауға бұрынғыдай белгілі бір салыстыру әрекеттерінен гөрі межеленген мақсатқа жетуде оқушының бойында конструктивті пікір арқылы белгілі бір құндылықтарды қалыптастыруға бағытталған үдеріс ретінде қарайтынын ашып көрсетеді.

Критериалды бағалауды енгізу алғышарттарын талдау мақсатында дәстүрлі бағалау жүйесінің артықшылықтары мен кемшіліктері қарастырылады. 1944 жылдан бастап енгізілген бесұпайлық бағалау жүйесі білім беру мазмұнында берік бекініп, жылдар бойы өз тұрақтылығын көрсетіп келгенімен, уақыт өте келе кемшіліктерін де байқата бастады. Мақала барысында осы бесұпайлық бағалау жүйесінің кемшіліктері сараланып, әрқайсысына жеке сараптама жасалады. Олардың негізгілері ретінде: бағаның объективсіздігі, дифференциалдау мүмкіндігінің төмендігі, жүйенің кемшіліктерді тізбелеуге бағытталуы, бағаның ақпараттық құндылығының төмендігі, қорытынды бағаны шығарудың айқын ережесінің жоқтығы, кез келген бағаның бірдей салмағы, шкаланың жоғарыдан шектелуі қаралып, оларға толық сипаттама беріледі.

Сондай-ақ бесұпайлық бағалаудың айтарлықтай сирек немесе мүлдем ескерілмейтін кемшіліктерін де атап өткен жөн. Бұл:

– нашар бағалардың жүгі, себебі олар қорытынды белгіге қатты әсер етіп, оны кейде қайтымсыз төмендетеді;

- ең соңғы сәтте қорытынды белгіні "бұзу" мүмкіндігін білдіретін оқушы жетістіктерінің "сақтандыруының" болмауы;

- нәтижені ғана емес, сонымен қатар күш-жігерді есепке алу жүйесінің болмауы;

- сабақты босатқан оқушының оқу жетістігін бағалаудың түсініксіздігі;

- бағаны бекіту жүйесінің архаикалығы;

- есеп қағаздарындағы ақпараттың айқын болмауы.

Қорыта айтқанда, бағалаудың жұмыс негіздерін талдай отырып бағалау жүйесінің сипатына әсер ететін төрт негізгі факторды анықтауға мүмкіндік аламыз: бағалаудың қолданылу саласы, мұғалім мен оқушы арасындағы қарым-қатынас, оқушының оқылатын пәнге қатынасы және оқу процесін басқарудың қажетті құралдарының болуы. Осы бағыт бойынша ғалымдардың еңбектерін талдаудан біз бағалаудың жаңа моделі баға белгісіз бағалау (қалыптастырушы бағалау) мен критерийлерге негізделген бесұпайлық бағалауды (жиынтық бағалау) біріктіруі оң нәтиже беруі тиіс деген қорытындыға келдік.

Бағалау және бақылау жүйесі шеңберінде жүргізілген зерттеулер бағалаудың бесұпайлық жүйесінің кемшіліктерін жою, бағалаудың критериалды жүйесін енгізу жолымен жүргізілуі тиіс деген қорытынды жасауға мүмкіндік береді. Бағалау үрдісін қайта қараудың өзектілігі білім берудің заманауи міндеттерімен, білім берудің деңгейін хапықаралық стандарттарды және білім берудің сапасына қойылатын талаптарды ескере отырып жоғарылату, білім берудің нәтижелерінің шынайы болуын қамтамасыздау және елден тыс жерлерде қазақстандық мектептердің түлектерінің бәсекелестікке қабілетті болуы мақсатында бағаға және оқушының оқу жетістіктерін бағалауға қойылатын бірыңғай талаптарды жасау қажеттілігімен анықталады.

**Түйін сөздер:** бағалау, бағалаудың тарихы, бесұпайлық бағалау, критериалды бағалау

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## **РАЗВИТИЕ СИСТЕМЫ ОЦЕНИВАНИЯ В ШКОЛЬНОМ ОБРАЗОВАНИИ**

**Аннотация.** В данной статье рассматривается история оценивания как важный компонент содержания образования. Обновления в содержании образования в Республике Казахстан напрямую связаны с изменениями в системе оценивания, поэтому данная проблема является одной из актуальных проблем. Раньше оценка в классе была основана исключительно на итогах проделанной работы ученика в течение урока, но сегодня оценка – это непрерывный процесс. То есть каждое действие, мнение и мысль учителя с начала урока и до его конца являются информативными и оценочными.

Наиболее важными категориями контрольно-оценочной деятельности являются концепции контроля, оценивания и оценки. Анализируя трактовку определений «оценивание» и «оценка» в различных педагогических и психологических исследованиях ученых, авторами был проведен анализ определений терминов «оценивание» и «оценка» ученых Советского Союза и Республики Казахстан на протяжении с 1960 по 2015 годы. В результате исследований, связанных с контрольной и оценочной деятельностью, фундаментальное понятие «оценивание» интерпретируется с разных сторон учебной деятельности и часто рассматривается как процесс. Обнаружив, что ценность и значение определения «оценки» и «оценивания» менялись с годами, исследователи обращают внимание, что на сегодняшний день оценивание – это процесс, который стремится формировать ценности посредством конструктивного суждения об ученике, чтобы достичь более объективной цели, чем проводить конкретные сравнения.

С целью анализа предпосылок для внедрения оценки на основе критериев авторами были рассмотрены преимущества и недостатки традиционной системы оценивания. Введенная с 1944 года пятибалльная система оценивания прочно зарекомендовала себя в сфере образования на протяжении многих лет и характеризовалась своей простотой, понятностью, постоянством и универсальностью. Но многолетняя практика педагогов также выявила и ее недостатки. Авторы выделяют некоторые основные недостатки данной системы оценивания и дают подробные пояснения. К ним относятся: субъективность оценки, низкая возможность дифференциации, направленность на выявление недостатков, низкая информативность оценки, отсутствие четких правил выведения итоговой оценки, равный вес любой оценки, ограничение шкалы сверху.

Но необходимо указать и те, которые существенно реже или совсем не отмечаются исследователями данной проблемы. Это:

- груз плохих отметок, ввиду того что они сильно влияют на итоговую отметку, понижая ее, причем порой – необратимо;
- отсутствие «страховки» достижений ученика, выражающееся в возможности «испортить» итоговую отметку в самый последний момент;
- сложность «прорыва», улучшения итоговой отметки, настроенность системы на фиксацию лишь заметного улучшения учебных достижений, которое выражается в улучшении уровня не менее чем на «один балл». Этот недостаток вытекает из низкой дифференцирующей способности системы;
- отсутствие системы учета не только результата, но и приложенных усилий;
- неадекватность, неполнота представления отметками учебных достижений учащегося, пропуская занятия;
- архаичность системы фиксации отметок. Слабым звеном данной системы следует считать учет результатов проверки, который не располагает необходимой наглядностью: изучение классных журналов для определения динамики учебы отдельного школьника или классного коллектива в целом представляется крайне трудоемким процессом.
- низкая прозрачность отчетной документации.

Таким образом, анализируя основы систем оценивания, мы можем выявить четыре ключевых фактора, которые влияют на характер системы оценки: объем оценки, отношения учителя и ученика, отношение ученика к изучаемому предмету и наличие инструментов, необходимых для управления процессом обучения. Анализируя работу ученых в этой области, мы пришли к выводу, что новая модель оценки должна иметь положительное сочетание объективной оценки (формирующая оценка) и основанной на критериях пятибалльной оценки (итоговая оценка).

Исследования, проводимые в рамках систем оценивания и контроля, позволяют сделать вывод о том, что устранение недостатков системы оценивания по пятибалльной шкале следует проводить путем внедрения системы оценивания, основанной на критериях оценивания. Актуальность пересмотра процесса оценивания основана на едином подходе к оцениванию и оценке достижений учащихся с целью достижения современных

образовательных целей, повышения уровня образования в соответствии с международными стандартами и требованиями к качеству образования, обеспечения точности результатов обучения и конкурентоспособности выпускников казахстанских школ за рубежом.

**Ключевые слова:** оценивание, история оценивания, пятибальное оценивание, критериальное оценивание.

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## **MACROECONOMIC ANALYSIS OF THE SECURITIES MARKET OF THE REPUBLIC OF ARMENIA**

**Abstract.** The article deals with the problems of the development of the securities market of the Republic of Armenia. The main changes that have occurred in recent years in the securities market in the Republic of Armenia have been investigated. Methods for analyzing the securities market of the Republic of Armenia are proposed. The indicators of the securities market are considered and the main trends of its development are revealed. This article presents the structure of the securities market of the Republic of Armenia in terms of trading volume. We chose the macroeconomic analysis as a method of our research, as it constitutes an integral element for the fundamental analysis of the securities market. With the help of the macroeconomic analysis an investor effects vigilance and analyses of the basic economic indicators; thus he also defines the extent of their influence on the securities market dynamic. It is the macroeconomic analysis that provides investors with the possibility to define which element of the financial market (securities, currency, credit) is currently the most profitable and attractive for to invest into.

**Keywords:** market, securities, stock exchange, investments, financial market, government securities.

**Introduction.** Throughout the period of market relations' development the investment of financial resources into negotiable instruments is one of the opportunities for investing. The research of investment objects on the basis of fundamental analysis constitutes an important stage of the investment process in the sphere of investment. In order to increase the effectiveness of the securities market it is vital to pay particular attention to the proportionality and sustainable development of all of its segments. The securities market is one of the most important segments of the financial market. This is why the fundamental analysis of the securities market shall have a number of peculiarities related to weak information, which demands a detailed research and a definition of the nature of their influence on the effectiveness of investing. Given that during the last decade the development of the securities market has been one of the priority directions for reforming the financial market of the Republic of Armenia, the studies of this problem keep being of high priority up till now.

**Analysis of publications.** The issues for analysis of the securities market are mirrored in the scientific works of A.Bagdasryan, A.Peresad, Y.Kravchenok, L.Dolinsky, V.Sharp, Y.Mirkin, I.Varyash. In the recent years the analysis of the securities market of the Republic of Armenia has been effected on the basis of the studies of a precise segment or of selected functions and issues of its development. A.B.Salnazaryan [15] has studied the investment functions of the Armenian securities market; G.A.Bagdasaryan [2] – the problems of attracting investment flows; K.Kh.Shakhbazayn [17] – the ways for improving the investment field; T.K.Vardevanyan [9] – the issues of development of institutions of collective investment in the Republic of

Armenia. In their turn, T.K.Blokhina [7,6,22], V.M.Gevorgyan [9] attached importance to the issues of the Armenian securities market within the structure of the Eurasian economic union, of their emission and placement of the state securities; L.A.Margaryan [13] – the problems of formation of the corporate securities market in the Republic of Armenia. A.A.Bakhchagulyan studied the methodological questions of the analysis of the Armenian securities market. Scientists L.P.Moldashbaeva, O.V.Nazarenko, G.A.Gukasyan [11], analysed the securities market as a matter of public debt management; A.A.Sagradyan – as a matter of development and state securities market management; L.V.Karapetyan – as an introducing of a saving pension scheme. As it is seen from the presented overview of the authors' research in the field of the Armenian securities market development, this problem has got an ample follow-up, but nevertheless needs a complex approach towards analysis of its modern status at the macroeconomic level.

**The results of the research.** The Armenian securities market has passed several stages in its development. The first stage is connected with the adoption of the law of the Republic of Armenia «On regulation of securities» in July 1993, which remained in force for seven years. The second stage began with the adoption of a new statutory act in July 2000, which set forth a new regulation system for the securities market and for creation of its infrastructure. The third stage opens in October 2007, when a new Law of the Republic of Armenia was adopted, namely «On the securities market», which nowadays comprises all the aspects of any activity within the Armenian securities market [1]. As a basis of our research we chose the numbers of NASDAQ OMX Armenia, which is the only stock exchange operating in Armenia [18]. For these reasons it is important to study the basic performance in the Armenian securities market for a number of years for the total macroeconomic analysis [7, p.95] (table 1).

Table 1 – The performance of the Armenian securities market, 2011-2018, millions, USD

Name	Years							
	2011	2012	2013	2014	2015	2016	2017	2018
Number of emitents listed (trading in shares) at the securities market, units	11	11	11	11	10	11	11	11
Stockmarketcapitalization	0,1	0,1	0,2	0,2	0,1	0,2	0,2	0,2
Tradeinshares	0,5	1	3,7	60,6	9,1	43	25,1	4,4
Tradeindebtsecurities	15,7	11,4	44,3	82,7	29,8	125	157,5	179,6
Trade in public debt securities	13,9	10,4	37,2	71,5	25,4	112,6	134,9	118,1
Trade in corporate debt securities	1,8	1	7,1	11,2	4,4	12,4	22,6	61,5
Tradingforeigncurrency	760,4	753,7	714,5	744,5	312,6	3,9	3,3	0,01
Number of emitents listed (trading in shares) at the securities market, units	7087,7	15084,3	16444,1	13949,9	1734	–	–	–
A source: <a href="https://amx.am/">https://amx.am/</a>								

As it is seen from table 1, in 2011-2014 the number of issuers listed to trading shares in the securities market equals 11. In 2015 this number decreased to 10. In 2016-2018 it grew again to 11.

In 2011-2013 the stock capitalization in the securities market equaled to 0,1 billion USD, increasing twice in 2013 and equaling to 0,2 billion USD. In 2014-2018 the index was at the level of 2013 (excluding a failure in 2015, when the capitalization drastically went down). Regarding the number of the listed issuers, the Republic of Armenia cedes to the Russian Federation – the number of those issuers is 25 times less, and the stock capitalization is 2 thousand times less than in Russia [7, p.96]. Let us proceed to the securities trading. The absolute maximum of such a trade was reached in 2014 and equaled to 184 million USD. However we should notice a different dynamic in the development of trade in shares, corporate and state bonds (figure 1).

It is seen on figure 1 that the trade in shares reached its maximum in 2014 – 60,6 million USD. It was followed by a dramatic decrease in the volumes of trade in shares in 2015 down to 9,1 million. In 2016 the shares market grew up to 43 million USD, however it was again followed by a decrease in 2017-2018 – down to 4,4 million USD. It should be noted that the development of the securities market in the Republic of Armenia depends on different objective factors – size of the economy, market volume, competition, market liquidity, pricing. There do also exist subjective factors – the culture of corporate and public

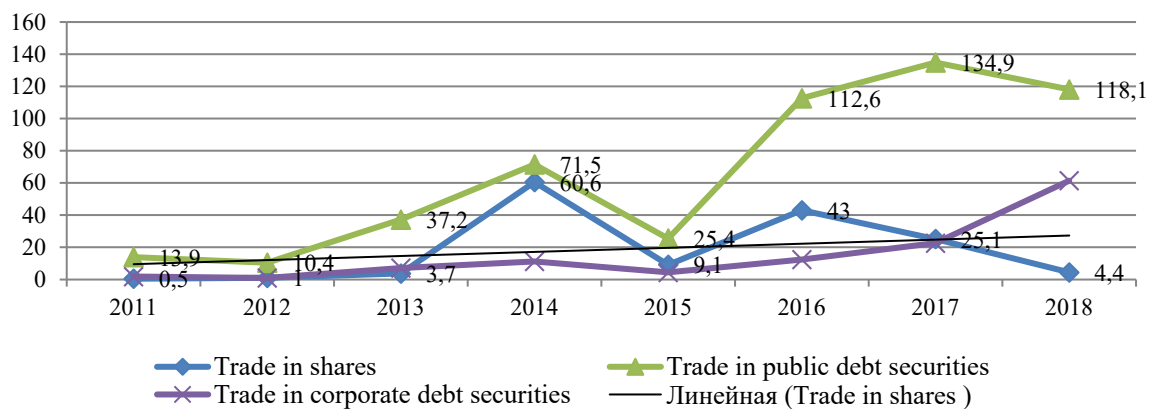


Figure 1 – Dynamic of the volume for securities trade in the Armenian stock exchange, million USD.  
NB: developed by the authors

government, the extent of defense regarding the rights and interests of investors, the political situation. The volumes of trade in debt securities at the securities market in Armenia equaled to 179,6 million USD in 2018, which is an absolute historic maximum. However here it should be noted that corporate and state segments of the market in question have different dynamics. State securities of the Republic of Armenia constitute one of the most confident negotiable instruments [7, p.98]. The data provided in table 1 revealed that the biggest volumes of trade in state securities in the securities market in Armenia were marked in 2017 (134,9 million USD), while the lowest were in 2012 (10,4 million USD). We should also highlight the drastic decrease of the state debt market in 2015, where the volumes of transactions involving state bonds equaled only to 25,4 million USD. Throughout 2006-2009 the volumes of trade in corporate debt securities were constantly increasing. In 2010-2012 those volumes decreased [5, p.105]. As it derives from table 1, the hugest volumes of trade in corporate debt securities were marked in 2018 (61,5 million USD), the lowest – in 2012 (1,0 million USD). Thus in the Republic of Armenia most of the negotiable instruments at the securities market are state securities. The reasons of that are a low level of corporate management and a specific structure of investors (figure 2).

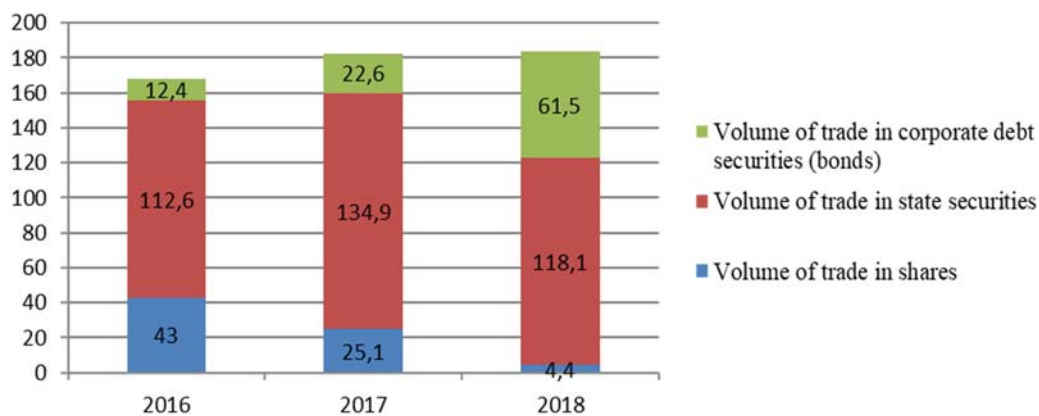


Figure 2 – Structure of the securities market of the Republic of Armenia, volume of trade, million USD.  
NB: developed by the authors

In 2010-2012 the main trade instruments via NASDAQ OMX Armenia trade system were credit resources and foreign currency. The volumes of trade in credit resources and foreign currency was 1260 times more than all the volumes of trade in other instruments. The trade in foreign currency started at the Armenian stock exchange in 2005. The volumes of trade were constantly growing till 2011. From 2015 there was a decrease in volumes of trade in foreign currency [5, p.104]. The volume of trade in foreign currency started to drastically decrease from 2015 and by 2018 equaled to only 10 thousand USD. The decrease of volume of the stock currency trade is owing to changes in regulation and shift of liquidity into an over-the-counter

currency market. Also there was a deterioration of the economic situation in the country. It could be said that the stock exchange almost suspended any currency operations.

The trade in credit resources began to get arranged since 2010. In the beginning the volumes of trade in credit resources significantly prevailed over volumes of trade in other instruments. In 2012 the volumes of trade in credit resources were 11,5 times more than the numbers of 2010. The volumes of trade in credit instruments were increasing till 2013 and equaled to 16444,1 million USD. Since 2015 the number was constantly decreasing. In 2015 the volume of trade in credit resources equaled to 1734 million USD. It should be noted that, as a result of changes in conditions of trade in credit resources, the mere trade in them was not affected at the Armenian stock exchange since September 2015.

From the indices represented it could be seen that today the main instruments of the NASDAQ OMX Armenia trade system are not credit resources and foreign currency, as it was before 2015, but the securities market instruments. Such numbers reveal that the reforms taking place at the market have lead to a qualitative improvement of the market. Despite some difference in direction of the dynamics of development of different segments of the Armenian securities market, there does exist a rather sustainable long-term connection. There is a matrix of twin-coefficients of correlation drawn below. It should be highlighted that the comprehensiveness of the research should comprise the currency rate among the indices to be analysed. As a result it could be seen that there is a close connection between the debt segments of the securities market. As far as the shares market is concerned, it has a weak correlation with the bond market in general. Scarcely any connection could be seen between the dynamic of the shares market and the segment of corporate bonds.

Table2 – Matrix of twin-coefficients of correlation of the indices for the securities market of the Republic of Armenia

Indicator	Tradeinshares	Tradeindebtsecurities	Trade in public debt securities	Trade in corporate debt securities	Currencyrate
Tradeinshares	X	–	–	–	–
Tradeindebtsecurities	0,353	X	–	–	–
Trade in public debt securities	0,477	0,976*	X	–	–
Trade in corporate debt securities	-0,041	0,836*	0,697	X	–
Currencyrate	0,512	0,734	0,751	0,528	X

\*Constituting the segments of the negotiable instruments market, the markets of state and corporate bonds automatically correlate with it. For this reason this interaction is not interesting, and the correlation coefficients are drawn for information only.  
NB: developed by the authors

Regarding the link between the securities market segments with the currency rate, it is highlighted that in all the cases we could mark rather high coefficients of correlation. However, the nature of this link demands a separate research, as it could reveal to be a false regression because the currency rates and volumes of the securities market segments were growing in the period in question, and this growth might not have been mutually reinforcing.

**Conclusion.** Deriving from the effected research for a calculation regarding the influence of the factors on the condition of the securities market, it is reasonable: to effect calculations of the business activity indices (in industry, in the service sector, in agriculture etc.); to elaborate and to calculate regularly a composite index of the leading indicators on the basis of the methods applied in the international practice, using the additional components, whose influence on the domestic economy is crucial; to increase informational transparency of the economy, in particular to provide free public access to information on correspondent macroeconomic indices; to define constant dates for publication of macroeconomic indicators in order to create an economic calendar of macroeconomic information in Armenia (in accordance with the international standards and practice). The practical value of the research is defined by the complex of procedures offered for analysing the securities market of the Republic of Armenia. The results may be used when making decisions at the legislative level and also when making some proposals regarding the economic development of the country.

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### АРМЕНИЯ РЕСПУБЛИКАСЫНЫҢ ҚОРДЫҚ НАРЫҒЫНЫҢ МАКРОЭКОНОМИКАЛЫҚ ТАЛДАУ

**Аннотация.** Мақалада Армения Республикасының бағалы қағаздар нарығын дамыту мәселелері қарастырылған. Армения Республикасындағы құнды қағаздар нарығында соңғы жылдары болған негізгі өзгерістер зерттелді. Армения Республикасының бағалы қағаздар нарығын талдау әдістері ұсынылған. Бағалы қағаздар нарығының индикаторлары қарастырылып, оның негізгі даму тенденциялары анықталды. Бұл мақалада Армения Республикасының бағалы қағаздар нарығының сауда-саттық көлемі бойынша құрылымы берілген. Біз зерттеу әдісі ретінде макроэкономикалық талдауды таңдадық, өйткені ол құнды қағаздар нарығын іргелі талдау үшін ажырамас элемент болып табылады. Макроэкономикалық талдау көмегімен инвестор қырағылық пен негізгі экономикалық көрсеткіштерге талдау жасайды; осылайша ол бағалы қағаздар нарығының динамикасына олардың әсер ету дәрежесін анықтайды. Бұл макроэкономикалық талдау, инвесторларға қаржы нарығының қай элементі (бағалы қағаздар, валюта, несие) қазіргі уақытта инвестициялау үшін ең тиімді және тартымды екенін анықтауға мүмкіндік береді.

Арменияның бағалы қағаздар нарығы өзінің дамуының бірнеше кезеңінен өткендігі белгілі. Бірінші кезең 1993 жылы шілдеде жеті жыл бойы күшінде болған «Бағалы қағаздарды реттеу туралы» Армения Заңының қабылдануымен байланысты. Екінші кезең 2000 жылдың шілдесінде бағалы қағаздар нарығын реттеудің және оның инфрақұрылымын құрудың жаңа жүйесін құрған жаңа нормативтік құқықтық актіні қабылдаудан басталды. Үшінші кезең 2007 жылы қазанда Армения Республикасының жаңа Заңы қабылданған кезде басталады, нақтырақ айтсақ «Арнайы бағалы қағаздар нарығы туралы», қазіргі кезде армян бағалы қағаздар нарығындағы кез келген қызметтің барлық аспектілерін қамтиды. Зерттеудің негізі ретінде Арменияда жұмыс істейтін жалғыз биржалық NASDAQ OMX Armenia таңдалды. Осы себептерге байланысты жалпы макроэкономикалық талдау жүргізу үшін Арменияның бірнеше жылдағы бағалы қағаздар нарығының негізгі көрсеткіштерін зерттеу маңызды.

Олар мемлекеттік қарыздар нарығының 2015 жылы күрт төмендегенін көрсетті, сол кезде мемлекеттік облигациялармен жасалған операциялардың көлемі небары 25,4 млн. АҚШ долларын құрады. 2006-2009 жылдары Корпоративтік борыштық бағалы қағаздармен сауда-саттық көлемі үнемі өсіп отырды. 2010-2012 жылдары бұл көлемдер азайды.

Бүгінгі таңда NASDAQ OMX Армения сауда жүйесінің негізгі құралдары 2015 ж. бұрынғыдай несиелік ресурстар мен шетел валютасы емес, бағалы қағаздар нарығының құралдары болып табылады. Мұндай сандар нарықтық реформалар нарықтың сапалы жақсаруына әкелгенін көрсетеді. Армян бағалы қағаздар нарығының әр түрлі сегменттерінің даму динамикасы бағытындағы шамалы айырмашылыққа қарамастан, ұзақ мерзімді қатынастар жеткілікті тұрақты. Зерттеу қос корреляция коэффициенттерінің матрицасын ұсынады. Зерттеудің күрделілігі талданатын көрсеткіштер арасында айырбас бағамын қамтуы керек екенін атап өткен жөн. Нәтижесінде біз бағалы қағаздар нарығының борыштық сегменттері арасында тығыз байланыс бар екенін көреміз. Қор нарығына келетін болсақ, ол тұтастай алғанда облигациялар нарығымен нашар байланысты. Бағалы қағаздар нарығының динамикасы мен корпоративтік облигация сегменті арасындағы кез келген байланысты байқауға болмайды

**Түйін сөздер:** нарық, бағалы қағаздар, қор биржасы, инвестициялар, қаржы нарығы, мемлекеттік бағалы қағаздар.



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## МАКРОЭКОНОМИЧЕСКИЙ АНАЛИЗ ФОНДОВОГО РЫНКА РЕСПУБЛИКИ АРМЕНИЯ

**Аннотация.** В статье рассматриваются проблемы развития рынка ценных бумаг Республики Армения. Были исследованы основные изменения, произошедшие в последние годы на рынке ценных бумаг в Республике Армения. Предложены методы анализа рынка ценных бумаг Республики Армения. Рассмотрены показатели рынка ценных бумаг и выявлены основные тенденции его развития. В статье представлена структура рынка ценных бумаг Республики Армения по объему торгов. Нами выбран макроэкономический анализ в качестве метода нашего исследования, поскольку он является неотъемлемым элементом фундаментального анализа рынка ценных бумаг. С помощью макроэкономического анализа инвестор проявляет бдительность и анализ основных экономических показателей; при этом он также определяет степень их влияния на динамику рынка ценных бумаг. Именно макроэкономический анализ дает инвесторам возможность определить, какой элемент финансового рынка (ценные бумаги, валюта, кредит) в настоящее время является наиболее прибыльным и привлекательным для инвестиций.

Известно, что рынок ценных бумаг Армении прошел несколько этапов своего развития. Первый этап связан с принятием закона Республики Армения «О регулировании ценных бумаг» в июле 1993 года, который оставался в силе в течение семи лет. Второй этап начался с принятия в июле 2000 года нового нормативного акта, который установил новую систему регулирования рынка ценных бумаг и создания его инфраструктуры. Третий этап открывается в октябре 2007 года, когда был принят новый Закон Республики Армения, а именно «О рынке ценных бумаг», который в настоящее время охватывает все аспекты любой деятельности на рынке ценных бумаг Армении. В качестве основы исследования выбрали NASDAQ OMX Армения, единственную фондовую биржу, работающую на территории Армении. По этим причинам важно изучение основных показателей рынка ценных бумаг Армении за ряд лет для общего макроэкономического анализа.

Выявили резкое сокращение рынка государственного долга в 2015 году, когда объемы операций с государственными облигациями составили всего 25,4 млн. долларов США. В течение 2006-2009 гг. объемы торговли корпоративными долговыми ценными бумагами постоянно увеличивались. В 2010-2012 годах эти объемы сократились.

Сегодня основными инструментами торговой системы NASDAQ OMX Армения являются не кредитные ресурсы и иностранная валюта, как это было до 2015 года, а инструменты рынка ценных бумаг. Такие цифры показывают, что реформы, происходящие на рынке, привели к качественному улучшению рынка. Несмотря на некоторое различие в направлении динамики развития различных сегментов армянского рынка ценных бумаг, существует довольно устойчивая долгосрочная связь. В исследовании приведена матрица двойных коэффициентов корреляции. Следует подчеркнуть, что комплексность исследования должна включать курс валюты среди анализируемых индексов. В результате можно увидеть, что существует тесная связь между долговыми сегментами рынка ценных бумаг. Что касается рынка акций, то он имеет слабую корреляцию с рынком облигаций в целом. Можно увидеть связь между динамикой рынка акций и сегментом корпоративных облигаций.

**Ключевые слова:** рынок, ценные бумаги, фондовая биржа, инвестиции, финансовый рынок, государственные ценные бумаги.

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**FUNCTIONAL APPLICATION OF THE INTERNAL  
CONTROL SYSTEM IN AUTONOMOUS INSTITUTIONS**

**Abstract.** Modern business conditions are based on the laws and characteristics of the development of market relations. Successful and stable activity of any business entity today directly depends on the effectiveness of the management system, the most important element of which is properly organized control. In the activities of any business entity, the place, role and importance of control are as important as accounting, management and analysis. The domestic science of control has rather deep roots, and the multifaceted nature and depth of the concept of “control” are closely related to the concepts of “management” and “management accounting”. In conditions of increasing competition, when the problems of increasing the effectiveness of control are significantly updated, the issues of organizing internal control, its development and integration are becoming more relevant. The study of the category of “internal control”, its subjects and objects, the place in the management process allows us to identify in its structure individual species characterized by a targeted orientation and methodological features. The practical implementation of the internal control system should be carried out in accordance with the basic principles of its effective organization, which are closely interconnected, and the procedure for combining them to a greater extent depends on the prevailing specific business conditions and circumstances. Integration of the internal control system into the general management system will ensure the reliability of information at various levels, as well as significantly reduce the potential for making erroneous management decisions. The principles of making a choice when implementing a rational and economically reasonable accounting policy of an autonomous institution depend directly on the valid regulations of the accounting standards of the public sector system of the economy. This aspect makes it possible to influence not only the effectiveness of the use of material, labor and financial resources, but also to ensure a proper level of capital units’ turnover, to obtain additional internal sources of capital investments financing and current assets, to attract external resources to expand the scope of an autonomous institution. The application of various models of internal control, including elements of a risk-oriented approach allows to carry out to the right degree conceptual process of organizing enterprise control. The model of the internal control system of an autonomous institution suggested by the authors takes into account a systematic approach, risk orientation considering factors of the internal and external environment, incorporating the model in business processes, with regard to the ultimate goal of implementation - increasing the efficiency of business processes while reducing expenses and increasing profit in the financial responsibility centers.

Indicative management model is widely used as the foundation of management. As a rule, it is based on a spatial vision of internal control, and as an analysis, depending on the activity type of an economic entity, the business processing is allocated, taking into account the influence of various indicators that reflect the factors influence of the external and internal environment, in particular, in the context of parameters of competitive advantage.

We consider the use of an effective model to be the most promising model of internal control. Based on the author’s idea of an integrated model of internal control, its main components will be: a systematic approach, a focus on risks, taking into account factors of the internal and external environment, incorporating the model in business processes and financial responsibility centers. Furthermore the main object of the suggested model of internal control will be risks arising as a result of the influence of factors of the internal and external environment. The purpose of the suggested model is to increase the efficiency of business processes existing in the economic entity while simultaneously reducing expenses and increasing profits in financial responsibility centers.

Considering that the element “control environment” of internal control within the framework of the current legislation has changed to the institutional internal environment, it is noteworthy that the introduction into application practice of institutional environment of an autonomous institution internal control consists of the following levels:

external and internal. The external environment in the form of formal and informal institutes is prevailing, having an impact on the internal environment of an economic entity, represented by its own specific cultural and functional “micro institutes” (formal and informal).

**Keywords:** autonomous institutions, accounting, internal control model, institutional environment, economic entities, dashboards.

**Introduction.** Therewith interaction with development indicators is being built alongside on the basis of multifactorial analysis [6] and multidimensional scaling under the conditions of macroeconomic uncertainty [8]. In Russian reality, the process-oriented model was additionally enriched by the inclusion of an internal control system. In that respect, the functioning of the internal control system in autonomous institutions can be defined as the control of the economic entity with the allocation of business processes based on the influence of indicators (factors) of the internal and external environment for the final result of a specific business process using information and digital technologies [1,4,15,42].

It is necessary to highlight the most famous and widely used models of internal control in world management practice, such as COSO (The committee of sponsoring organizations of the treadway commission), COBIT (Control Objectives for Information and related Technology), etc. Modern digital solutions based on RCPM platforms provide a mobile analytics service that allows to provide shareholders, TOP managers, and directors of business divisions with up-to-date information on key performance indicators: performance and profitability indicators, liquidity indicators, ratios, risk indicators, budget data, etc. In this case, shareholders and managers anywhere and at any time, get the opportunity to promptly control important business events using their phone or tablet [29], tracking business indicators, instantly identify and analyze critical indicators. Digital platforms enable timely provision of:

- ≠ prompt notification of events or occurring problems in the current work;
- ≠ instant communication with responsible employees to clarify the situation and transmit relevant instructions [41];
- ≠ effective monitoring based on the analysis of various indicators using visual dashboards (especially KPI, liquidity indicators and risk indicators), as well as convenient dashboards management using touch functions (scrolling, swiping, smart scaling).

#### **Methods.**

**A. General Description.** The application of the COSO model is aimed at introducing and further improving of the internal control system, which is able to ensure the economic entity the efficiency and performance of operations, as well as ensure the reliability of financial statements, taking into account compliance with relevant legislation and regulations. The foundation of this internal control model based on the passed in 2004 COSO document “Organizational Risk Management. Integrated Model”, includes the systematic approach and the main object of internal control - risks, and the element “control environment” is replaced by the institutional internal environment [22]. The advantage of the integrated model is that the new concept implies setting goals and identifying events, and control is now a tool that increases the likelihood of achieving goals.

It should be emphasized that on the practical side, the application of the COSO internal control model consists of:

- 1) risk management of business entities [17];
- 2) conformance with the optimal balance between the profitability of the organization and risks [11];
- 3) effective and profitable use of the necessary resources to achieve the main goals of the organization development.

At the same time, the use of the COSO model is focused on risks management as a multifaceted cyclic process integrated into all business processes, and where all the parts (components) are interconnected and interdependent. The COSO model is based on the following interrelated elements that make up the risk management process:

- ≠ setting goals corresponding to the organization’s mission and its level of risk appetite, when the organization’s risk management process guarantees achievement of the goals;
- ≠ identification of events, taking into account the influence of positive (opportunities) and negative factors (risks) of the influence of internal and external environment on the achievement of the organization's goals [26]. The negative factors (risks) of the external environment include changes in legislation, currency

risks, interest risks, etc., and the risks of the internal environment include staff turnover, innovative technologies and innovations in management, the instability of the organization's development, reorganization measures for mergers (acquisitions), access to the foreign market, etc.;

≠ risk assessment while analyzing the likelihood of their occurrence and taking the necessary measures and developing measures to even them out, considering the level of risk response with the administration's use of such effective methods as risk aversion and measures to take, reduce and redistribute risks [21], allowing to bring risk to an acceptable and appropriate level for the organization;

≠ the use of control measures (control actions), assuming the principles and methods that guarantee the execution of management decisions and focus on the implementation of the developed measures to reduce the identified risks;

≠ the use of digital communications, allowing the organization's staff to effectively fulfill their responsibilities, to exchange information, both vertically and horizontally. The source of the necessary information is the data of bookkeeping (financial) and management (internal) accounting, the need for which is established by the organization's management system;

≠ monitoring, which is a mechanism for tracking and adjusting the organization's risk management process and performed within the scope of the current management activities or separately as necessary.

**B. Algorithm.** It should be noted that the main goal of the internal control model COBIT (Control Objectives for Information and Related Technologies) is to develop a safety control system of the use of information technologies based on control of all processes related to information technologies and, foremost, information technologies control, comparison between active IT - processes and the best examples existing in practice, including industry ones. According to COBIT, all processes related to information technologies are divided into four zones, including: planning and organization; acquisition and implementation; delivery and support; monitoring

The world practice in the application of the COBIT model is notable for the focus on reducing the risks of using information technologies, which include:

- 1) incorrect processing of data and / or processing of incorrect data [13];
- 2) unauthorized access to information, causing its destruction or changes, leading to the reflection of non-existent operations or incorrect reflection of operations [14];
- 3) establishment of additional privileges for information service employees in relation to access to special information, including elements of unauthorized data changes in the main files, systems or programs [31];
- 4) incapacity of information service employees to make the necessary changes to systems or programs [28], as well as incorrect manual intervention by information service employees or possible data loss or failure to access data.

The practical aspects of applying the SAC internal control model consist in focus on internal auditors. The internal control system is an integration of processes, functions, actions, subsystems and staff for the effective performance of the intended tasks taking into account risks and cost and results estimation. The components of the internal control system are the control environment, control procedures, manual and automated systems.

At the core of the Russian theoretical concept is a model of risk-oriented internal control (hereinafter - ROIC). The development of this model was started at the beginning of the 20th century, and it was approved as mandatory in 2014 for commercial banks [19]. Unlike the COSO model, the meaning of which consist in the fact that management is carried out considering the assessed risk, in the Russian ROIC model management itself is already considered a risky event. In this regard, risk-oriented internal control can be interpreted as prevention, assessment and risk control using various management technologies in all areas of activity and business divisions of economic entity aimed at the most possible reduction of risks. At the same time, the main differences identified between COSO and ROIC are sufficiently conditional and are as follows.

1. Unlike COSO, where great importance is attached to the internal environment, the ROIC places considerable emphasis on verifying the divisions activities in the context of business processes from the standpoint of building a risk management system.

2. In COSO, maximum importance is attached to monitoring of internal control as a form of subsequent control, and monitoring is one of the main elements of the COSO model. In ROIC the main emphasis is on building the system of internal control itself.

3. In COSO, the greatest weight is given to the work of the Board of Directors, while in ROIC - to the process of interaction of all management bodies.

4. ROIC in the modern concept includes the following elements:

≠ compliance control, as control of legal and regulatory risk [2];

≠ control of the totality of potential and real risks [5] assigned to the internal audit service;

≠ monitoring compliance with procedures and deviations performed by the internal control service [37];

≠ risk assessment performed by the risk management service (Risk Management Service), which itself is an integrated element of any technological business process [40]. Risk assessment includes an assessment of the risk factor of any business model, including a development strategy, business plan, development concepts of individual areas and business, as well as including an assessment of risk-appetite for all development factors [25].

≠ control of prevention procedures of money laundering and terrorist financing assigned to the financial monitoring service.

In management practice, the Russian model of internal control should be highlighted - a confirmatory model of internal control, focused on assessing the compliance of the activities of audited economic entities with the requirements of federal legislation and internal documents of an economic entity. This model was also recommended by the Central Bank of the Russian Federation for use by the banking economy sector since 2007, together with the use of a risk-oriented model. Based on the fact that the confirmatory model is identical in its content to compliance control, which is an element of the risk-oriented model of internal control, we believe that this model has lost its purpose. Its existence can be justified only if the risk-oriented model does not work in the economic entity.

**Results.** Research of the internal control models application showed that in Russian society the risk-oriented model of internal control used in commercial banks and based on the foreign concept of COSO is most widespread. Therewith in Russian reality, in an effective model (based on the principles of a system-oriented model), a process-oriented model was enriched by the inclusion of not only business processes in the model, but also the Financial Responsibility Centre, and in the indicative model - by the influence of factors of the internal and external environment.

Whereas the institutional internal environment is identical to the notion of internal environment of internal control, formal institutes of the internal environment of internal control must also be represented by local regulatory documents reflecting the general attitude of executives and management towards the need for control in the institution and the actions taken in this regard. These documents may include: regulation of the responsibilities and authorities distribution; personnel policy; the procedure of preparing financial statements for external users; regulations of the implementation of internal management accounting and reporting for internal purposes; statute on the conformity of economic activity as a whole with the requirements of applicable legislation; style and basic principles of an autonomous institution management ; as well as the organizational structure of an autonomous institution. In this regard, the suggested model of the institutional environment of the internal control of an autonomous institution can be represented by the following algorithm (figure 1).

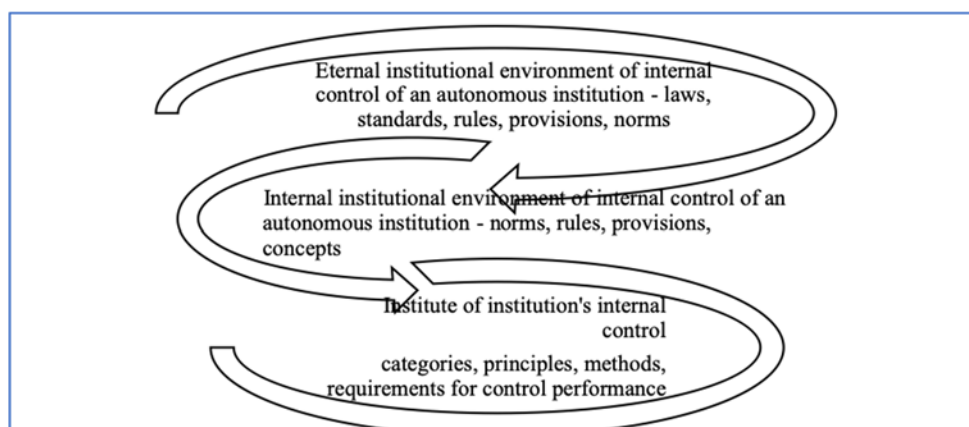


Figure 1 – The mechanism of functioning of the model of the institutional environment of internal control in an autonomous institution

**Discussions.** One of the important areas of analysis for internal control is on the one hand the study of the efficiency of the interaction of the internal institutional environment of internal control with the external institutional environment, and on the other hand, the analysis of the interaction of the internal institutional environment of internal control with the institutional environment of the autonomous institution as a whole [12,16,20,18,23,43]. Such interaction, in our opinion, can be not only highly productive, but also fraught with conflicts and reduced efficiency. If the process of the first interaction is generally understood and the efficiency of this interaction consists in maximizing the involvement of formal institutes of the external environment [35] to develop local legal documents on the internal control of the institution, on the basis of both these formal rules [3] and their own rules, taking into account the need for development of internal control in an autonomous institution [10].

As for the interaction of the internal institutional environment of internal control with the institutional environment of an autonomous institution, the essence of this interaction and its efficiency is as follows. The external institutional environment of an autonomous institution is formed by formal and informal institutes that govern the relationship of the institution with the state, consumers of works and services, suppliers, credit organizations and other legal and physical entities, and this environment, in its turn, determines the internal institutional environment as part of formal and informal institutes (rules) determining the development and functioning of a specific autonomous institution [34]. At the same time, the internal institutional environment of internal control directly interacts with both the internal institutional environment of an autonomous institution and the external environment, which looks like a relationship between the micro level and the meso level, as well as the micro level and the macro level (figure 2).

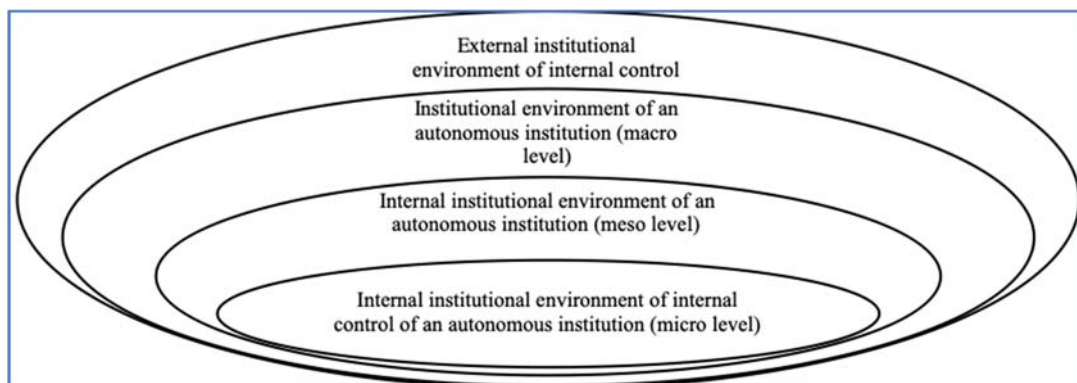


Figure 2 – The interaction order of the institutional environments of an autonomous institution

The presented interaction in figure 2 is largely subordinated to the priority of the formal rules of the institutional environment of an autonomous institution over the formal rules (institutes) of the internal institutional environment of the institution's internal control and, therefore, involves mandatory accounting, when developing local regulatory documents on internal control, legal documents on the special aspects of the development of an autonomous institution.

An effective model is based on such an understanding of internal control as a focus on optimizing costs, improving the efficiency of existing business processes and reducing costs alongside the establishment of financial responsibility centers (FRC) and building of financial flows of an economic entity. Consequently, effective internal control can be interpreted as control over business processes and FRC in all areas and divisions of the economic entity, aimed at costs optimizing as a condition for further development [27,36]. Therewith, the main directions of effective internal control should combine:

- 1) determination of key indicators of the Financial Responsibility Centers in the time perspective and in comparison [9];
- 2) analysis and building a model of business processes operating in an economic entity [7];
- 3) creation of an identification card of business processes and financial flows operating in an economic entity [38];
- 4) adjustment of the interaction system of various divisions with building of business process models [39].

The presented mechanism of the functioning of the model of the institutional environment of internal control in an autonomous institution constitutes the institutional concept of an autonomous institution internal control of consisting of the following main elements - the institute of internal control, institute components, institutional environment, model of the institutional environment and the relationship between the elements. It should be noted that the institutional approach is a new direction in the study and research of internal control in the institution [24,30,32,33]. At the same time, the institutional approach considers internal control as a set of fundamental concepts, rules and standards within a certain framework and is an extension of scientific and methodological developments in the field of internal control.

In this regard, the proposed concept in practice allows to represent the unity of the institution as an institute and its internal control as an institute, i.e. the totality of legal norms, rules, standards, concepts and mechanisms of their implementation into the economic entity. Summarizing, it should be noted that the system of internal control of an autonomous institution, from the perspective of an institutional approach, the more effective the system will be the more effective will be the influence of institutional factors (economic, financial, etc.) aimed at improving formal and informal rules on internal control in autonomous institutions, as well as on the whole autonomous institution. Among these factors, it is worth highlighting the improvement of formal institutions in the field of accounting and reporting, which are both objects of control and the main sources of information support for the internal control of an autonomous institution, which forms the efficiency of the internal control system.

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#### **АВТОМАТТЫҚ ИНСТИТУТТАРДА ІШКІ БАҚЫЛАУ ЖҮЙЕСІН ФУНКЦИЯЛЫҚ ҚОЛДАНУ**

**Аннотация.** Қазіргі заманғы бизнес шарттары нарықтық қатынастардың даму заңдылықтары мен сипаттамаларына негізделген. Бүгінгі күні кез-келген шаруашылық жүргізуші субъектінің сәтті және тұрақты қызметі басқару жүйесінің тиімділігіне тікелей байланысты, оның маңызды элементі дұрыс ұйымдастырылған басқару болып табылады. Кез келген шаруашылық жүргізуші субъектінің қызметінде бақылаудың орны, рөлі мен маңызы бухгалтерлік есеп, басқару және талдау сияқты маңызды. Басқарудың отандық ғылымы өте терең тамырларға ие және «басқару» ұғымының сан қырлы табиғаты мен тереңдігі «менеджмент» және «басқарушылық есеп» ұғымдарымен тығыз байланысты. Бәсекелестіктің күшеюі жағдайында бақылаудың тиімділігін арттыру мәселелері едәуір жаңарған кезде ішкі бақылауды ұйымдастыру, оны дамыту және кіріктіру мәселелері өзекті бола түседі. «Ішкі бақылау» категориясын, оның субъектілері мен объектілерін, басқару процесіндегі орнын зерттеу бізге оның құрылымында мақсатты бағдар мен әдіснамалық белгілермен ерекшеленетін жеке түрлерін анықтауға мүмкіндік береді. Ішкі бақылау жүйесін іс жүзінде жүзеге асыру оны тиімді ұйымдастырудың негізгі принциптеріне сәйкес жүзеге асырылуы керек, олар бір-бірімен тығыз байланысты және оларды біріктірудің тәртібі көбінесе нақты іскерлік жағдайлар мен жағдайларға байланысты болады. Ішкі басқару жүйесін жалпы басқару жүйесіне біріктіру әртүрлі деңгейдегі ақпараттың сенімділігін қамтамасыз етеді, сонымен қатар кәсіп басқару шешімдерін қабылдау мүмкіндігін төмендетеді. Автономды мекеменің ұтымды және экономикалық негізделген есеп саясатын жүзеге асыру кезінде таңдау жасау принциптері тікелей экономиканың мемлекеттік жүйесінің бухгалтерлік есеп стандарттарының қолданыстағы ережелеріне тәуелді. Бұл аспект материалдық, еңбек және қаржы ресурстарын пайдаланудың тиімділігіне ғана емес, сонымен қатар капиталдың айналым деңгейінің тиісті деңгейіне әсер етуге, капиталды салымдар мен айналым қаражаттарын қаржыландырудың қосымша ішкі көздерін алуға, тартуға мүмкіндік береді. автономды мекеме аясын кеңейту үшін сыртқы ресурстар. Тәуекелге бағытталған тәсіл элементтерін қоса алғанда, ішкі бақылаудың әртүрлі модельдерін қолдану кәсіпорынды басқаруды ұйымдастырудың концептуалды процесін дұрыс жүргізуге мүмкіндік береді. Авторлар ұсынған автономды мекеменің ішкі бақылау жүйесінің моделі бизнес-процестерде модельді іске асырудың түпкілікті мақсатына байланысты - ішкі және сыртқы ортаның факторларын ескере отырып, жүйелік көзқарасты, тәуекелге бағдарлауды ескереді. қаржылық жауапкершілік орталықтарында шығындарды азайту және кірісті арттыру кезінде бизнес-процестердің тиімділігі.

Менеджменттің негізі ретінде индикативті басқару моделі кеңінен қолданылады. Әдетте, ол ішкі бақылаудың кеңістіктік көрінісіне негізделеді және талдау ретінде, экономикалық субъектінің қызмет түріне байланысты, бизнес факторлары әсер ететін факторларды көрсететін әр түрлі көрсеткіштердің әсерін ескере



отырып, бизнеске бөлінеді. сыртқы және ішкі орта, атап айтқанда, бәсекелестік артықшылық параметрлері тұрғысынан.

Тиімді модельді пайдалануды ішкі бақылаудың перспективті моделі деп санаймыз. Интеграцияланған ішкі бақылау моделі туралы автордың идеясына сүйене отырып, оның негізгі құрамдас бөліктері мыналар болады: жүйелік тәсіл, ішкі және сыртқы ортаның факторларын ескере отырып, үлгіні бизнес-процестер мен қаржылық жауапкершілік орталықтарына енгізе отырып, тәуекелдерге назар аудару. Сонымен бірге, ішкі бақылау моделінің негізгі объектісі ішкі және сыртқы орта факторларының әсерінен туындайтын тәуекелдер болады. Ұсынылған модельдің мақсаты - қаржылық жауапкершілік орталықтарында шығындарды азайту және кірісті арттыру кезінде экономикалық субъектіде болып жатқан бизнес-процестердің тиімділігін арттыру.

Қолданыстағы заңнама аясында ішкі бақылаудың «бақылау ортасы» элементі институционалдық ішкі ортаға өзгергенін ескере отырып, автономды ішкі бақылаудың институционалдық ортасын қолдану практикасына келесі деңгейлер енеді: сыртқы және ішкі. Ресми және бейресми институттар түріндегі сыртқы орта басым болады, ол өзіндік мәдени және функционалды «микро институттармен» (ресми және бейресми) ұсынылатын шаруашылық жүргізуші субъектінің ішкі ортасына әсер етеді.

**Түйін сөздер:** автономды мекемелер, бухгалтерлік есеп, ішкі бақылау моделі, институционалды орта, шаруашылық субъектілері, бақылау тақтасы

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#### ФУНКЦИОНАЛЬНОЕ ИСПОЛЬЗОВАНИЕ СИСТЕМЫ ВНУТРЕННЕГО УПРАВЛЕНИЯ В АВТОМАТИЧЕСКИХ ИНСТИТУТАХ

**Аннотация.** Современные условия ведения бизнеса основаны на закономерностях и особенностях развития рыночных отношений. Успешная и стабильная деятельность любого хозяйствующего субъекта сегодня напрямую зависит от эффективности системы управления, важнейшим элементом которой является правильно организованный контроль. В деятельности любого субъекта бизнеса место, роль и важность контроля так же важны, как учет, управление и анализ. Отечественная наука о контроле имеет довольно глубокие корни, а многогранный характер и глубина понятия «контроль» тесно связаны с понятиями «менеджмент» и «управленческий учет». В условиях усиливающейся конкуренции, когда проблемы повышения эффективности контроля существенно обновляются, вопросы организации внутреннего контроля, его развития и интеграции становятся все более актуальными. Изучение категории «внутренний контроль», ее субъектов и объектов, места в процессе управления позволяет выявить в ее структуре отдельные виды, характеризующиеся целенаправленной ориентацией и методологическими особенностями. Практическая реализация системы внутреннего контроля должна осуществляться в соответствии с основными принципами ее эффективной организации, которые тесно взаимосвязаны, а порядок их объединения в большей степени зависит от сложившихся конкретных условий бизнеса и обстоятельств. Интеграция системы внутреннего контроля в общую систему управления обеспечит достоверность информации на различных уровнях, а также значительно снизит потенциал для принятия ошибочных управленческих решений. Принципы выбора при реализации рациональной и экономически обоснованной учетной политики автономного учреждения напрямую зависят от действующих норм бухгалтерского учета системы государственного сектора экономики. Этот аспект позволяет влиять не только на эффективность использования материальных, трудовых и финансовых ресурсов, но и обеспечивать надлежащий уровень оборачиваемости единиц капитала, получать дополнительные внутренние источники финансирования капитальных вложений и оборотных средств, привлекать внешние ресурсы для расширения сферы действия автономного учреждения. Применение различных моделей внутреннего контроля, в том числе элементов риск-ориентированного подхода, позволяет в должной степени осуществить концептуальный процесс организации контроля на предприятии. Модель системы внутреннего контроля автономного учреждения, предложенная авторами, учитывает системный подход, ориентацию на риски с учетом факторов внутренней и внешней среды, включение модели в бизнес-процессы с учетом конечной цели внедрения – повышение эффективности бизнес-процессов при снижении затрат и увеличении прибыли в центрах финансовой ответственности.

Индикативная модель управления широко используется в качестве основы управления. Как правило, он основан на пространственном видении внутреннего контроля, и в качестве анализа, в зависимости от вида деятельности экономического субъекта, распределяется бизнес-обработка с учетом влияния различных показателей, отражающих влияние факторов внешняя и внутренняя среда, в частности, в контексте параметров конкурентного преимущества.

Считается использование эффективной модели наиболее перспективной моделью внутреннего контроля. Исходя из авторской идеи интегрированной модели внутреннего контроля, ее основными компонентами станут: системный подход, акцент на риски, учет факторов внутренней и внешней среды, включение модели в бизнес-процессы и центры финансовой ответственности. Кроме того, основным объектом предлагаемой модели внутреннего контроля будут риски, возникающие в результате воздействия факторов внутренней и внешней среды. Целью предлагаемой модели является повышение эффективности бизнес-процессов, существующих в хозяйствующем субъекте, при одновременном снижении затрат и увеличении прибыли в центрах финансовой ответственности.

Учитывая, что элемент «контрольная среда» внутреннего контроля в рамках действующего законодательства изменился на институциональную внутреннюю среду, следует отметить, что внедрение в практику применения институциональной среды внутреннего контроля автономного учреждения состоит из следующих уровней: внешний и внутренний. Внешняя среда в форме формальных и неформальных институтов преобладает, оказывая влияние на внутреннюю среду экономического субъекта, представленную его собственными специфическими культурными и функциональными «микро институтами» (формальными и неформальными).

**Ключевые слова:** автономные учреждения, бухгалтерский учет, модель внутреннего контроля, институциональная среда, субъекты хозяйствования, информационные панели.

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## **THE CONTENT OF POWER AND GOVERNMENT IN CENTRAL ASIAN NOMADS**

**Abstract.** The article submitted for publication contains an analysis of the power-management system of Central Asian nomads. The focus of such tasks as:

– Analysis of military power, the cult of a warrior in the history of the evolution of the tribal power of the leader in ancient and medieval Central Asia in the context of the theory of chiefdom, neoevolutionism, aggressive and commercial theories of political genesis, evolutionary theories of the matrilineal and patrilineal development of the society;

– Study and analysis of the power authority of the tribal power through the system of titles and ranks in the Hunnu, Turkic, Oghuz, Karakhanid, Khitan, Seljuqid states, description and study of the terminology of Chinese texts on ranks and ranks, functions of officials and tribal chiefs, the role of a titled aristocracy in the management system nomadic polities.

**Key words:** history, Central Asia, polities, power, titulatura, nomads.

Nomadism belongs to the components of the world-historical processes, and the territory of Kazakhstan was its key area, here cattle breeding was the main way of doing business. In the vast territory of the steppe zone of Central Asia, from the antiquity to the colonial era, nomadic politicians have played a significant role. According to written sources of authentic and external nature, nomad societies have left the original and local forms of political organization with inherent tribal relations as the most stable structure of social relations. As J. Haas writes: «The question of the origin of the state is mainly the question of how and why on the long way of the evolution of culture in society there were originally formalized institutions of governance» [1, p.19]. In our opinion, the study of the institution of political power reflects the problem of studying the institutions of governance in nomadic societies, as a variant of the evolution of the statehood of Central Asian peoples.

In the present article, we focused on the study of the content of the institution of power as a system of social and political management in the Central Asian nomads of the ancient and early medieval periods.

The purpose of this article is a comprehensive analysis of the content of power and control of the nomads.

To accomplish this, the following tasks were undertaken:

– Analysis of military power, the cult of a warrior in the history of the evolution of the tribal power of the leader in ancient and medieval Central Asia in the context of the theory of chiefdom, neoevolutionism, aggressive and commercial theories of political genesis, evolutionary theories of the matrilineal and patrilineal development of the society;

– Study and analysis of the power authority of the tribal power through the system of titles and ranks in the Hunnu, Turkic, Oghuz, Karakhanid, Khitan, Seljuqid states, description and study of the terminology of Chinese texts on ranks and ranks, functions of officials and tribal chiefs, the role of a titled aristocracy in the management system nomadic polities.

From the late Bronze Age and the Iron Age in the nomadic society, the cult of a warrior begins to claim the right of a centrally forming military power with the corresponding redistributive functions - leader,

leader, ruler. The cult of the warrior began to manifest itself in connection with the cultivation of the horse for war, revealed the great endurance and strength of men, the cult of the warrior became the leader in the culture of nomads. The image of Maude (Maodun) -shanuyu in the annals is exceptionally bellicose, it is a warrior, leader, ruler of the steppe power. His famous receiver was Laoshan-shanyu, whose image repeated the features of Mode, as a warrior, the winner of Yuezhi, Dunhu, Hun. The formation of the Hunnu Empire was accompanied by a change of political domination in the Steppe, the nomadic society acted under the name of the Hunnu, and the acts of conquering the Yuezhi and Dunhu were accompanied by military victories, migrations and the disappearance of their references in the chronicles in the territory under the subjugated Hun.

In Turkic society, every man who reached the age of initiation became a warrior (Turkic er) - this is all a free adult male population, capable of carrying arms. Before reaching the er-warrior age, boys, teenagers, and male children were in the category «oyu, uri», among which «beg oyul», born with «prescribed» status [2, p.145], are distinguished. According to Yu.A. Zuev on the hundredth organization, in which the «hundred» is the second division of the decimal system, the oldest form of the calculation of the tenthsystem of the military-tribal organization of the Turkic society, this age group performed intelligence and alert functions with respect to the tribe, but its main purpose was to teach military affairs in chapter with a respected warrior. The transition to the age group of an adult member of society enshrined the military's military and rank functions, given titles. Age stratification was reflected in the ethnosocial organization of the entire Turkic society [3, p.95-100].

Kagan stood at the head of the category of er-warriors, i.e. Turkic society-troops and thought worthy to manage it. Moreover, it was not just an army - it was a Turkic el, a kaganate. Among the category of er-warrior Turkic memorials highlight the most illustrious alp-er - hero warriors. The warrior-hero became the key figure in the epic tales of the Turkic peoples. The main function of the kagan and its troops was the non-economic activity «to acquire» (the Turkic qazyan - to earn, conquer) the means of subsistence, this function is assigned to the kagans, and is connected with distribution (distribution) and redistribution (redistribution) mechanisms.

In the world outlook, there is also a process of asserting the legitimate right to the power of the clan in the male line, associated with the cult of the heavenly deity. The appearance of the idea of the Father-Heaven is fixed in the Indo-European cultural tradition, in which the Father-Heaven is the supreme Indo-European deity [4, p.791-792]. A.K. Akishu holds the hypothesis that from the 1st millennium BC. and right up to the early Middle Ages throughout the whole of Central Asia, one of the religions was Saka Mithraism - the polytheistic religion with the cult of the god Mitra - the solar god, the guarantor of the union of different types: «Saka Mithraism was basically a» male «religion, an essential role in it belonged to the warrior-horsemen» [5, p.25,28]. This «religion» on the vast territory of cattle-breeding societies contributed to the cult of the rider-rider cult, which can be traced through archaeological materials: burials with horses, tsar's burial mounds, lack of armament items in burial mounds, which indicates the ranking of a society where only warriors had burial rights with weapons [6, p.71].

For the Turkic authentic written heritage, a unique case of a clear representation of the origin of the male warrior and male offspring from the heavenly deity is recorded. The "heavenly" origin of the male warrior father (Turk er) is fixed in the Yenisei inscription (E-53), which originates from the area in the right-bank part of the middle reaches of the river. Elegend [7, p.279-281]. In this lapidary inscription is transmitted the idea of the allocation of kinship in the male line (the blue sky - the husband - the male offspring - the husband-warrior). The relationship of the father is based on the idea of the heavenly-solar tradition as opposed to the lunar-terrestrial, maternal, prior tradition and the whole complex of representations of the Sarmatian-Yueji period. His Turkic written fixation on the stone is the most significant confirmation of the strengthening of the position of father's law among the nomadic tribes of the Central Asian steppes. The sovereign power of the Turkic Khagans was based on the connection of the kagan with the deity of Tengri, "unbegottenness" and "heavenliness" is affirmed by the prerogative of only the Khagans of Ashina [8]. Genealogical legends about the origin of Usun and Ashin repeat each other, pointing to the distinctive feature of their socio-political organization and world view.

The cult of the warrior formed the social, political and ideological foundations for the formation of the supreme authority of the leaders. According to the theory of chiefdom, tribal chiefs became the basis of the

centripetal power, which helped develop the many other leaders endowed with this or that title, functions, rank, but belonging to the same tribal system of relations.

Chinese chronicles have fixed a complex and harmonious system of the tiutulno-ranking system of the Hunnu Empire. In studies on the project, a group of Sinologists gave their vision of this structure in the form of a hierarchy of titles and ranks. Relying on Chinese sources, the founder of the Hunnish state Mete (Mode Shanuy), the kagan ruled the country, dividing it into four parts. The central part of the rules itself, and gave the remaining parts to his sons, the eastern part of the left Bilge khan, the western part to the right Bilge khan, and the far-landed lands gave the khans to the Western Khan bearing the title. Total 24 levels of rulers were in power in the Hun state and subordinated to the Great Khagan. Approximately, they can be listed: the left wing of the Bilge kagan, the right wing of Bilge Khan, the yabgu (the chief vizier), the kut of the left wing, the right wing kut, the left wing han, the khan of the right wing, the left wing of the Ulug Sangun (general), the right wing of the smiley sung, smile tutk bek of the left wing, uluk tutuk bek of the right wing, uluk kazyna bek of the left wing, uluk kazyna bay of the right wing, batys khan, tumen basses, thousandths, centurions, foremen, and others.

For the Turkic period, a system of titles for Western Turks, Turgeshes, Oguzes, Karakhanids and Seljukids was described. In several Chinese chronicles a list of Turkic titles, eastern and western Turks is given. Traditionally, these titles are presented in order of decreasing the power of their owners. In Zhou Shu, Bei Shee and Sui Shu, the list of these record of the main «ranks and titles» is as follows: after the kagan and his wife katun are listed yabgu (Chinese hu), shad/chad (Chinese sha/shee/cha), tegin (Chinese Tele, Tetzin), Elteber (Chinese Sylefa) and Tudun. In Tan Shu, in addition to the titles mentioned above, there are chor (Chinese zho/cho), apa (Chinese abo), and Irkin (Chinese sytzin).

In the old version of Tang shu (Tszyu Tan Shu), the title of Tarkan is also mentioned. From these schematic lists of Chinese chronicles it is clear that the highest title was considered to be kagan. The place and significance of katuns, whose title invariably accompanies the title of kagan, has not been determined. Then the titles yabgu, shad and tegin are important. The title yabgu-kagan was fixed and became the hereditary title for the rulers of the western side of the Turkic kaganate, i.e. Western Turks. The Arab-Persian authors preserve information about the titles of the Oguzes, the main components of which were yabgu (jabgu, baigu), kol-erkin (erkin), shubashis, inalas, orki, tarhans and beks.

The system of titles and ranks in the management system of the Huns and Turks was not differentiated from tribal relations, moreover, it had an inherited character and only when the empire was added as a super-identity did the system of governors in the agricultural regions of the empire arise.

In 907 the East Mongolian tribes of the Khitan managed to create their powerful Khanate called Kidan-Liao, the Liao state. Studies Bakhtiyar Tursunov [9], who studied the state structure and administrative-military ranks, set out a systemized system of titles and ranks taken from the Khitan.

1. Organ sofa (the central seat of the government), there were institutions of military affairs, administration, industry, internal affairs of the khanate rate, laws and institutions for punishment, order control bodies.

2. The body for the protection of the khan horde, performed the functions of protecting the khan's stakes and protecting government objects.

3. The establishment of the officials of the khan's tent (Horde), performed the functions of overseeing the rioters, providing the khan's tent with papers, feathers, ink, seals, lamps and everything necessary.

4. Establishment of the community of the khan's tent (household, khan's clan), consisting of: soldiers of personal protection, responsible for the security of the khan's family, heirs of the throne, heads of the tents of the princess-malik, officials.

5. The tent of strangers - this body directed the affairs of the elders of subordinate peoples like Bukhai and Shy.

6. The establishment of the Horde was responsible for various cases of permanent and temporary hordes.

7. The tribal organ, this body ruled over the Khitan and other settlements, was appointed by the imperial decree in different places by local governors-governors.

8. The military affairs body, which included the main military headquarters, which was headed by Vali Ahdi and heirs, bodies under the leadership of the viziers and commanders-in-chief. The same body included

the Eastern District, the Western District, the Great Sangun, the headquarters of military defenders, the military institutions of the Khitan and the conquered tribes.

9. The body of military campaigns carried out the functions of planning military campaigns, intelligence, commanding the right, left and central wings-troops.

10. The body for the supervision and development of goods of artisans, pastoralists and the maintenance of especially valuable birds and animals.

Such a complex management system in the Liao Empire was determined by the influence of China, the desire to balance the management system of pastoral and agricultural areas. In the western regions of Central Asia, we also note the increasing complexity of the system of titles and management, including agricultural and pastoral areas.

A more complex system of titles and management is fixed in the states of the Karakhanids and the Seljukids. B. Kochnev, the coins identified on the coins engraved in the Karakhanid era were divided into three groups: Turkic (2846 times - 64.8%); Arab (used 1406 times - 31.9%); Persian-Tajik (used 144 times - 3.3%) [10, p.32]. The scientists identified five main Turkic titles, which are found on the coins that survived to us from the Karakhanids - khakan (kagan) or khan, ig, tegin, yoga and jog [11, p.9].

The Arab titles of the Karahanids are represented by such titles as sultan (sultan ash-Sharq wa-sin «sultan of the East and Sina» and ulug sultan as-salatin «great sultan of sultans»), malik ([al-] malik al-Islam, al-malik al-Mashrik, malik al-Mashrik wa-s-Shin), amir (amir al-madarah, «amir amirs»), mawla amir al-mu'minin «client of the Amir believers») [10, p.22]. The Persian-Tajik titles were characterized by the titles of dikhkan, pakhlavan (pakhlavan ash-Shark), shah, padha [x], shahanshah, malikshah (malikshah al-a-zam), sanjar (sanjar al-a'zam) [10,p.23].

The highest dignitary in the empire of the Great Seljuks was her ruler - the Sultan. The first Seljuqid, who took this title, became Togrul bey, who, after another victory over Mesud Gaznevi in 1038, ascended the throne in Nishapur [11, p.28]. In Nishapur and Beihaq the Khutb was read. In it, along with the name of the Abbasid caliph, his name was also mentioned, as well as the title – «The Great Sultan» («Sultan-ı a'zam») [12, p.329]. Thus, in the environment of the Oguzes, which belonged to the Kynyk Seljuq tribe, a new, already not Turkic, and Arabic title – «Sultan» was applied to the ruler, formerly known as «yabgu».

The Seljuks, in contrast to their predecessors Oghuz and Karahanids, had a management system based not on the bridle structure of political power, but based on the agricultural system. In managing the empire, the Seljuk sultan relied on the Great Sofa, which, in his absence, was headed by the Grand Vizier. This state body consisted of the following divans:

– *Divan-ı Tuğra ve İnşâ* (Divan-i Tuğra ve insha). The main task of this department was the preparation of texts of the decrees of the Sultan, other documents of national importance, the conduct of diplomatic correspondence, correspondence with the rulers of the vassal states, governors of the provinces, and so on. The documents became valid after they were sealed by the seal (tuğra) of the sultan. The custodian of the stamp was the head of the divan, a keeper - *tuğrayî* (tuğrai).

– *Divan-ı İstifâ* (Divan and istif). The department dealt with financial issues, kept records of the state's revenues and expenditures, drafted a budget, and so on. The sofa had a widely ramified apparatus in the provinces. Its purpose was to ensure the collection of taxes on time and in certain sizes for each province. The person who answered before the vizier and the sultan for collecting taxes in each province was her governor - amid (amide). The representative of the sofa in the provinces was a dignitary called müstevfi (muestevfi).

– *Divan-ı İşrâf-ı Memâlik* (Divan-i ishraf ve memimalik). He exercised control over the activities of government officials in the capital (and even in the palace) and in the provinces. The Department also collected information on the internal political situation in the country. The dignitary, who headed the sofa, was called müşrif (mushrif).

– *Divan-ı Arz* (Divan-i Arz). The main functions of the sofa were the registration of the payroll of the armed forces, the calculation and payment of the salary of the standing army, the provision of the army with weapons, equipment, uniform, food, fodder, etc. The sofa did not exercise command functions, did not participate in the decision on the use of armed forces. He was in charge of their condition. To this end, this sofa was required to carry out regular inspections of the army, holding reviews and parades. He was headed by ârız (aryz) [27, p.509-510; 13, p.156; 11].

**Conclusion.** Thus, in the comparative typological analysis of the institution of political power in different periods (antiquity and the Middle Ages), one can trace the complication of forms of government, the evolution of governance institutions, including stages: the consolidation of military power as the basis for the formation of supreme power, which was an undifferentiated system of functions. Over time, the supreme authority authorizes the development of the titular rank system into a tribal management system, which leads to a gradual de-differentiation of the functions of supreme power.

The meaning of the transformation in the management system consisted in adapting to the influences of the agricultural management system and incorporating the rollepline relations in the system of centralized management. These observations allow the researchers to conclude that in the Marxist theory the social class nature of social development overlooked the stability of the economic specialization of the cattle-breeding society, the existence of political organization and socio-economic integrity. Moreover, the search for class has formed a theoretical approach, which defined two opposing societies in Central Asia: sedentary and nomadic. This view did not allow us to consider the processes occurring in nomadic empires in integrity, always separated the agricultural and cattle-breeding population in their development, revealed various levels of cultural development, and the absence of mutual influences on the management system.

**Analysis methodology is based** on the application of the theories of political genesis, evolutionism and neo-evolutionism

**The result** of the study was the conclusion that there is a complication of management forms, the evolution of governance institutions, including stages: the consolidation of military power as the basis for the formation of supreme power, which was an undifferentiated system of functions. Over time, the supreme authority authorizes the development of the titular rank system into a tribal management system, which leads to a gradual de-differentiation of the functions of supreme power. The transformations in the management system of the nomads were associated with the adaptation to the influences of the agricultural management system and incorporating the rollepline relations in the system of centralized management.

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### **ОРТАЛЫҚ АЗИЯ КӨШПЕНДІЛЕРІНІҢ МЕМЛЕКЕТТІК БАСҚАРУ ҚҰРЫЛЫМЫ**

**Аннотация.** Мақалада Орталық Азия көшпенділерінің мемлекеттік басқару құрылымы жүйесіне талдау жасалынған. Төмендегі мәселелерді шешуді көздейді:

– Қоғамның аталық және аналық даму тізбектеріндегі эволюциялық теория, политогенездегі басқын-шылдық пен сауда теориясы, неоэволюционизм басымдығы теориясы қолданылуы тұрғысынан Орталық Азия ежелгі, ортағасырлық тарихындағы әскери билікке талдау жасау, оның ішінде қарапайым жауынгерден көсемдік билікке дейінгі билік сатыларының жоғарылауы мәселесі;

– Ежелгі хұндар, түріктер, оғыздар, Қарахандықтар, кидандар, селжүктер мемлекет теріндегі атақтар мен дәрежелер жүйесі арқылы тайпаларды басқару билік құзыреттеріне талдау және зерттеу жүргізу; қытайлық мәтіндердегі шенеуніктер міндеттемелері, атақтары мен дәреже деңгейлері атау ұғымдарына талдау жасау һәм зерделеу; көшпенділер қауымындағы билік басындағы ақсүйектердің маңыздылығын қарастыру;

Талдау әдістеме негізіне политогенез, эволюционизм, неоэволюционизм теориялары қамтылған.

Зерттеу нәтижелері ретінде биліктің басқару сатыларының біртіндеп жоғарылауы, күрделенуі, даму тарихы мәселесі арнайы қарастырылады; оның ішінде мемлекеттік билік міндеттері арасындағы әскери биліктің жоғары билік қалыптасуындағы орны кеңінен сөз болады. Уақыт өткен сайын жоғары биліктегілер атак, дәрежелердің даму жүйесін заңды түрде мойындап, тайпаларды басқарып тұрған мемлекеттік билік міндеттерінің жіктелуіне жол ашады. Мұндай бейімделушілік егіншілер қауымының ықпалы арқылы пайда болды және отырықшы мемлекеттік басқару жүйесіне ру-тайпалық қарым-қатынастар құрылымы енгізілді.

**Түйін сөздер:** билік, көшпенділер, Орталық Азия, атак-дәрежелер.



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## СОДЕРЖАНИЕ ВЛАСТИ-УПРАВЛЕНИЯ У ЦЕНТРАЛЬНО-АЗИАТСКИХ КОЧЕВНИКОВ

**Аннотация.** Проводится анализ системы власти-управления у центрально-азиатских кочевников. В центре внимания такие задачи, как:

– анализ военной власти, культы воина в истории эволюции надплеменной власти вождя в древней и средневековой Центральной Азии в контексте применения теории вождества, неоэволюционизма, завоевательной и торговой теорий политогенеза, эволюционистские теории матрилинейного и патрилинейного развития социума;

– изучение и анализ властных полномочий надплеменной власти через систему титулов и рангов в государствах хунну, тюрков, огузов, караханидов, киданей, сельджукидов, описание и исследование терминологии китайских текстов о рангах и чинах, функциях чиновников и родоплеменных вождей, роль титулованной аристократии в системе управления кочевыми политиями;

Методология анализа основана на применении теорий политогенеза, эволюционизма и неоэволюционизма.

Результатом исследования стали выводы о том, что прослеживается усложнение форм управления, эволюция институтов управления, включающие в себя этапы: укрепление военной власти как основы для формирования верховной власти, представлявшей собой недифференцированную систему функций. С течением времени верховная власть санкционирует развитие титульно-ранговой системы в надплеменную систему управления, что приводит к постепенной дифференциации функций верховной власти. Трансформации в системе управления номадов были связаны с приспособлением к влияниям земледельческой системы управления и включения родоплеменных отношений в систему централизованного управления.

**Ключевые слова:** история, Центральная Азия, политики, власть, титулатура, номады.

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## **THE MODEL STATUS OF THE HEAD OF THE SUBJECT OF THE RUSSIAN FEDERATION**

**Abstract.** The relevance of the topic is determined that the highest official of the subject of the Russian Federation are central in the system of regional public authorities and has a significant impact on the performance of Federal state functions. The Federal structure of the Russian Federation provides for different levels of governance.

The effectiveness of solving state problems depends on the quality of management in the regions. The legislation defines only the basic principles of the requirement of the organization of power in the subject of the Russian Federation. Subject of the Russian Federation can regulate the organization of management. Federal legislation provides the subjects of the Russian Federation with relative freedom in determining the system, structure, order of formation and functioning of the Executive power. The subjects of the Russian Federation are different models of governance, which determine the status of the head of the subject of the Russian Federation. The article identifies two models for realizing the principle of separation of powers in the subjects of the Russian Federation.

The place of the head of the subject of the Russian Federation in the power system is considered from the position of the scope of powers. The article describes the status of the head of the subject of the Russian Federation when using different models, highlights the features of organizational models. The practical application of the management model depends on the characteristics of the territory (area, population, socio-economic situation). In contrast to the Federal model, the head of a subject of the Russian Federation in fact included in the system of Executive power regardless of the model. The article deals with discussion issues. The article highlights the main disadvantages and offers suggestions on the advantages of models.

**Key words:** Federal structure, legislation of the subject of the Russian Federation, the highest official, the head of the subject of the Russian Federation, the system of Executive power.

**The relevance of the topic.** The Federal system is used in less than 10% of the countries of the world. The Federal structure assumes the presence of a complex system of management, the separation of powers between levels of government. In the Russian Federation the legislator establishes only the basic principles of the organization of management in subjects of the Russian Federation, providing thus the opportunity independently on places to regulate some questions.

Therefore, in the subjects of the Russian Federation there are different models of management. Management issues in the subject of the Russian Federation in the scientific literature are considered from the position of organizational aspect [2,4,5] and functional aspect [3,4,7]. The aim of the study is to highlight the features of the position of the highest official in the system of state power of the subject of the Russian Federation under different organizational models.

**Materials and methods of research.** The method of analysis of the legislation of subjects of the Russian Federation and existing practice was used. The research was conducted using legislation and scientific papers on the research topic.

**Research results.** On the example of the Siberian Federal District, organizational models of the status of the head of the subject of the Russian Federation were identified.

The status of the highest official of the subject of the Russian Federation is not fully regulated. In addition, to allocate as an independent position – the position of the head of the highest executive body of state power of the subject of the Russian Federation, working on a professional competitive basis.

The management system in the Russian Federation is under reform. The basic principles of governance were laid down in the Constitution of the Russian Federation. Until 1999, the subjects of the Russian Federation, independently determined the management system, based on constitutional principles. After the adoption of the Federal law «On General principles of organization of legislative (representative) and executive bodies of state power of the subjects of the Russian Federation» dated 06.10.1999 (hereinafter the Federal law «On General principles...»), the process of unification of management began. The Federal law established the general principles of the organization of state power of the subjects of the Russian Federation. The change of the Federal legislation testifies to reduction of independence of the subject of the Russian Federation in the decision of organizational questions of management [2,5,6].

The provisions of the law allow the subjects of the Russian Federation to take into account regional peculiarities. The scientific literature suggests that with the adoption of this law there was a strengthening of the vertical of power and as a consequence it affected the degree of independence of the regions in determining the management structure [5, p.93]. Despite the presence of Federal regulations, the structure of Executive power in the subjects of the Russian Federation is very diverse both in organizational and functional sense. There are different approaches in determining the status of the higher official of the subject of the Russian Federation (hereinafter the head of the subject of the Russian Federation) in the system of authorities of subjects of the Russian Federation. And also, the structure by types of bodies and a combination of powers differs [7, p.139].

The legislation of the Russian Federation ambiguously fixes existence of a post of the head of the subject of the Russian Federation. So, according to article 2 of the Federal law «On General principles...» the position of the higher official of the subject of the Russian Federation may be established by Constitution of the subject of the Russian Federation. The legislator doesn't include this position in the number of mandatory. Besides, this position is not specified in the List of standard state positions of subjects of the Russian Federation approved by the decree of the President of the Russian Federation of 04.12.2009 № 1381 «About standard state positions of subjects of the Russian Federation».

According to article 17, paragraph 4 «the structure of executive bodies of state power of a subject of the Russian Federation is determined by the highest official of the subject of the Russian Federation (head of higher executive body of state power of a subject of the Russian Federation) in accordance with the Constitution (Charter) of the subject of the Russian Federation». Thus, in the absence of this official, the question arises: «what body or official will be determine and / or change the structure of the Executive power?». In practice, the position of the highest official is provided in all subjects of the Russian Federation.

The fundamental principle of the organization of power is the principle of separation of powers [1, p.278]. In contrast to the Federal model of management, in the subjects of the Russian Federation the highest official is part of the Executive power system. The Federal law uses the following construction «the highest official of the subject of the Russian Federation (head of higher executive body of state power of a subject of the Russian Federation)». Based on generally accepted rules of legal technique, the terms «the highest official of the Russian Federation subject» and «the head of the higher executive body of state power of a subject of the Russian Federation» are equivalent in this legal act. In fact, the legislator includes the head of the region in the system of Executive power of the subject of the Russian Federation as a head.

The status of the head of the Russian Federation subject in the Executive power of the Russian Federation varies. In the subjects of the Russian Federation, the following options are used.

1. Combination of two positions (the head of the region and the head of Executive power). The title indicates the double status of the head of the subject of the Russian Federation and the head of the executive body of the subject of the Russian Federation (for example, the Head of the Republic of Khakassia – The Chairman of the Government of the Republic of Khakassia; Altai territory Governor, the Chairman of the Government of the Altai territory);

2. The head is included in the system of Executive power, while the functions of the head of the highest executive body are performed by the first Deputy head of the subject of the Russian Federation (for example, Krasnoyarsk territory, Irkutsk region).

The first variant involves direct leadership of the highest executive body of the subject of the Russian Federation. In the second variant, another official performs the management function of the Executive power of the subject. At the same time, the head of the subject of the Russian Federation retains «leverage», because the head of the executive body is directly subordinate to the highest official of the subject of the Russian Federation.

Analyzing the status of the head of the subject of the Russian Federation, V. A. Hmara and E. A. Psarev come to the following conclusion. Direct inclusion of the head of the subject of the Russian Federation in the highest executive body as the head «provides centralization of the power and is characteristic for mobilization or «manual» type of management» [4, p.373]. Another variant, providing for a special post of the head of the executive body of the subject of the Russian Federation, «leaves more opportunities for separation of powers, specialization in management and seems more promising» [4, p.373]. In large subjects of the Russian Federation, the second variant is more preferable, since it allows to distribute the authority to manage the subject of the Russian Federation.

Allocation of a separate position of the head of the highest executive body of the subject of the Russian Federation allows to appoint the head proceeding from professional qualities and experience. The position of the head of the subject of the Russian Federation is elective. Therefore, the scientific literature discusses the need to refuse the election and appointment of the head to the post [8]. Therefore, the requirements for the presence of experience in the field of management or economic activity to the candidate for the post of head of the subject of the Russian Federation can't be presented. When using the second variant, possibly appoint a head based not on party or other political preferences, but on professional characteristics, taking into account the existing experience of economic or managerial activities. Thus, the elected head will be able to concentrate the efforts on other directions of work.

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#### **РЕСЕЙ ФЕДЕРАЦИЯСЫ СУБЪЕКТІСІНІҢ БАСШЫСЫ МӘРТЕБЕСІНІҢ МОДЕЛЬДЕРІ**

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#### **МОДЕЛИ СТАТУСА ГЛАВЫ СУБЪЕКТА РОССИЙСКОЙ ФЕДЕРАЦИИ**

**Аннотация.** Актуальность темы обусловлена тем, что высшее должностное лицо субъекта Российской Федерации занимает центральное место в системе региональных органов государственной власти и оказывает существенное влияние на выполнение общефедеральных государственных функций. Федеративное устройство Российской Федерации предусматривает наличие разных уровней управления.

Эффективность решения государственных задач во много зависит от качества управления в регионах. Законодательство определяет только основные принципы требования организации власти в субъекте Российской Федерации. Регионам предоставляется право регулировать вопросы организации управления.

Федеральное законодательство предоставляет субъектам РФ относительную свободу в определении системы, структуры, порядка формирования и функционирования исполнительной власти. В субъектах РФ используются разные модели организации управления, которые определяют статус Главы субъекта РФ. В статье выделяется две модели реализации принципа разделения властей в субъектах Российской Федерации.

Место Главы субъекта РФ в системе власти рассматривается с позиции объема полномочий. В статье дается характеристика статуса Главы при использовании различных моделей, выделяются особенности организационных моделей. Практическое применение модели управления зависит особенностей территории (площади, численности населения, социально-экономического положения). В отличие от федеральной модели, Глава субъекта Российской Федерации фактически включен в систему исполнительной власти независимо от модели.

Выделение отдельной должности руководителя высшего исполнительного органа субъекта Российской Федерации позволяет назначать руководителя исходя из профессиональных качеств и опыта. Должность главы субъекта Российской Федерации является выборной. Поэтому в научной литературе обсуждается необходимость отказаться от избрания и назначения руководителя на должность [8]. Поэтому требования к наличию опыта работы в сфере управления или хозяйственной деятельности кандидату на должность главы субъекта Российской Федерации не могут быть представлены. Также возможно назначение руководителя исходя не из партийных или иных политических предпочтений, а по профессиональным характеристикам, с учетом существующего опыта хозяйственной или управленческой деятельности. Таким образом, избранный руководитель сможет сосредоточить свои усилия на других направлениях работы.

В статье рассматриваются дискуссионные вопросы, а также выделяются основные недостатки и формулируются предложения о преимуществах моделей.

**Ключевые слова:** федеративное устройство, законодательство субъекта РФ, высшее должностное лицо, глава субъекта РФ, система исполнительной власти.

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## **FORMATION OF INTELLECTUAL CORPORATE CAPITAL: METHODS AND MODERN TRENDS**

**Abstract.** The accumulated assets of intellectual capital serve as the basis for the formation of competitive advantages of TNCs in the global economy. The world leading corporations are diversifying methods of forming and attracting intellectual capital in terms of increased competition. The aim of the study is to identify modern features and methods of intellectual capital accumulation as the basis of competitive advantages of TNCs in the global environment. The findings imply that the basis of leadership and high competitiveness of TNCs are the accumulated assets of intellectual capital. The result of the study was the systematization and disclosure of the methods of accumulation of intellectual corporate capital. The current trends in the accumulation of intellectual capital assets by leading TNCs of the world are revealed. The accumulation of corporate intellectual capital of corporations is carried out on the basis of large-scale investment in assets: the development of corporate forms of personnel training, a tremendous increase in R&D expenses, the formation of distributed innovation networks and open innovation platforms, the introduction of the latest knowledge management mechanisms. The forms of attracting intellectual capital from outside are actively used: the search and attraction of talented and highly qualified human resources from other countries, the purchase of patents, technologies, management models, mergers and acquisitions of companies, etc. Transnational corporations are becoming the leading subjects of spending on science in the world: in the top ten countries they account for more than half of all R&D costs, and in the leading countries of the USA and China - up to 80%. The accumulation of corporate intellectual capital is characterized by tendencies in the formation of two powerful world leaders - the USA and China, increased competition, a sharp increase in R&D costs, regional and industry transformations. The world leaders in science spending are the corporate sector in the United States and China. The sectoral structure of the world's leading transnational corporations is changing: instead of oil and automobile, the top ten transnational corporations now mainly include computer and high-tech companies. Aggressive strategies for increasing intellectual assets are being implemented. An effective tool for accumulating intellectual assets is mergers and acquisitions. The leaders in the number of mergers and acquisitions are TNCs from leading countries: USA, China, United Kingdom, Germany and Japan. The formation of corporate intellectual capital is an important step in building an effective synergistic interaction of all the constituent triangles "business-education-science". This triad is a key tool for the strategic development of the knowledge economy for any country in the world.

**Key words:** human capital, corporate universities, structural capital, organizational capital, R&D, M&A, outsourcing

**Introduction.** While the post-industrial paradigm of social development is under formation, knowledge emerges as the key resource, generation, spreading, and use of which is provided by various actors (such as state, educational institutions and scientific institutions, enterprises, personalities), among which the transnational corporations play a special role. The leading transnational corporations are the flagships of the global processes of intellectual capital build-up due to accumulating huge human capital resources such as highly skilled and motivated professionals, investing heavily in research and development, and ensuring the integration of scientific developments and practical solutions. TNC concentrate technological priorities, while development and implementation of the latest products, technologies, and business models is being developed, and integrated knowledge management systems are formed. The intellectual capital embodied in the knowledge, experience, and results of the creative work of highly skilled personnel becomes

a key asset in the formation of competitive advantages and high competitiveness of TNCs in the global economic environment.

The rapid digitization and networking of the global economy transforms its configuration, factors, and instruments of functioning. Under these processes, the leading corporations have changed the composition (instead of petroleum and automotive top ten leading TNCs of the world there are mainly computer and high-tech companies), global value chains are formed, in which all processes of intellectual capital accumulation are accelerated, global instruments of search, engagement, and use of the human capital are activated.

**Theoretical basis.** The category "intellectual capital" does not have a clear definition in the scientific literature. The growth of its significance for the development of society and its individual subjects led to an increase in attention to this problem among scholars. The first began to explore the intellectual capital of the company and identified L. Edvinsson, M. Melon, A. Broking, T. Stewart, who had a unique experience in managing intellectual capital. L. Edvinsson considered the notion of intellectual capital identical with the concept of intangible assets and considered it as a necessary condition for the company's competitiveness (Edvinsson, 1999). Significantly different from the presented interpretation of intellectual capital thought A. Broking, formed from the standpoint of practice, which actively uses in its activities the results of intellectual work. According to A. Broking, intellectual capital is a term for identifying intangible assets without which the company can't exist and enhance competitive advantages (Broking, 2009). In general, the approach to the definition of intellectual capital in terms of auditing, the need for accounting for intangible assets that are becoming more diverse (patents, know-how, brands, etc.) – R. Petty, J. Guthrie (Petty, 2000), G. Hamel, C. Prahalad (Prahalad, 2000), etc.

There is no unanimity in determining the structure of intellectual capital. Thus, according to L. Edvinsson, intellectual capital is the totality of human capital, structural capital and customer capital (Edvinsson, 1999), each of which can be borrowed or own. Broking divides intellectual capital into four types of assets: market assets; 2) intellectual property assets; 3) human capital and 4) infrastructure assets. Stewart allocates human, structural capital and consumer capital. Famous Ukrainian scientist A. Chukhno also allocates human capital, structural capital and consumer capital. In accordance with the approach of D.L. Volkov, T.A. Garanina (Volkov, 2006), the structure of the components of the intellectual capital of enterprises can be represented: human capital, organizational (structural) capital and capital relations.

The uncertainty of the structure of intellectual capital, the emergence of new important assets determines the relevance of the problem of assessing the assets of intellectual capital. This issue is also unclear. The systematization of many approaches to the assessment of intellectual capital has made it possible to distinguish the following main types: Intellectual Asset Valuation, Market Capitalization Methods, Return on Asset Methods - ROA, Value Added (EVA, VAIC, Calculated Intangible Value, etc.), Value Added Intellectual Coefficient (VAIC), Scorecard Methods - SC, Balanced Scorecard (BSC), Skandia Navigator Balanced ScoreCard, Value Chain Score Board, Business IQ), Intangible Asset Monitoring (IAM), Intellectual Capital Rating (IC Rating), Sei-Cho™ and MAGIC, etc.). A. Pulik proposed method of evaluation based on the intellectual value added factor (VAIC™) (Pulik, 2000) and used to evaluate to 30 companies from FTSE list. It allows assessing the contribution to the value of tangible and intangible assets. Further developed and supplemented this method by G. Laing, J. Dunn, S. Hughes-Lucas (Laing G., 2010), M. Chen (Chen, 2005). In the works of N. Salamudin, R. Bakar, M. Ibragim and F. Hassan we find the possibilities of evaluating the intangible assets of business structures and their activities in specific and regional capital markets (Salamudin, 2010).

Intellectual capital becomes a strategic asset, a decisive production factor in the condition of a knowledge economy. The theoretical aspects of the study of the essence of intellectual capital and its influence on the formation of the value of the company in the conditions of industrial revolution, we find in Edvinsson's work (Edvinsson, 1999). L. Antoniuk, I. Gernego and others research the possibilities of enterprise development on the basis of formation and use of intellectual capital, taking into account the general conditions of total intellectualization of production processes (Antoniuk et al., 2017).

Intellectual capital is considered as core source of companies' competitive advantages in modern economic environment. As M. Porter intellectual capital is important factor in the strategy of competitive forces (Porter, 1980). The authors of this study in previous papers examined the methodological approaches to assessing the use of intellectual capital of multi-level subjects are investigated in the works I. Kalenyuk, L. Tsymbal, E. Panchenko and A. Djakon (Kalenyuk et al., 2018). G. Hamel and C. Prahalad define the

methods and forms of forming the intellectual capital of corporations and the possibilities of its accumulation and use for ensuring competitiveness. They suggest that company's performance is droved by ability to identify and develop core competencies and capabilities (Prahalad, 2000). That's why the concept of learning organisation is widespread. It justifies the necessity for every company to study continuously (Senge, 1990).

Preservation and development of intellectual potential and formation of the human capital of a society are the main direction of development of any civilized country. It is seen as an important factor in socioeconomic development, solving global problems associated with the progressive development of a particular society. Due to this, in many countries the problem of intellectual potential growth is assigned to priority areas in the policy of states [32].

The well-known Swedish researcher K.Sveiby is considered to be the founder of Knowledge Management. He proved that the key element of business growth is not the production function, but the knowledge and creativity of the employees. His proposals for measuring capital knowledge (which includes customer capital, individual capital and structural capital) are fundamental to all knowledge-based companies (Sveiby, 1997). Together with changing the role of TNCs in the economic environment, the internal structure of corporations, which must adapt to market challenges, is also changing. Corporations are increasingly focusing on investing in human capital and defining it as a source of growth. The role of intellectual capital in creating value added was investigated by the P.Sullivan (Sullivan, 2000).

Despite the growing quantity of studies in this subject, there is no unambiguous interpretation of the intellectual capital, its essence and structure, so we need to analyse the newest processes of its accumulation and transformation into the competitive advantages of TNCs within the frame of countries Ukraine are in the context of seeking an innovative way for economic development, where the large business plays a key role in close interaction with science, education, and the state institutions.

**The aim of the article** is to identify modern features and methods of intellectual capital accumulation as the basis for the formation of TNCs' competitive advantages in the global environment.

The content of this study, scientific conclusions and recommendations are based on the broad application of the systematic approach to the study of phenomena. The proposed work demonstrates a thorough study of the scientific works of domestic and foreign scholars on the conditions for the formation of corporate intellectual capital. To achieve the research goal, the following methods have been used: review of scientific literature, quantitative empirical research, performed to identify current trends of a specific scientific problem. Methods of descriptive statistical analysis and visualization were used to obtain the results of the study. The article uses the methodology of comparative analysis and evaluation of the dynamics of the main indicators of innovation activity of the leading transnational corporations of the world.

**Results.** The intellectual corporate capital (including transnational corporations) has the following structure: 1) the human capital (the people with such cumulative features as experience, skills, trades, scientific achievements); 2) the structural capital (the intangible resources such as intellectual property and client's capital); 3) the organizational capital (the management capital such as a company's management system, communication capital, corporate culture, intellectual products (services) that are obtained as the result of using intellectual capital management).

Formation of intellectual corporate capital may occur as follows below: first, by the internal way, when the corporate capital is formed by formation and use of own capital; second, by the external way, when the intellectual capital from external sources is involved; and third, using both mixed forms. The capital is formed by own efforts through the system of corporate universities, research centres, and science institutes. The capital is involved from external sources due to involvement, leasing, outsourcing of highly qualified personnel, purchase and lease of various intellectual property objects (such as patents, licenses, know-how, technologies, etc.). The modern practice is described by new forms of the intellectual corporate capital generation emerging through interaction: such as formation of research networks, open innovation platforms, etc.

Each intellectual capital component plays an important and specific role in the formation of the company's total intellectual capital: the human resources such as intellectual stuff, the structural assets as the result of intellectual activity, the organizational assets as a set of relationships to ensure synergy of all components. It is the organizational capital that represents the totality of relations in the intellectual resources management: all successive processes of generation, accumulation, and use of all types of intellectual



property. The key goal is to increase the knowledge share at all stages of value added creating, which is the most important prerequisite for transnational companies to ensure their economic power, to form competitive advantages, and to achieve the high competitiveness.

The TNCs' human capital formation occurs both through the accumulation of own capital and its involvement from the outer sources. The own human capital is formed in corporate universities and training centres within their training and retraining system. The TNCs' powerful training centres (or corporate universities) are becoming increasingly large in scale, and thus become an alternative form of training for highly skilled personnel. The growth of corporate spending on staff training is a constant feature of modern business.

The development of such processes as digitalization, networking, and globalization brings new changes and trends into the corporate training systems. While the global audience of corporate training systems expands, the physical form, the general mission, and the education technology change. The functions of corporate universities are not limited to education, but they rather become true aggregators of development and play a key role in the overall chain of value increment, knowledge, and intellectual capital.

Large companies use a wide range of forms of involving human capital: search of human resources from abroad (international migration, both labour and educational), hiring of employees, outsourcing, leasing, etc. The methods and techniques for finding talented and promising professionals relate not only to trained employees, but also to talented youth by holding academic competitions or contests (CFAs), through diverse cooperation with students and graduates, expanding certification programs (CIMA), and by involving foreign youth to study.

In modern conditions the volumes of outsourcing dynamically increase. Thus, just in 2013, more than 2 million working places were involved in outsourcing in the global economy. The outsourcing companies cover 43% of IT services market, 12% of call-centre services, 38% of research, 15% of personnel consulting, and 8% of staff training (Salamudin, 2010). Outsourcing costs depend on a company's size. Thus, the large companies use outsourcing services at most spending more than 7% of their budget, while the average companies spend 4.6%, and small companies spend 6.1%. There is a separate Knowledge process outsourcing segment, which focuses on information and knowledge, and is an integral part of the value added chain (IT-outsourcing).

In the modern world, the speed of doing business is a key element of success. Therefore, the active use of outsourcing, even in the company's daily business, leads to acceleration of all transactions, growth of the global economy, and deepening globalization of the entrepreneurial activity.

The transnational corporations are powerful players in R & D funding, accounting for almost half of global R & D spending goes from TNCs and 2/3 goes from private funding (Occasional note, 2018). The fulfilment of R & D on government orders, especially in the defence sector, is a common practice: (2011: Lockheed Martin Corp. (USA) got a contract worth \$ 789.8 million with the U.S. government in order to create a defence system for the Missile Defence Agency; 2012-2016 - Lockheed Martin Corp. and Space System (US) got \$ 238 million contract with the U.S. Department of Defence for space vehicle production (18)); innovative products development (2007, Rosnano, Sovcomflot, United Aircraft Corporation (Russia), a contract worth \$ 8.2 billion for nanotechnology projects).

The analysis results confirmed the spin-off increase in the cost of transnational companies in the world for R & D, whose leadership is becoming a dominant component of international competitiveness. In the global scope, according to absolute figures, the largest spending on R & D is provided by the U.S. corporate sector, followed by China. By relative indicators (the share of business in the total spending structure on R & D), the highest level (78.2%) is in South Korea, the second place is for Japan (77.8%). The TNCs' main R & D centers are in the EU, in the USA. and in some Asian countries (see figure 1).

Along with the United States, China becomes the centrepiece of business science, which accounts for 77.3% of all country's R & D expenditures, while total expenses of the U.S. and China companies are up to \$ 627.18 billion that is by 40% more than the costs spent by the companies from other 8 countries of the TOP-10 countries in terms of the R & D expenditures. Overall, in all the TOP 10 countries, the level of corporate costs on R & D is more than 50% of the country's total R & D expenditures that is indicating on close ties in the business science system and high levels of business involvement into the global chains of accumulation of intellectual capital. The global R & D expenditures are gradually increasing from 1.08% of global GDP in 2001 to 1.15% of global GDP in 2011 (UNESCO, 2016).

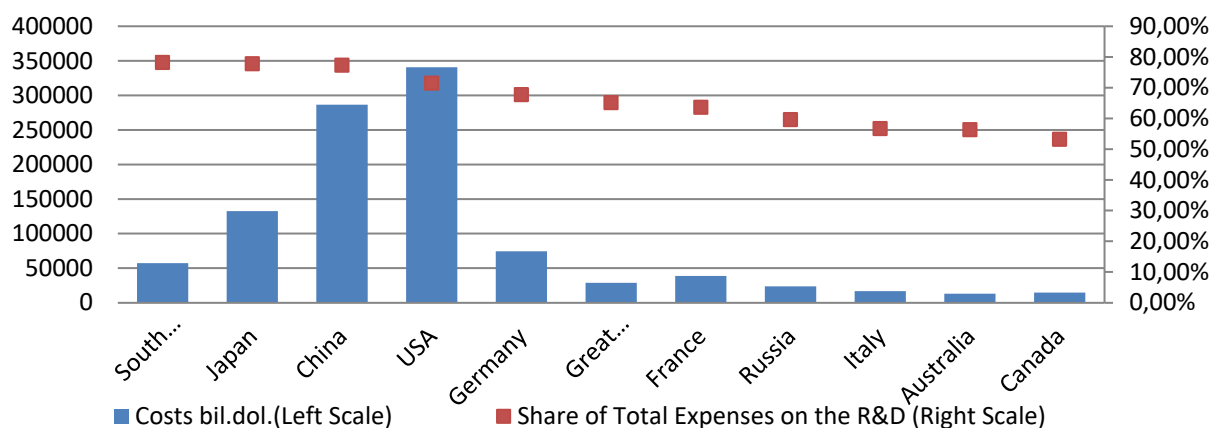


Figure 1 – Expenses of the business sector in the DIR in the leading countries, billion dollars. and% (2016).  
Source: built according to UNESCO

Among the leading companies with a high level of R & D costs, there are dominant the U.S. parent companies. Therefore, of the 25 companies, 15 are from U.S., 7 are from the European Union. and 3 are from Asia. By sectoral distribution, TOP-25 includes 8 companies in the pharmaceutical sector, 6 automotive companies, and 5 work in the software sector. Overall, top 10 companies have invested in research and development of more than \$ 120 billion (Intellectual Capital Index, 2016).

The dominant positions in the global technology market are kept by TNCs from the USA, among other leading countries are such as the EU, China, Japan, India, and others. To date, the TNCs account for 40% of the world's cost of developing the latest technologies; 38% of the patents for new technologies are received in industrialized countries; 37% of scientists; 35% of global scientific works. Now, in the U.S., there work 70% of Nobel laureates scientists; 66% of scientific papers authors of the, which are most actively cited worldwide; 75% of the universities are among the top 20 universities in the world. The largest quantity of leading companies by amount of their own patents is also located in the United States. Among the main holders of patents there are the companies with a high level of R & D costs and internationalization of activities, since the registration of patents is an eloquent result of the R & D work for a company itself, as well as cooperation with other enterprises.

The analysis made it possible to conclude that the companies that make the largest investments in R & D are described by high indicators of patent activity, profit, growth of capitalization, brand prospects, etc. (table 1).

Table 1 – Indicators of performance of TOP-10 companies in terms of expenses for R&D

№	Company	Expenses for R&D, billions of dollars	Costs, billion dollars	Intensity R&D, %	Patent activity	Capitalization growth rates	Index FutureBrand	
							PwS	change by 2016
1	Amazon.com. Inc.	16,1	136,0	11,8	1,960	+56%	4	21(-13)
2	Alphabet Inc.	13,9	90,3	15,5	3,065	-	2	31(-10)
3	Intel Corporation	12,7	59,4	21,5	3,726	+3,9%	21	16(-4)
4	Samsung Electronics Co., Ltd.	12,7	167,7	7,6	5,810	+8%	14	9(-6)
5	Volkswagen Aktiengesellschaft	12,1	229,4	5,3	-	+6%	93	54(-21)
6	Microsoft Corporation	12,0	85,3	14,1	2,601	+16%	3	12(-10)
7	Roche Holding AG	11,4	51,8	21,9	-	+55,3%	35	77(-17)
8	Merk&Co., Inc	10,1	39,8	25,4	-	-	55	69(+8)
9	Apple Inc.	10,0	215,6	4,7	2,225	+16%	1	4(-3)
10	Novartis AG	9,6	49,4	19,4	-	+8,1%	27	61(+10)

Source: built by the author on the basis of: Intellectual Capital Index, The Future Brand index

An effective method for involving intellectual capital from external sources is mergers and acquisitions (M & A), which allows the company to immediately engage in intellectual capital without funding for R & D. It allows customers to meet their immediate needs, to invest in high-tech companies that offer new solutions to existing problems (improved products, improved customer experience, new infrastructure solutions, etc.). Mainly, the companies from the leading countries (USA, China, EU, Japan) are leaders in the field of mergers and acquisitions (M&A). Overall, 22% of all deals are made in the U.S., 15% belongs to China, 7% - in Great Britain, 6% - in Germany, and 4% in Japan. Together, these countries hold 54% of the quantity of global deals. In total, the developed countries account for the most expensive transaction costs (Global M&A, 2018).

TNCs are practicing the purchase of small companies that develop and implement innovative products. Thus, all of the R&D costs lie on the small companies, and TNCs only benefit from the active implementation of redeemed technologies. In developing and delivering innovations on the market, significant investments that small companies often do not own are required. Thus, in 2010, Intel Corporation used the development of Nvidia chips, the controlling stake of which was redeemed on the eve (Twelve, 2010). Another way to implement an innovation is to create strategic alliances that are designed to aggregate all the knowledge gained in several companies for a specific type of product (i.e. Hitachi (Japan) and Texas Instruments (USA) for the development of RAM, Toshiba (Japan) - IBM (USA), Fujitsu (Japan) - AMD (USA), Sharp (Japan) - Intel (USA) to develop processors).

Total value of the intellectual capital, according to Dow Jones Industrial Average (DJIA), is now more than \$ 4.4 trillion that is an increase of more than \$ 300 billion as compared with 2015. The top five companies include the most value-rich companies with powerful intellectual capital, such as Pfizer, Boeing, Apple, Visa, and Johnson & Johnson (table 2).

Table 2 – Index of Intellectual Capital DJIA, 2016 (Intellectual Capital Index, The Future Brand index)

The company name	Rank		The cost of an enterprise Billion dollar	Intellectual capital Billion dollar	Intellectual capital index	
	2016	2015			2016	2015
Pfizer	1	2	221,390	245,411	1.11	1.04
Boeing	2	1	95,978	103,042	1.07	1.04
Apple	3	3	489,153	509,067	1.04	1.04
Visa	4	6	210,562	209,687	1.00	0.98
Johnson&Johnson	5	7	296,977	291,021	0.98	0.98
UnitedHealth	6	5	174,021	170,306	0.98	0.98
Procter&Gamble	7	8	243,234	236,878	0.97	0.97
United Technologies	8	4	105,427	102,257	0.97	1.01
Microsoft	9	9	373,891	349,143	0.93	0.93
3M	10	11	115,272	107,571	0.93	0.91
DuPont	11	10	65,987	66,066	0.93	0.93
Merck	12	13	172,276	156,934	0.91	0.89
Nike	13	12	89,478	81,034	0.91	0.91
IBM	14	15	205,303	179,522	0.87	0.86
Home Depot	15	14	189,143	164,171	0.87	0.86

The value of intellectual capital in individual companies is significantly higher than the cost of the companies themselves, in particular, for such leading companies as Pfizer, Boeing, and Apple. Overall, given the company's aggregate value, these amounts are quite significant. Having analysed the indicators in Table 2, we can note that the value of transnational companies' intellectual capital of included in this rating is not less than 50% of the company's value itself, which confirms the prominent role of intellectual capital itself in the formation of competitiveness factors (figure 2).

The highest rates in the company of Visa and its indicators are more than 3 times higher than those of follow-up companies. In general, analyzing indicators, it should be noted that the performance of selected

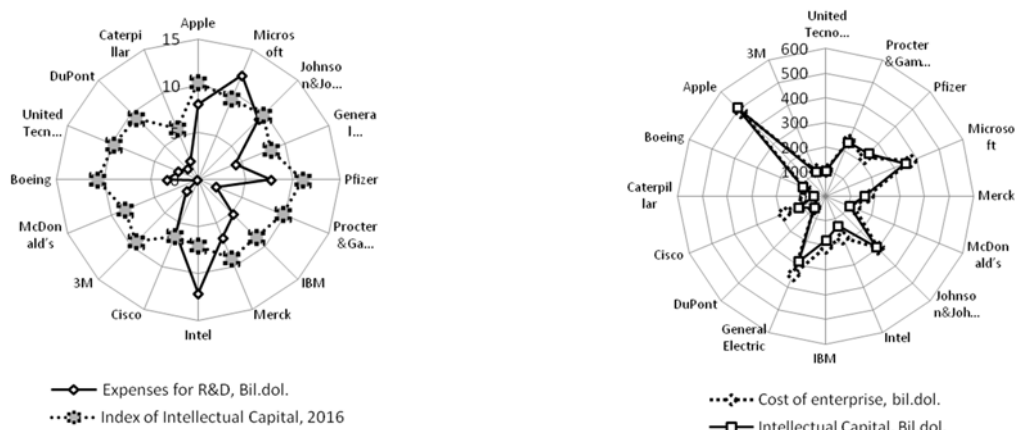


Figure 2 – Top 10 companies at the cost of intellectual capital. *Source: Calculated based on company data*

companies is rather high, despite the lag behind the leader of the company. Intellectual capital of the company includes actually the intangible assets of the company that exceed its financial value and in the amount include both the intellectual potential and the intellectual results of intellectual activity.

According to analysts, in 2016, the total value of the intellectual capital of these companies amounted to 4.4 trillion. dollars, while the division into spheres of activity is quite significant and the largest share falls on technology (figure 3).

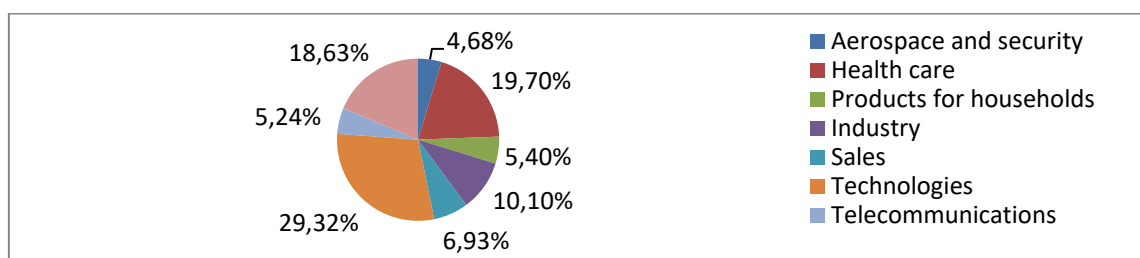


Figure 3 – Share with 4.4 trillion. dollars intellectual capital by type of activity (Intellectual Capital Index)

Involvement of foreign companies and stimulation of their innovation activity is an effective instrument for increasing the economic potential of the country in the world. This is confirmed by the experience of Ireland, Singapore, Finland, Israel, and other countries. The most evident are Israel's successful efforts to create a supportive environment for innovation: a reduced tax scheme for the companies that open their own R&D centres in Israel or invest in Israeli centres abroad; promotion of high-skilled personnel migration; the development of technologies and infrastructure, the involvement of business in the ICT development due to co-financing by the state of important projects (up to 50% of programs' costs in nanotechnology and biotechnology; for depressed or underdeveloped regions this figure rose by 10%, and for companies working in the research with companies from other countries it rose up to 50%, and it rose up to 75% for small and medium enterprises that participated in the 7th Framework Program of the EU).

Formation of corporate intellectual capital in Ukraine requires specific instruments. First of all, it concerns not only high-tech activities, but also an increase in the technification level of low-tech sectors of economy, which is generally a global trend. In order to intensify economic activity in Ukraine, it is necessary to concentrate efforts on the formation of innovation infrastructure and the involvement of precisely those stages of production, in which value added is formed significant amount. It is necessary to encourage foreign companies to open their own research centres in Ukraine through a system of tax, credit, and institutional instruments. The State's support for innovation is necessary at the very initial stages of creating business incubators or innovative hubs; the State's partial participation in the financing or a partial reimbursing of the costs (in some countries it amounts to up to 85%). The State's support is needed both for involving foreign multinational companies and for the development of Ukrainian business activity. Accumulation of the companies' intellectual capital and their effective realization allows to access external resources, including through such instruments as mergers, acquisitions, alliances, purchases of companies, etc. An

effective measure is to reduce tax rates for the enterprises operating in high technology sector or other priority sectors (for example, to stimulate agricultural products processing, production of goods with a higher value added).

**Discussion and conclusions.** The problem of intellectual capital is one of the most urgent in modern scientific research. Intellectual capital is a key tool for achieving the competitiveness of TNCs in the global environment. The TNCs realize aggressive strategies in order to increase investment in the intellectual sphere, to search and use of human capital, creation and implementation of technological innovations, providing the technical basis for the society's progress.

There are no unities in understanding the essence of intellectual capital, its relationship with human capital, the definition of the essence of organizational and structural capital. The author's approach to the definition of the essence and structure of intellectual capital allowed to construct the logic of the study of ways of its accumulation within modern TNCs.

The modern practice of accumulating intellectual capital assets within the leading TNCs dynamically changes. Along with its own research activities, the search and training of personnel, the following forms are developed: creation of joint research platforms, joint patent portfolios, formation of distributed networks for cooperation between corporations. All these problems need further study.

The TNCs' human capital formation occurs both through the accumulation of own capital (corporate universities) and its involvement from the outer sources (search of human resources from abroad (international migration, both labour and educational), hiring of employees, outsourcing).

The transnational corporations are becoming powerful actors in the R&D worldwide. As a result of fierce competition in the global environment, the new centres of formation and accumulation of intellectual capital are formed. They are described by a high level of expenditures on R & D both in absolute and relative terms.

The USA corporate sector is a global leader, while China is in the second place. Overall, for all countries included in the top ten world leaders list, the level of corporate expenditures on research is more than half the country's total expenditure on R & D.

An effective instrument for involving intellectual capital from external sources of mergers and acquisitions (M&A) is also activated. It allows to immediately involving intellectual capital without R & D funding. Moreover, the composition of the leading countries that are the main M & A subjects is similar: the USA, China, the Great Britain, Germany, and Japan, which account for more than half of all global deals.

In addition, the problem of accumulating its own intellectual corporate capital and its effective inclusion in the processes of strategic development of the national economy is extremely topical. The formation of intellectual corporate capital is important for every country in the world, because it promotes building of effective synergies between all constituent elements in the triangle "business-education - science".

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#### **ЗІЯТКЕРЛІК КОРПОРАТИВТІК КАПИТАЛЫН ҚАЛЫПТАСТЫРУ: ӘДІСТЕР МЕН ЗАМАНАУИ ҮРДІСТЕР**

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#### **ФОРМИРОВАНИЕ ИНТЕЛЛЕКТУАЛЬНОГО КОРПОРАТИВНОГО КАПИТАЛА: МЕТОДЫ И СОВРЕМЕННЫЕ ТЕНДЕНЦИИ**

**Аннотация.** Накопленные активы интеллектуального капитала служат основой для формирования конкурентных преимуществ ТНК в мировой экономике. Ведущие мировые корпорации диверсифицируют методы формирования и привлечения интеллектуального капитала в условиях усиления конкуренции. **Целью исследования** является выявление современных особенностей и методов накопления интеллектуального капитала

как основы конкурентных преимуществ ТНК в глобальной среде. Полученные данные свидетельствуют о том, что основой лидерства и высокой конкурентоспособности ТНК являются накопленные активы интеллектуального капитала. **Результатом** исследования стала систематизация и раскрытие методов накопления и привлечения интеллектуального корпоративного капитала. Выявлены современные тенденции аккумуляции активов интеллектуального капитала ведущими ТНК мира. Накопление собственного интеллектуального капитала корпораций осуществляется на основе масштабного инвестирования в его активы: развитие корпоративных форм обучения персонала, колоссальное возрастание расходов на НИОКР, формирование распределенных инновационных сетей и платформ открытых инноваций, внедрение новейших механизмов управления знаниями. Активно используются формы привлечения интеллектуального капитала извне. Основными источниками являются: поиск и привлечение талантливых и высококвалифицированных человеческих ресурсов из других стран; покупка перспективных патентов, новейших технологий, моделей управления; слияния и поглощения компаний, и т. п. Транснациональные корпорации становятся ведущими субъектами расходов на науку в мире. В десяти ведущих странах они составляют больше половины всех национальных расходов на НИОКР, а в странах-лидерах США и Китае – до 80%. Накопление активов корпоративного интеллектуального капитала характеризуется следующими тенденциями:

- на глобальном уровне выделяются два мощных мировых лидера – США и Китай;

- происходит колоссальное обострение конкуренции за ресурсы и лидерство между странами и субъектами мировой экономики; стремительно растут затраты на научные исследования и разработки; динамично трансформируется региональная и отраслевая структура глобального экономического пространства.

В мировой практике действенным механизмом наращивания экономического потенциала страны является привлечение иностранных компаний и стимулирование их инновационной деятельности, что подтверждается опытом Ирландии, Сингапура, Финляндии, Израиля и других стран. Успешны усилия Израиля в формировании благоприятной среды для инноваций: программа пониженного налогообложения для предприятий, открывают собственные исследовательские центры в Израиле или инвестируют в израильские центры; содействие миграции высококвалифицированного персонала; развитие технологий и инфраструктуры, привлечение бизнеса в развитие ИКТ через софинансирование государством важных проектов.

Мировыми лидерами по расходам на науку является корпоративный сектор США и Китая. Меняется отраслевая структура ведущих мировых ТНК: вместо нефтяной и автомобильной в десятку ведущих ТНК теперь в основном входят компьютерные и высокотехнологичные компании. Реализуются агрессивные стратегии наращивания интеллектуальных активов. Эффективным инструментом наращивания интеллектуальных активов являются слияния и поглощения компаний. Лидерами по количеству слияний и поглощения являются ТНК ведущих стран: США, Китай, Великобритания, Германии и Японии. Формирование корпоративного интеллектуального капитала является важным шагом в построении эффективного синергетического взаимодействия всех составляющих треугольников «бизнес-образование-наука». Эта триада является ключевым инструментом стратегического развития экономики знаний для любой страны мира.

Формирование корпоративного интеллектуального капитала в Украине требует конкретных механизмов. В первую очередь это касается не только высокотехнологической деятельности, но и повышение уровня технологизации низкотехнологических секторов экономики, что в целом является глобальным трендом. Для активизации экономической деятельности в Украине стоит сконцентрировать усилия на формировании инновационной инфраструктуры и привлечении именно тех этапов производства, на которых формируется значительный объем добавленной стоимости. Необходимо стимулировать иностранные компании открывать в Украине собственные исследовательские центры через систему налоговых, кредитных и институциональных инструментов.

**Ключевые слова:** человеческий капитал, корпоративные университеты, структурный капитал, организационный капитал, НИОКР, слияния и поглощения, аутсорсинг.

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## **CENTRAL ASIAN REGION AT THE FOCUS OF GEOPOLITICAL INTERESTS**

**Abstract.** In the XXI century the role of Central Asia in international politics is increasing. This region, possessing rich natural, energy, mineral and raw material resources, has an important geostrategic position, in which we see the geopolitical confrontation of global actors. The confrontation is explained by the fact that, for example, for Russia this region, being a “vulnerable underbelly”, is included in the traditional sphere of influence, from the perspective of China, the region seems to be an alternative source of energy and a vital partner for stabilizing and developing the troubled Xinjiang province. As for the United States and their allies, this region appears to be an important transportation hub, for example, for military supplies to unstable Afghanistan. Central Asia is not only a key region on the world map, the establishment of control over which allows you to manage the regional transit of hydrocarbons and other types of strategic raw materials for the largest developing economies, primarily China, and, as a result, affect their economic growth and aggregate power. Central Asia is a crossroad of civilizations, control over which, as was believed over the centuries, allows you to rule the world. The region retains its exceptional geopolitical significance today.

**Key words:** international politics, geostrategic position, geopolitical confrontation, geopolitical interests, sphere of influence, vital partner, allies, transport hub, key region, regional transit.

**The relevance of the topic.** As a result of the collapse of the Soviet Union, in order to fill the remaining vacuum in the 1990s, a new “Big Game” broke out in Central Asia and is still being played out in the second decade of the 21-st century. Currently, it is part of a process that can determine the structure of an international system. Each of the global actors - Russia, China and the United States has its own goals in the region. The three great powers of the modern world cannot be just passive spectators. Now they are actively working to determine which of them, from a geopolitical point of view, what, where and when to receive in Central Asia.

Thus, in the context of globalization of the world economy and with the dominant role of global actors (Russia, China and the USA) in the region, the study of the place of each global actor individually through the prism of the evolution of geopolitical strategy and, based on the development vector, the prospects for their future activities in relation to countries The region is becoming an urgent need [1, P.17].

**Materials and methods of research.** The most optimal will be the division of the studied works on the issue into several groups. The first group included the works of Western scholars who studied both evolution and the current state, and the potential prospect of geopolitical interests and US foreign policy. This category includes such prominent geopolitics as H. Mackinder (The Heartland theory), A. Mahan (the Atlantism doctrine) and N. Spykman (The Rimland theory). Their scientific works became the foundation of the concept of US foreign policy, initially against the Soviet Union, and now against Russia.

For example, the English geographer and geopolitician H. Mackinder developed a very interesting concept, according to which 1) the geographical location of the country is an important factor that directly affects the course of historical processes; 2) the geolocation of the country previously determines the



potential strengths and weaknesses of the state; 3) technological progress changes the geographical area of residence of states, has a positive or negative impact on their potential power; 4) The Heartland region is the main “theater stage” of world politics, where political processes of a global scale take place [2, P.83].

In accordance with the doctrine of “Atlantism”, justified by A. Mahan, the main global geopolitical actions of the USA in the XX century against the USSR and the socialist bloc were carried out. In particular, the geopolitical interests of the United States with respect to the Soviet Union were implemented through the Anaconda Loop project. According to the geostrategic forecasts of A. Mahan, the United States, using the power of the “Sea Force” and destroying the USSR through gradual strangulation, would have seized Eurasia, and hence Central Asia. To implement this project, such blocs as NATO, ASEAN, ANZUS, CENTO were created, which played a decisive role in counteracting the USSR during the Cold War [2, P.90].

Thus, G. Kissinger, in his books *The World Order* and *On China*, points to the futility of the American strategy of global dominance and emphasizes the importance of spreading market and democratic values. Another master of American geopolitics Z. Brzezinski, starting in the late 1970s, developed the ideas of a unipolar world with the dominant role of the United States and the prevention of an opponent in Eurasia that could challenge the United States. In his works, Z. Brzezinski extremely negatively assesses attempts to artificially introduce a democratic system in other countries, regarding them as undermining the geopolitical position of the United States. He also states that the concept of a universal fight against terrorism, due to its narrow focus, is unable to be the central system-forming principle of US foreign policy [3].

In his scientific works, F. Fukuyama, another no less famous representative of American geopolitics, associates hopes for the formation of a new geopolitical picture of the world with the modernizing role of the United States, and considers the recognition by the American elite of the principles of multipolarity as the condition for its fulfillment [3].

But, nevertheless, despite the certain successes of American scientists in the study of relations between Central Asian countries and the United States, it is noted that the level of knowledge of relations between the United States and Central Asia does not reflect the whole picture and does not correspond to the scale of the current and planned policies of this state in this region.

The second group of published scientific works consists of the works of Russian scientists. The works of A. Stokov, O. Stolpovsky, D. Ziyatdinov, I. Ippolitov, R. Gumerov, D. Babayan, S. Nikolaev and D. Popov are worth noting. In general, in the works of Russian scientists [4].

According to the chronology of historical events, Russia’s foreign policy towards Central Asian countries, starting from the period of Soviet implosion and up to the present day, has not been consistent. The author, analyzing Russian foreign policy doctrines, coupled with her practical activities of those times, conditionally divides Russia’s foreign policy into three periods: “indifference”, “return” and “rehabilitation” [4].

The period of “indifference” witnessed a huge loss by Russia of its influence in Central Asia and the entry of the Western powers into it. As a result, the initial mistakes made in this period became a serious obstacle to the process of Russia’s later return to Central Asia.

Considering the “return period”, the author notes that during this period Central Asia was no longer seen as part of the CIS system, but rather a vital region that Russia could not afford to lose. Russia, depending on the specific economic and political situation and the security situation in each country, carried out a differentiated policy. For Kyrgyzstan, Kazakhstan, and Tajikistan, which were fairly close partners, Russia intensified multi-level cooperation with other partners such as Belarus. Russia has made significant efforts to promote the regional unification of these countries, especially in developing a common economic zone and reaching consensus on a consistent foreign policy. Although Uzbekistan, which was initially resistant to Russia’s influence, was insurmountable as a result of leaving the collective security system with Russia as a dominant, Russia still used Uzbekistan’s fragile defensive ability and tried to prevent it from getting closer with the United States, trying to establish military-technical cooperation. Despite the fact that the signing of the Russian-Uzbek agreement on military-technical cooperation was far from practical, both sides at least showed interest in long-term cooperation in the field of military training and technological exchanges. In the case of Turkmenistan, which declared itself a neutral state, Russia actively used its armed forces to ensure the security of its border territories. Russia was also uncompromising in terms of Turkmenistan’s independence from Russian oil and gas pipelines.

In general, Russia urgently needed the support of Central Asia to revive its great power in the international arena, hoping to create a Eurasian community over which Russia has absolute control. Although the Central Asian states more or less successfully coped with Russia's influence, the unstable economy and vulnerable border were their "Achilles heel" [5].

**Research results.** Over the past 28 years, having undergone many metamorphoses, the relations between the two neighboring countries have reached a new level of strategic partnership. An extensive regulatory framework has been formed that regulates and promotes development in the political, legal, trade, economic and humanitarian spheres. The "cornerstones" of many years of fruitful cooperation are the Treaty on Good Neighborhood, Friendship and Cooperation, signed on January 15, 2007, and the Joint Declaration on Establishing a Strategic Partnership between Tajikistan and China of May 20, 2013. There is a clear trend in the development of trade between the two countries. Despite the fact that earlier, being part of the USSR, Tajikistan remained an unknown country for the Celestial Empire, and later, in the 90s, becoming exclusively a market for Chinese products, the economic relations of the two countries underwent a significant evolution in a positive way. Today, Chinese investors who are interested in the Tajik economy are investing not only in the mining sector, but also in related industries, thereby stimulating the development of the economy of both countries.

We conditionally divided the formation of Sino-Kazakhstan relations into 4 stages:

- First stage. From 1991 to 1996. The period is characterized by the development of bilateral relations. Relations have developed in the field of foreign policy, which have developed through the establishment of diplomatic relations and mutual visits at a high government level; at that time, economic, trade, security cooperation was steadily developing, mutual understanding was reached in areas related to the prohibition of the use of nuclear weapons;

- The second stage began with the signing by China, Russia, Kazakhstan, Tajikistan, Kyrgyzstan in Shanghai of the "Agreement on building confidence in the military sphere and mutual reduction of armed forces in the border zone," which was noted as the agreement of the Shanghai Five. Thus, Kazakh-Chinese relations entered a new period of parallel development of bilateral and multilateral relations;

- The third stage. In 2005, President Hu Jintao and President of Kazakhstan N. Nazarbayev signed a declaration on strategic partnership between the two countries. The Chinese side has confirmed that it will continue cooperation with Kazakhstan in the framework of the SCO and CICA;

- The fourth stage. Since 2011, the countries have established a "comprehensive strategic partnership" relationship, expanded energy, transport and communication cooperation.

As regards Sino-Uzbek relations, the author concludes that in the absence of a common border, their strategic partnership is built on the foundation of political understanding. Both countries have always supported each other's security, sovereignty and territorial integrity, firmly supporting each other in choosing "development paths", they follow the principle of non-interference in internal affairs [6].

Relations between China and Kyrgyzstan are determined by the fact that Kyrgyzstan is much smaller and weaker than China, but, as in the case of Russian-Kyrgyz relations, Kyrgyzstan plays an important role in achieving China's national and economic interests in the region. Currently, the two countries cooperate quite widely in the field of economy and security. Both countries are members of the Shanghai Cooperation Organization. Kyrgyzstan is also important for China because of its hydropower potential, as well as gold and other metal and mineral resources. Kyrgyzstan also serves as a transit zone for the Chinese New Silk Road project, which aims to connect the markets of Southeast Asia and Europe. In other words, as in relations with the United States and Russia, the geographical position of Kyrgyzstan determines the importance of its role in the long-term geopolitical and geo-economic thinking of China [3].

Kyrgyzstan is also an important partner for China in matters of national security. It borders China and, most importantly, the Chinese Xinjiang Uygur Autonomous Region, which is known for its troubled relations with the Chinese government. More than 35,000 Uyghurs live in Kyrgyzstan, and their total number in other countries of Central Asia is about 500,000. Therefore, it is extremely important for China to maintain close security relations with Kyrgyzstan and other Central Asian states in order to prevent the potential organization of large-scale anti-Chinese activities carried out by the Uyghurs. Moreover, any political instability in Kyrgyzstan worries China, because it could have a direct negative impact on China's security in the Xinjiang region. For this reason, it is in the interests of China to ensure security and other assistance to Kyrgyzstan and ensure its stability and prosperity [4].

Also, in the part concerning the evolution of the formation of US geopolitical interests in the region, it is noted that Central Asia is a “middlegame” in the Great Chessboard and even with the assistance of any kind of assistance, the United States of America is guided by its national interests. C5 + 1 format promises positive results for Central Asian countries. But it is worth paying special attention to the fundamental goals pursued by the United States of America in the framework of its geostrategic “chess game” in this region, the main of which are the prevention of strategic partnerships in the form of military blocs and political alliances, especially between world and regional powers, reduction the economic presence of Chinese capital in the economies of Central Asian countries, a decrease in the military-political influence of Russia, restraining the growth and influence of economic unions, as well as direct or indirect control of hydrocarbon reserves in Central Asia. And the quintessence of all strategic goals and objectives is to maintain the global leadership of the United States of America [5].

Russia uses many tools to ensure regional security, and remain a key external player in post-Soviet Central Asia. However, in order to regain its dominance, Russia actively demonstrates its hard and soft powers in order to keep the region in the sphere of its influence. The author also examined Russia’s interests in Central Asia, such as control over energy resources, ensuring security forces and the formation of regional organizations. The countries of the region have never disputed the status of a great power of Russia and its Eurasian identity. Nevertheless, the Eurasian center has become a contested region for the rest, both world and regional actors. Western policy is seen as a challenge to Russia’s spheres of interest. At present, Russia’s aspirations in Central Asia are clearly characterized as a “neo-imperial” policy, and it involves the desire to curb external influence in the region, which reflects, in fact, substantial evidence of Halford Mackinder’s Heartland philosophy [6].

Driven by economic interests, especially the desire to ensure the security of resources and the desire to maintain stability and security in its Xinjiang region, China’s significant interaction with Central Asia has aroused what has been called the “New Big Game” in a region where the influence and interests of Russia, China and the United States are often collide. As China’s economic participation in Central Asia continues to expand, its relative influence in the region with respect to Russia and Western countries has grown with it. There is no doubt that China’s economic dynamism and expansion could be a mutually beneficial agreement that would benefit China, as well as the Central Asian states, for which the growth of Chinese trade and investment is a catalyst for growth [7].

Thanks to its diplomatic relations and growing economic cooperation, China is having an impact on the internal affairs of Central Asia. But China’s participation and influence in security matters was very modest compared to its wider economic obligations, mainly revolving around the SCO, China’s main multilateral instrument in the region, which proved unable to act in times of crisis, such as the 2010 ethnic conflict in Kyrgyzstan. While many in China are concerned that the deteriorating security situation in the region, which leads, for example, to mass emigration, Islamic fundamentalism, drug trafficking, and internal and regional conflicts, could jeopardize trade and economic cooperation and, ultimately, jeopardize China’s domestic policy. Under conditions of stability, China does not want to intervene or mediate in major crises, while the SCO’s effectiveness, which is very ambitious on paper, is limited by competition between China and Russia.

Russia and China have different strategies, different interests and different priorities in Central Asia, which sometimes seem incompatible with the growing role of China. Although cooperation between them in the areas of energy, investment, high technology and military equipment has grown significantly over the past two decades, given the strategic rapprochement between Russia and Central Asia, it is too early to say whether the phenomenon of cooperation / competition between Russia and China will lead to an agreement about joint control over the region, or the region will serve as a field of confrontation between them [8].

Due to the isolation of the region within the mainland and the lack of access to the sea or oceans, objectively the region is not of economic interest to the United States. Taking into account the total mutual trade between the United States and the countries of the region in the most successful year, from the point of view of the global market situation, 2013 amounted to about \$ 3.29 billion, which is less than 1% of the total US trade with the outside world. For comparison, this is lower than the US export-import operations with a country such as Jordan or, for example, Morocco, where there are no large hydrocarbon reserves [9, P.68].

Under the conditions of a truncated trade and investment relationship between the United States and Central Asia, the policy chosen by Washington to pursue an active economic policy here seems unreason-

nably intrusive, dissonant with a real contribution to the economic life of the territory. Moreover, as it becomes clear from a more detailed analysis, such a disproportionately active “economic” diplomacy of the overseas partner is aimed not so much at the region’s progress, but at containing the growing cooperative ties of Central Asia with Russia and China [10, P.145].

In the conclusion we would like to note, that The United States of America uses Central Asia as a kind of platform for the deployment of American troops to different countries of the Near and Far Abroad to combat terrorism. If before the events of September 11, United States policy in the region was aimed more at reducing the level of dependence of post-Soviet countries on Russia and removing Russian influence from the orbit, along with the democratization of the region, then after the tragic terrorist attack on the Gemini towers on September 11, 2001, With the proclamation of the fight against terrorism as the main foreign policy priority of the United States, the policy of the United States in the region has been radically revised. Against the backdrop of the fight against terrorism, the United States launched a large-scale anti-terrorism campaign in Afghanistan.

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### **ОРТАЛЫҚ АЗИЯ РЕГИОНЫНЫҢ ҚАЗІРГІ ЗАМАНҒЫ ГЕОСАЯСИ МҮДДЕЛЕРДЕГІ ОРНЫ**

**Аннотация.** XXI ғасырда халықаралық саясаттағы Орталық Азияның рөлі артып келеді. Табиғи, энергетикалық, минералды және шикізат ресурстарына бай бұл аймақ маңызды геостратегиялық жағдайға ие, онда жаһандық субъектілердің геосаяси қарама-қайшылығы бар. Қарама-қайшылық, мысалы, Ресей үшін бұл аймақ «әлсіз», дәстүрлі ықпал ету аймағына кіретіндігімен, Қытайдың көзқарасы бойынша, аймақ балама энергия көзі және проблемалы Шыңжаң провинциясын тұрақтандыру мен дамыту үшін, Америка Құрама Штаттары үшін маңызды серіктес болып табылатындығымен түсіндіріледі. және олардың одақтастары бұл аймақ, мысалы, тұрақсыз Ауғанстанға әскерлер жеткізу үшін маңызды көлік торабы болып көрінеді. Орталық Азия - бұл әлемдік картаның шешуші аймағы ғана емес, бақылау орнату арқылы дамып келе жатқан ірі экономика-ларға (ең алдымен Қытайға) көмірсутектер мен басқа да стратегиялық шикізат түрлерінің аймақтық транзитін басқаруға мүмкіндік береді және нәтижесінде олардың экономикалық өсуіне және жиынтық қуатына әсер етеді. Орталық Азия - өркениеттердің тоғысқан жері, оны басқару ғасырлар бойы ігілік пен әлемді басқаруға мүмкіндік береді. Бүгінгі таңда аймақ өзінің ерекше геосаяси маңызын сақтап келеді.

Орталық Азия мемлекеттері өзінің геосаяси және экономикалық маңызына, табиғи және адам ресурстарына, трансконтинентальдық сауда мен көлік үшін транзит мүмкіндіктеріне байланысты әлемдік қоғамдас-тықтың назарын аударады. Орталық Азияның барлық елдері тең геосаяси қолайсыз жағдайда, өйткені теңіз коммуникациясына шығу жолы жоқ. Алайда, өңірдің дербес геосаяси маңызы әр түрлі жобалардың іске асырылуына қарай өсетін болады. Өңір елдері жүйелі жұмыс жүргізуде, ұлттық және халықаралық ауқымдағы жобалар іске асырылуда, қазіргі көлік инфрақұрылымына үлкен капитал салу жасалуда. Қазіргі уақытта жетекші әлемдік державалардың геостратегиялық мүдделерін шоғырландырудың аса маңызды орталықтар-ының бірі Орталық Азия болып табылады, геосаяси аймақтандыру шеңбері Қазақстан, Қырғызстан, Өзбек-стан, Тәжікстан және Түрікменстан бес тәуелсіз мемлекетінің аумақтары арқылы айқындалады. Ресми түрде бұл атау 1993 жылы қаңтарда қабылданды. Мемлекет және үкімет басшыларының Ташкент қаласында өткен жалпы кездесуінде одан әрі Орта Азия мен Қазақстанды Орталық Азия деп атау ұсынылды.

Орталық Азияның географиялық тұрғыдан орналасуы өте ерекше: ол Еуразия құрлығының ішінде орналасқан және мұхиттарға шыға алмайды. Орталық Азия мемлекеттерінің табиғи ресурстары, капиталдары мен басқа да ресурстары тек ішінара егеменді болып табылады және өңірдің барлық мемлекеттері арасында даулы аумақтар, су және минералдық ресурстарды бөлу, көлік бағыттарын салу жолдары, электр энергетикалық және мұнай-газ магистральдары негізінде бірқатар еңсерілмейтін келіспеушіліктер бар. Орталық Азиядағы екіжақты және көпжақты қатынастарды күрделендіретін басқа факторлардың қатарына: мемлекет-тердің саяси және экономикалық құрылымдарының әлсіздігі мен дәрменсіздігі, олардың экономикаларының криминализациясы, есірткі трафигі, этникалық және діни алауыздық жатады. Өңір мемлекеттері бетпе-бет

келіп отырған басты сын-кәтерлер әскери-саяси емес, экономикалық жауапты талап етеді; Орталық Азия елінің сыртқы ресурстарын тартпай, одан әрі құлдырауға және перманентті тұрақсыз-дыққа тыйым салынған. Алайда, тіпті өңірлік құрылымдарға біріктіріліп, Орталық Азия мемлекеттері өзінің әлеуметтік-экономикалық және саяси проблемаларын, әдетте, өңірден тыс шешеді, бұл мұнда сыртқы басқаруды орнату үшін қолайлы орта жасайды. Орталық Азия мемлекеттерінде биліктегі кландарды бір мезгілде байытқан кезде кедейлі пен тұрақсыздық дамиды; жергілікті режимдер жаппай репрессивті және авторитарлық сипатты сақтады.

**Түйін сөздер:** халықаралық саясат, геостратегиялық жағдай, геосаяси қарама-қайшылық, геосаяси мүдделер, ықпал ету саласы, өмірлік серіктес, одақтасар, көлік торабы, негізгі аймақ, аймақтық транзит.

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### ЦЕНТРАЛЬНОАЗИАТСКИЙ РЕГИОН В ФОКУСЕ ГЕОПОЛИТИЧЕСКИХ ИНТЕРЕСОВ

**Аннотация.** В XXI в. роль Центральной Азии в международной политике все более возрастает. Данный регион, обладая богатыми природными, энергетическими, минерально-сырьевыми ресурсами, имеет важное геостратегическое положение, в котором наблюдается геополитическое противостояние глобальных участников. Противостояние объясняется тем, что, к примеру, для России данный регион, будучи «уязвимым подбрюшьем», входит в традиционную сферу влияния, с перспективы Китая регион представляется альтернативным источником энергоносителей и витальным партнером для стабилизации и развития беспокойной провинции Синьцзян. Что же касается Соединенных Штатов и их союзников, этот регион представляется важным транспортным узлом, например, для военных поставок в нестабильный Афганистан. Центральная Азия – не только ключевой регион на карте мира, установление контроля над которым позволяет управлять региональным транзитом углеводородов и других видов стратегического сырья для крупнейших развивающихся экономик (прежде всего, Китая) и, как следствие, влиять на их экономический рост и совокупную мощь. Центральная Азия – это перекресток цивилизаций, контроль над которым, как считалось на протяжении веков, позволяет властвовать над миром. Это свое исключительное геополитическое значение регион сохраняет и сегодня.

Государства Центральной Азии вызывают пристальное внимание мирового сообщества в силу своего геополитического и экономического значения, природных и человеческих ресурсов, возможностей транзита для трансконтинентальной торговли и транспорта. Все страны Центральной Азии находятся в равном геополитически невыгодном положении, поскольку не располагают выходами к морским коммуникациям. Однако самостоятельное геополитическое значение региона будет возрастать по мере реализации разных проектов. Странами региона ведется системная работа, реализуются проекты национального и международного масштаба, в существующую транспортную инфраструктуру делаются большие капиталовложения. Одним из наиболее важных центров сосредоточения геостратегических интересов ведущих мировых держав в настоящее время является Центральная Азия, рамки геополитической регионализации которой определяются территориями пяти независимых государств Казахстана, Кыргызстана, Узбекистана, Таджикистана и Туркменистана. Официально это название было принято в январе 1993 г. на общей встрече глав государств и правительств в городе Ташкенте, когда было предложено именовать далее Среднюю Азию и Казахстан Центральной Азией.

Расположение Центральной Азии в географическом отношении крайне своеобразно: она находится внутри евразийского континента и не имеет выхода к океанам. Природные ресурсы, капиталы и другие ресурсы центральноазиатских государств являются лишь частично суверенными, и между всеми государствами региона существует ряд непреодоленных разногласий на почве спорных территорий, распределения водных и минеральных ресурсов, путей прокладки транспортных маршрутов, электроэнергетических и нефтегазовых магистралей. К числу других факторов, осложняющих двусторонние и многосторонние отношения в Центральной Азии, относятся: слабость и несамостоятельность политических и экономических структур государств, криминализация их экономик, наркотрафик, этническая и религиозная рознь. Главные вызовы, с которыми сталкиваются государства региона, требуют не военно-политического, а экономического ответа; без привлечения внешних ресурсов страны Центральной Азии обречены на дальнейшую деградацию и перманентную нестабильность. Однако даже будучи объединены в региональные структуры, централь-

ноазиатские государства решают свои социально-экономические и политические проблемы, как правило, вне региона, что создает благоприятную среду для установления здесь внешнего управления. В государствах Центральной Азии прогрессирует бедность и нищета при одновременном обогащении находящихся у власти кланов; местные режимы сохраняют почти повсеместно репрессивный и авторитарный характер.

**Ключевые слова:** международная политика, геостратегическое положение, геополитическое противостояние, геополитические интересы, сфера влияния, витальный партнер, союзники, транспортный узел, ключевой регион, региональный транзит.

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## **ACTIVITY RESULTS OF LOAN PARTNERSHIPS AND AGRICULTURAL PRODUCERS**

**Abstract.** The article outlines the issues of financial support provided to agricultural producers through a lending system. The results of the activities of credit partnerships were analyzed using the example of Credit Partnership (CP) Tselinogradskoye Limited Liability Partnership (LLP) in Akmola region and the agricultural enterprise Aktyk Agrofirma JSC. CP Tselinogradskoye LLP provides soft loans and subsidies at interest rates that are much lower than market rates. The performance of the credit partnership, which is ensured by annual monitoring by the CP of the targeted use of bank loans and borrowings, the financial condition of the business entity, as well as their collateral. The relationship of the results of production and financial activities of agricultural business entity and credit unions, reasonable given the specific data of participants who received loans due to improved their operational and financial performance. It is noted that the effectiveness of the use of financial resources, regardless of their structuring and affiliation, is expressed through indicators of productive production activities of the enterprise. It is substantiated that, based on the principles of a systematic approach, the optimization of the structure of the formation of financial resources should be considered from the point of view of interdependence and interaction with production efficiency.

**Keywords:** agricultural sector of the economy, production efficiency, credit partnerships, financial support, agricultural producers, lending, subsidies, performance.

**Introduction.** It is known that the need for constant state financial support is due to the seasonal nature of agricultural production, high dependence on climatic conditions, risks in obtaining stable incomes, a significant time gap between the costs incurred and the production of agricultural products.

The listed factors, as well as a number of other objective reasons, ultimately lead to low competitiveness of agricultural products and to the fact that agricultural producers cannot maintain the necessary level of profitability. In this regard, financial support from the state is a necessary tool and an important component of agricultural policy.

For financial support of agricultural production, state and commercial structures use various methods of resource mobilization. Basically, they are implemented in practice through a system of lending and insurance, which differ only in terms and conditions and the subjects of the provision of additional financial and lending resources [1].

However, at present, the state of the current system of state financial regulation of the agricultural sector, especially the frequently applied subsidies, dotation, and compensations, shows their insufficient effectiveness, since they still do not significantly affect economic indicators. There is a reduction in their share, and some of them have been transferred to the regional level. Thus, the republican budget provides compensation for part of the cost of acquiring only mineral fertilizers and chemical plant protection products.

It should also be noted that, judging by the index of the ratio of growth rates of gross output and growth rates of volumes of financial support [2], i.e. in terms of the indicator that characterizes the level of effectiveness of such support, state financing and lending to agricultural producers are still ineffective.

Since the most widespread form of state financial support in our republic is concessional lending to agricultural producers, we considered as a goal in this article, on the one hand, the effectiveness of intermediary activities of financial institutions providing such services. First of all, these are credit partnerships (CP) that directly provide financial services to agricultural producers, which cover 93% of the republic's territory, i.e. located in almost all areas, provide cheap credit resources, provide employment and are the most affordable financial institution for the rural population [3]. Due to the lack of liquid collateral among agribusiness entities and the poor representation of financial institutions in rural areas, CPs are currently an effective tool to provide rural people with affordable financial resources. Studying the experience of developing credit co-operation in countries such as Germany, Ireland, Poland, Vietnam, Russia, Lithuania, shows that the system itself is based on the credit and savings principle of credit cooperation, which allows taking savings from participants, while in a number of countries these savings are also guaranteed by the state. As a result of the high development of these systems - coverage and expansion of access to financial services of the population. International experience shows that the further development of the credit cooperation system is associated with the improvement of existing and the introduction of new mechanisms to enhance its financial stability and attractiveness, both for potential participants in the system and for investors.

It should be noted that to date, 193 CPs have been registered in the republic, including 18 credit partnerships operating in the Akmola region.

On the other hand, we examined the results of activities of loan recipients - agricultural groups of various forms of ownership and management, which were united by credit partnerships, which essentially acted as intermediaries in the distribution of allocated budget funds.

In our opinion, we have chosen the object of the most typical representative of all credit partnerships in the Akmola region, namely CP Tselinogradskoye LLP, as well as agricultural enterprises credited by this CP as the object for evaluating the activities of credit partnerships.

Methods. When studying the state and effectiveness of the facilities, a methodology was used for a comparative assessment of the production and financial activities of agricultural entities credited by CT and the credit partnership itself based on economic and statistical methods of comparison and dynamics, abstract logical methods and methods of analysis and generalization of the results.

Results. The starting materials were the current modern system of state financial support for the agricultural sector of the economy of Kazakhstan, implemented through the use of such basic forms as soft loans to agricultural enterprises and subsidies for agricultural production and material and technical resources [4].

These forms of financial support were considered in the article on the example of the activity of CP Tselinogradskoe LLP with the use of evidence for a number of years. The main economic indicators of enterprises credited by CP for a number of years served as materials and initial data for analyzing the activities of agricultural producers.

The main results of the research. LLP "CP Tselinogradskoye" has been operating since 03.03.2004. The structure of the participants of the credit partnership together with Agrarian Credit Corporation JSC in 2005 included 23 agricultural units of the Tselinograd region. The charter capital of CP was formed in the amount of 55.4 million tenge, of which the share of Agrarian Credit Corporation JSC was 8.7 million tenge, or 15.6%.

To date, there have been significant changes in the development of CP Tselinogradskoe LLP, which are confirmed by specific indicators. So, when it was created, the participants were only 23 farms, and the lending limit was a little more than 99 million tenge. Today, there are 59 participants in this CP, including 22-LLP, 2-JSC, 24-KH and 11-IP, and the lending limit has increased to 6.5 billion tenge, or 66 times more than in 2005.

To date, there have been significant changes in the development of CP Tselinogradskoe LLP, which are confirmed by specific indicators. So, when it was created, the participants were only 23 farms, and the lending limit was a little more than 99 million tenge. Today, there are 59 participants in this CP, including 22-LLP, 2-JSC, 24-PF and 11-IP, and the lending limit has increased to 6.5 billion tenge, or 66 times more than in 2005.

Over the years of CPs functioning, credit resources have been allocated for a total amount of more than 15.5 billion tenge, of which 26.2% are long-term and 73.8% are short-term types of loans. During this



period, all CP participants acquired fixed assets in the amount of 739.6 million tenge. These are 12 tractors, 48 combines, 10 reapers, 10 sowing complexes, 14 load-lifting cars, 20 agricultural equipment, 1 mill complex, 2 sets of grain cleaning machines and equipment, 2 trailers, equipment for a machine and tractor workshop, equipment for kumys farms, a wind power station, as well as 81 horses, 405 sheep, 147 cattle.

To a certain extent, the volumes of allocated credit resources shown above also contributed to the development of agriculture in the Tselinograd region as a whole, as can be judged from the data on agricultural production in all categories of households given in table 1.

In general, as can be seen from the data in table 1, in the Tselinograd region, for all agricultural enterprises and households, growth in gross output is provided in dynamics. So, if in 2014 it amounted to 15.2 billion tenge in the context of agricultural enterprises, then in 2018 it increased to 36.1 billion tenge, or 2.4 times. At the same time, such enterprises accounted for an average of 62.5% of total production.

Table 1 – Volumes of agricultural products in the context of categories of enterprises in the Tselinograd district, billion tenge

Indicators	2014		2015		2016		2017		2018	
	amount	share, %	amount	share, %	amount	share, %	amount	share, %	amount	share, %
All categories of farms	15,2	100	18,5	100	24,4	100	26,8	100	36,1	100
Agricultural enterprises	9,2	60,5	10,2	55,1	15,5	63,5	16,4	61,2	25,9	71,8
Household farms	1,1	7,2	1,1	5,9	1,5	6,1	1	3,7	2,0	5,6
Households	4,9	32,2	7,2	38,9	7,3	29,9	9,3	34,7	8,2	22,6

In 2018, compared with 2017, the highest growth rate (200%) of gross agricultural production in household farms is observed, while in private farms, on the contrary, there is a decrease of 12% in production volumes. We associate such structural changes with the development in recent years of household farms, to which the state provides financial support through credit partnerships.

Now, we will consider in more detail the main indicators characterizing the development and results of the activities of CP “Tselinogradskoye” LLP in Akmla region. Some decrease occurs in 2018. So, the value of short-term assets decreased by 1.4% and short-term liabilities - by 3.1%. And, on the contrary, if the cost of equity increased by only 13.7%, long-term liabilities increased sharply whose growth rate amounted to 174% [5].

An increase in liabilities is a perfectly acceptable and actually necessary result of CP activities, since the partnership carries out authorized banking operations and, in essence, performs the functions of a credit institution. But the positive is the fact that HF provides long-term loans, which are urgently needed by agricultural enterprises. The growth of equity, cash, reduction of short-term liabilities as a rule, indicates an increase in the financial stability of any business entity, including the analyzed credit partnership.

From the data of table 2 it can be seen that the activity of the enterprise is annually profitable, and the amount of profit gained has increased over the period from 2014 to 2018 from 4.7 million tenge to 15.6 million tenge, or 3.3 times. The increase in profits from core activities was affected by an increase in financing income, which increased over the analyzed period from 125.1 million tenge to 517.3 million tenge or 4.1 times. High at the enterprise are the growth rate of financing costs and administrative expenses.

So, the former increased from 55.6 million tenge to 331.7 million tenge, or almost 6 times, and the latter from 65.9 million tenge to 153.2 million tenge, or 2.3 times. It is not difficult to notice that, despite the increase in financing income in 2018 compared with 2017 by 16.1%, while the financing costs increased by 17.4%, the mass of profit from core activities increased by only 5, 4%, since administrative expenses increased by another 8.7%. Such changes, of course, contribute to lower levels of return on assets, equity and borrowed capital.

However, taking into account the approximately different average annual growth rates of expenses and incomes, and this, in principle, is not a completely desirable phenomenon, we can conclude that the main factor in the growth of the company's net profit is the annual decrease in the administrative expenses of the partnership, financing costs and the growth of financing income.

Table 2 – The financial results of the CT "Tselinogradskoe"

Indicators	2014 thousand tenge	2015 thousand tenge	2016 thousand tenge	2017 thousand tenge	2018 thousand tenge	2018/2017, %
Financing income	125,1	182,2	326,3	445,7	517,3	116,1
Administrative expenses	65,9	73,6	93,0	141,0	153,2	108,7
Finance costs	55,6	102,1	206,9	282,6	331,7	117,4
Other expenses	–	–	–		11,3	–
Profit (loss) for the period from continuing operations	3,5	6,5	26,4	22,2	23,3	105,4
Corporate income tax expense	1,2	3,3	1,2	7,9	7,7	98,3
Net profit (loss) for the period before deduction of minority interest	4,7	3,2	25,2	14,3	15,6	109,3
Total profit (total loss) for the period	4,7	3,2	25,2	14,3	15,6	109,3

Consider the dynamics of volumes of loans granted by CP to agricultural enterprises (table 3).

Table 3 – the State of lending to agricultural producers, mln. tenge

Indicators	2014	2015	2016	2017	2018	2018/2017,%
Number of CP participants receiving loans	20	26	28	25	26	104,0
Loans issued, total	1251,0	1449,2	2515,9	3246	4033	124,2
Including:						
Working capital loans	1135,9	1099,8	1709,5	2858	3080	107,7
Loans for the acquisition of fixed assets and other purposes	115,1	103,1	806,4	387,8	953	2,5 times
Loan issued for 1 participant on average	62,6	55,7	61,1	129,8	155,1	119,5
Credit repayment	1217,9	1120,4	1633,8	3288	3822	116,2
% loan repayment	97,3	77,3	95,6	101,3	94,8	–

The data on the lending status of CP participants – agricultural producers of the Tselinograd district, shown in table 3, indicate that, judging by the average rate of loan disbursement per participant, then, starting from 2016, a generally positive dynamics of lending volumes has been observed. However, the number of loan recipients and their total volumes vary by year. So, if in 2014 the volume of loans issued amounted to 1251.0 million tenge, then in 2018 this amount amounted to 4033 million tenge. In 2014, a credit line was opened to 20 participants, and in 2018 CP Tselinogradskoye LLP provided loans to 26 agricultural producers. This is evidence of the development of CP itself and the effectiveness of its activities. A satisfactory picture has also arisen on the repayment of loans, since there is a rather high level of loan repayment, which ranged from 77.3-101.3%. It can be seen that its highest level in 2017 was 101.3%.

If we evaluate the structure of loans issued by the directions of their use, we can see that their main share was annually allocated to replenish working capital or, in other words, to carry out spring-autumn field work. So, in 2018, 76.4% of the total volume was received to replenish working capital, and the remaining 23.6% – for the acquisition of fixed assets and for other purposes. Compared with the 2014 level, there is a significant increase in the share of loans for the purchase of fixed assets (in that year only 9.2% was received for this purpose, and in 2018 -23.6%).

However, we note that in general there is a low share of investments in fixed assets, i.e. this means that the share of long-term loans is still insignificant. In fact, the allocation by agricultural producers of more significant amounts of credit resources to increase their assets would contribute to their further development, would indicate the renewal of fixed assets necessary to increase production and sales of agricultural products, improve technology and expand areas of activity.

Of practical interest are the results of activities of direct recipients of loans, i.e. participants of credit partnerships. The analysis showed that the volume of loans issued to agricultural producers, subsidizing

interest rates on loans received significantly improved the production and financial performance of most participants in the credit partnership. All participants in the CP are engaged in the production and sale of crop products (growing grain and fodder crops), livestock (meat and dairy), as well as the processing of agricultural products (production of flour, pasta, kumys, dairy and sour-milk products, semi-finished products).

Discussion of the data and conclusion. An analysis of the activities of CP Tselinogradskoye LLP over a five-year period allows us to conclude that the credit partnership, like all SKT of the republic, takes part in the implementation of state programs of financial support for agriculture, directly crediting agricultural producers. At the same time, the credit partnership as a result of its activities provides a sufficiently high level of profitability ratios for the use of its assets, equity and borrowed capital, as well as an acceptable level of payback for its expenses.

In other words, CT, providing intermediary assistance in the allocation of credit resources allocated from the republican budget, demonstrates its financial stability and the effectiveness of its activities. In addition, by increasing the volume of loans issued to agricultural producers, subsidizing interest rates on loans received, the partnership contributes to a significant improvement in the production and financial performance of most participants in the credit partnership.

The level of efficiency in the use of loans received and, most importantly, how they affected the production of gross agricultural products, can be judged by the results of the activities of one of the participants in the trade, namely, En-Dala LLP, the main production and economic whose indicators are given in table 5 [6].

Table 4 – Key performance indicators of Agrofirma Aktyk JSC did not find data, you look at Aktyk Folder

Indicators	2016		2017		2018		Relative changes, % (2018/2017)	
	wheat	barley	wheat	barley	wheat	barley	wheat	barley
Sown area, ha	20120	1200	20150	2600	18318	1200	90,9	46,1
Productivity, c/ ha	13,18	57,3	9,2	10,9	12,28	30	133,4	2,7 times
Gross harvest, ton	265170	68760	185375	28340	224910	36000	121,3	127
Cost of 1 ton, tenge	30337	4907	31555	26633	40246	16471	127,5	61,8
Selling price, tg	57000	26500	48855	34000	63000	48950	128,9	144,0
Grain sales, tons	19156	5311	8074	1376	12200	3640	151,1	2,6 times
Revenue from sales, thousand tenge	1091892	140741,5	394455,3	46784	768600	178178	194,8	3,8 times
Profit from sales, thousand tenge	580043,7	114680,4	139680,2	10137	277598,8	118223,6	198,7	11,7 times

The calculation results of this table show that the highest gross yield of wheat and barley was in 2016. In 2017, these indicators sharply decreased, and in 2018 they increased again. The decrease in the gross harvest of the two main crops in 2017 is due, first of all, to a decrease in the yield of wheat from 13.18 centners to 9.2 centimeters and barley from 57.3 centimeters to 10.9 centimeters. Accordingly, the volume of sales of goods and the revenue received decreased. In 2018, at Aktyk Agrofirma JSC, the level of wheat productivity increased by 33.4%, barley – 2.7 times. The increase in crop yields in two crops positively affected their gross yield. Thus, the gross yield of wheat increased by 21.3%, and barley – by 27%. At the same time, there was an increase in the cost of wheat in 2018 from 31,555 tenge to 40,246 tenge, and, conversely, barley production costs decreased by 38.2%, which amounted to 16,471 tenge per ton, which positively affected the final financial result. It can be seen that the revenue from the sale of wheat annually exceeded its cost, therefore, profit from sales in 2016 amounted to 580043.7 thousand tenge, in 2017 - 139680.2 thousand tenge and in 2018 it increased to 277598.8 thousand tenge, or 98.7%.

Even better results were achieved by the company from the sale of barley in 2018. The profit gained was 11.7 times higher than the level of 2017.

It should be noted here that the analyzed company in order to achieve high final financial results annually attracts short-term and long-term loans. And, in addition, CT Tselinogradskoye LLP often provides loans for emergency needs to this household from (HF) its own funds under the Trust program.

For reference, in 2016, the total amount of short-term debt of Aktyk Agrofirma JSC on loans of CP Tselinogradskoye LLP amounted to 6144481 thousand tenge, in 2017 it increased to 925136 thousand tenge or 1.5 times, and in 2018 it decreased to 378,039 thousand tenge or 60%, which should be noted as a positive moment in the enterprise. In addition, CP Tselinogradskoye LLP annually provides this company with long-term loans for replenishment of fixed capital from its own funds, debt on which for 2016-2018. amounted to an average of 1307,000 thousand tenge.

Discussions. In conclusion, we can say that progressive achievements in the development of individual farms, in particular, Aktyk Agrofirma JSC in general, show the effectiveness of attracting loans. The experience of such enterprises gives reason to argue that, ceteris paribus, financial and credit resources provided to agricultural producers contribute to the growth of production volumes. This is possible even despite the difficult conditions that exist both in their functioning and in their financial support. Moreover, we note that, as analysis shows, in the practice of organizing the functioning of these farms there are examples of a relatively high level of material costs. However, nevertheless, rational use of resources, a high level of organization and management in such enterprises provide a high level of production and low cost of production.

Along with this, we also note that the main beneficiaries of loans of CP Tselinogradskoye LLP are large agricultural enterprises, which ensured the growth of agricultural production, especially in the crop sector. Household farms still do not have the opportunity to receive loans, especially long-term loans for the purchase of agricultural machinery, since the achieved production indicators remain quite low in terms of securing loans.

Based on this, we believe that further development of the lending mechanism for agricultural entities through the system of credit partnerships should be carried out taking into account the size and results of production and financial activities, development prospects of the partnership participants. Loans should be received, first of all, by successfully operating agricultural enterprises.

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### **НЕСИЕЛІК СЕРІКТЕСТЕР МЕН АУЫЛШАРУАШЫЛЫҚ ӨНДІРУШІЛЕРДІҢ ҚЫЗМЕТІНІҢ НӘТИЖЕЛЕРІ**

**Аннотация.** Мақалада ауыл шаруашылығы кәсіпорындарын олардың қызметі нәтижелерінің және берілетін қаржы қаражатының көлемдерінің өзара байланысын бағалаумен мемлекеттік қаржылық қолдау мәселелері қаралды. Экономиканың аграрлық секторын қаржылық қолдау негізінде-маусымдық фактордың әсерінен ақша қаражатының біркелкі түспеуі, өндірістік процестерде қарыз ресурстарын пайдаланудың объективті қажеттілігі, аграрлық өндірістің дотациялық сипаты және басқалар. Бұл саланың дамуы және ауыл шаруашылығы өнімдері өндірісінің өсуі ауылдық аумақтардың тұрақты дамуын теңдестіреді және елдің азық-түлік қауіпсіздігін қамтамасыз етеді. Экономиканың агроөнеркәсіптік кешенін қаржылық қолдау проблемалары бойынша әртүрлі дереккөздерді зерттеу аграрлық сектордағы қаржылық-несиелік қатынастарға мемлекеттің әсер ету жүйесі өзара байланысты экономикалық, құқықтық және ақпараттық салалар жиынтығын пайдалануға негізделгенін көрсетеді.

Мемлекет тарапынан ауыл шаруашылығы тауарөндірушілерді қаржылай қолдау бірқатар әдістер мен тетіктерді қолдана отырып жүзеге асырылады. Олардың ішінде біздің республикамызда ең дамыған кез келген жағдайда бұл саладағы кәсіпорындарды ауылдық несиелік серіктестіктері арқылы қаржыландыру болып саналады. Алайда, қазіргі түсінікте кредиттік серіктестіктер "кооперация" ұғымының өзінің негізгі идеясын жоғалтты, өйткені бастапқыда "кредиттік серіктестік" түсінігі жеке сенім мен олардың қызметінің табыссыздығы принципіне негізделген серіктестердің өзара несиесін ұйымдастыруды білдірген. Қазір несиелік серіктестіктері коммерциялық банктердің бір түріне айналды. Бұл болашақта елдің аумағының барлық ауылдық аудандарын қамтитын ауылдық несиелік серіктестіктерін ауыртпалықсыз қайта ұйымдастырылған ауыл шаруашылығы банкінің бөлімшелері ретінде қайта құру мүмкіндігі бар дегенді білдіреді.

Ауыл шаруашылық тауарөндірушілерге мемлекеттік жәрдем жасау жүйе шаруашылық жүргізуші субъектілердің нарықтық өзара әрекеттесуі үшін жағдайларды жүзеге асыру шеңберіндегі бағдарламалар мен іс-

шараларды жүзеге асыруға, олардың тиімді жұмыс істеуі үшін оңтайлы жағдайларды жасауға, шаруашылық жүргізуші субъектілердің қаржы-шаруашылық қызметіне араласудың рұқсат етілген шекараларын бұзбай және олардың қаржылық тәуелсіздігін сақтауға ықпал етуі керек. Ауыл шаруашылық өндірісін мемлекеттік қаржылық қолдау шараларын оңтайландыру және оның тиімділігін арттыру қажет. Республикалық бюджеттен бөлінетін қаражат көлемін ұлғайту ғана емес, сонымен бірге субъектілердің жарғылық капиталының мөлшеріне тәуелді емес, олардың қызметінің нәтижелерін ескере отырып қаржылық ресурстармен қамтамасыз етіп, сол ресурстарды пайдалануын жақсарту қажет. Мақалада келтірілген жекелеген кәсіпорындардың тәжірибесі ауыл шаруашылығының тауар өндірушілеріне олардың жұмысының қиын жағдайларында да, оларды қаржылық қамтамасыз етудегі қиындықтарға қарамастан берілетін қаржылық-несиелік ресурстардың оң әсерін көрсетеді.

**Түйін сөздер:** мемлекеттік қаржылық қолдау, экономиканың аграрлық секторы, өндіріс тиімділігі, ауылшаруашылық өндірісі, қаржылық жағдайды талдау әдістері, субсидиялар, өндіріс көрсеткіштері

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### РЕЗУЛЬТАТЫ ДЕЯТЕЛЬНОСТИ КРЕДИТНЫХ ТОВАРИЩЕСТВ И СЕЛЬХОЗТОВАРОПРОИЗВОДИТЕЛЕЙ

**Аннотация.** Рассмотрены вопросы государственной финансовой поддержки сельскохозяйственных предприятий с оценкой взаимосвязи результатов их деятельности и объемов предоставляемых финансовых средств. В основе финансовой поддержки аграрного сектора экономики – неравномерность поступления денежных средств из-за влияния фактора сезонности, объективная необходимость использования заемных ресурсов в производственных процессах, дотационный характер самого аграрного производства и другие. Развитие этой отрасли и рост производства сельскохозяйственной продукции сбалансирует устойчивое развитие сельских территорий и обеспечит продовольственную безопасность страны.

Финансовая поддержка сельскохозяйственных товаропроизводителей со стороны государства осуществляется с применением целого ряда методов и механизмов. Среди них самым развитым, во всяком случае в нашей республике, считается финансирование предприятий этой отрасли посредством сельских кредитных товариществ. Однако в современном понимании кредитные товарищества потеряли основную идею самого понятия «кооперация», поскольку изначально понятие «кредитное товарищество» означало организовать взаимный кредит товарищей, который основывался на личном доверии и принципе бездоходности их деятельности. Сейчас же кредитные товарищества практически превратились в разновидность коммерческих банков, причем, надо заметить, очень мелких банков. Это означает, что в перспективе имеется возможность безболезненного преобразования сельских кредитных товариществ, которые территориально охватывают практически все сельские районы страны, в отделения вновь организованного сельскохозяйственного банка.

Отмечено, что эффективность использования финансовых ресурсов не зависит от их структуризации и принадлежности выражается через показатели результативной производственной деятельности предприятия. Обосновано, что, исходя из принципов системного подхода, оптимизация структуры формирования финансовых ресурсов должна рассматриваться с точки зрения взаимообусловленности и взаимовлияния с эффективностью производства. Необходимо осуществлять рационализацию мер государственной финансовой поддержки сельскохозяйственного производства и повышение ее результативности. Нужно не только увеличивать объемы средств, выделяемых из республиканского бюджета, но и улучшать их использование, предоставляя финансовые ресурсы субъектам с учетом результатов их деятельности, а не в зависимости от размеров их уставных капиталов. Приведенный в статье опыт деятельности отдельных предприятий свидетельствует о положительном влиянии предоставляемых сельхозтоваропроизводителям финансово-кредитных ресурсов, даже в сложных условиях их функционирования и несмотря на проблемы в их финансовой поддержке.

**Ключевые слова:** государственная финансовая поддержка, аграрный сектор экономики, эффективность производства, производство продукции сельского хозяйства, методика анализа финансового состояния, субсидий, производственные показатели

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## STABILITY OF FISCAL REVENUES IN EU: WHAT TO TAX?

**Abstract.** Certain and predictable tax revenues are desirable by states to run fiscal policy smoothly and minimize any negative effects of business cycles. Over the last decades sizes of government budgets in most EU Member States have experienced rather small transformations. However, particular kinds of taxes contribute to that stability to different extent. Although, this matter is important from the perspective of state budget, it has not been analysed thoroughly before – especially in EU. Based on statistical analysis of macroeconomic data I calculated that revenues from payroll taxes feature especially low variability and positively influence the budget constancy. Changes over time are slightly bigger for taxes imposed on production. Inflows from taxation of income of corporations are particularly unstable. These findings may support policymakers in appropriate budget revenues design.

Expansionary fiscal policy is believed to boost economic growth (Aschauer, 1989), (Munnell, 1990)). Public investments are traditionally believed to support long-term growth of economies (Barro, Government Spending in a Simple Model of Endogenous, 1990). On the other hand low taxes should support development of economy as well ((Engen & Skinner, 1992), (Daveri & Tabellini, 2000), (Karras & Furceri, 2009), (Padovano & Galli, 2001) or (Lee & Gordon, 2005) to mention only selected research). For example Romer and Romer estimated that a 1% increase in taxation relative to GDP induces reduced output of up to 3% over the following three years (Romer & Romer, 2007). Mountford and Uhlig claimed that tax cuts - even if financed from budget deficit – are most effective from the perspective of economy growth (Mountford & Uhlig, 2008). Blanchard and Perotti found that tax shocks affect investment, consumption and output (Blanchard & Perotti, 2002).

However, some empirical analysis failed to confirm significance of the relation between GDP and tax rates ((Easterly & Rebelo, 1993), (Mendoza, Milesi-Ferretti, & Asea, 1997)). The correlation between the level of the tax rate and output was found to be indeed negative but sometimes non-existing. These results are in line with common sense. However, in the long run high public spending cannot be combined with low taxes (assuming that low taxes transfer into smaller budget revenues). High public deficits, which may arise in consequence of expansionary fiscal policy, are eventually harmful for economic growth in the long-run. Therefore, satisfactory inflows from taxes are desirable.

Maintaining balanced budgets is a typical objective of several world economies. Yet this requirement seems key for European Monetary Union states, which use single currency and hence lead common monetary policy [1]. To improve economic stability of those countries and to provide for at least impeded policy-mix tools, certain requirements related to fiscal policy were imposed on them. According to the so called Convergence Criteria (also known as Maastricht Criteria)(i) the ratio of the annual government deficit to GDP must not exceed 3 percent and (ii) the ratio of government debt to GDP must not exceed 60 percent. However, several Member States are struggling against high budget deficits which are followed by excessive public debts. Most EU Member States have been returning to balance over last years and in 2017 almost half of them recorded government surplus. However, the budget deficit for the EU as a whole is still substantial and in 2017 amounted to 81.6% of its GDP. This is far more than before the crisis in 2007 when a figure of 57.5% of GDP was recorded. Moreover, although from peak in 2014 general government debt decreased on average in a number of Member States, still in 2017 as much as 12 out of 19 eurozone countries bound by the Maastricht criteria recorded debt above required level of 60% of local GDP. Identification of reliable sources of state revenues may provide a useful tool to cope with that issues.

**Key words:** Income Tax, National Budget, Public Finance, Revenue, Taxation.

**Introduction.** Therefore, it is believed that public expenditures should match government revenues within some limits. Keeping an appropriate balance between taxation and budget expenses should support economic growth as long as the size of the government is not excessive ( (Fölster & Henrekson, 2001), (Bassanini, Scarpetta, & Hemmings, 2001)). However, fiscal spending should accommodate to current economic conditions.

In the literature the typically mentioned drawback of volatile fiscal revenues is the disability of government to avoid significant spending reductions or increases of taxes in times of low tax inflows. In addition such actions of government often affect real economy and push it to a vicious circle of cyclicality (Kwak, 2013). Levinson, who analysed US states found that strict balanced budget requirements exacerbate business cycle (Levinson, *Balanced budgets and business cycles: evidence from States*, 1998). Canova and Pappa found that the fiscal constraints are almost unimportant for macroeconomic fluctuations. However, they conclude that the reason could be that (i) constraints apply only to a portion of the total budget, (ii) that no formal provision for the enforcement of the constraints exist and that (iii) rainy days funds play a buffer-stock role (Canova & Pappa, 2005).

Assuring stable revenues for the budget seems crucial both to maintain the balance and to foster economic growth of a state. Tax revenues tend to follow business cycle. Therefore, secure revenue sources that are less prone to business cyclicality are particularly desirable as they enable to run fiscal policy more independently from current economic situation. For this reason this analysis focuses on volatility of government revenues [2].

The study dig further and is focused on particular components of revenues, which is seldom done in the literature (Afonso & Furceri, 2010). There is not only need for better understanding of tax policy mechanisms – especially in EU - (which this article should contribute to) but also there are practical reasons mentioned above (and hereinafter in this article) that justify the necessity of this research.

**Methods.** Methods used are general scientific and special, such as: system analysis method; content analysis method; comparative analysis method; method of analysis and synthesis; method of systematic approach.

**Results.** Size of the government in EU countries generally stabilized over the last twenty years. However, still there were states where budget revenues from taxes (which are the main financing source, as explained above) were ongoing significant changes. The biggest change in the period 1995–2016 was recorded in Greece - increase by 12.5 percentage points relative to GDP. Ireland ranked second with a decrease of 9.9 percentage points of local GDP. Concurrently, there are as much as eighteen countries, where the changes did not exceed 3 percentage points (both in plus or in minus) [3].

Such findings do not give sufficient information on the changes of tax inflows within the analysed period as only the extreme dates are compared. Therefore, as one of the solutions I calculated standard deviation of revenues for total taxes for each country for the verified time span. However, this measure in terms of deviation analysis is also not particularly informative as government revenues from total taxes vary significantly among EU states in comparison to their GDPs. For example, in 2016 in Denmark government size accounted for 47.5 percent of local GDP but at the same time for Ireland the figure was exactly two times lower (for other countries please refer to table 3 included above) [4]. Therefore, to account for comparability among the sample standard deviation applicable for each state was compared with average tax revenues of such state and in effect coefficient of variation was calculated.

From these descriptive statistics calculations stems out that coefficient of variation is the biggest for Cyprus (11.8%) followed by Slovakia (10.1%). Greece, where changes in tax revenues in extreme dates where the biggest (as analysed earlier) is now ranked third. However, for several EU countries the figure is relatively low [5]. This means that in majority of Member States tax revenues have been relatively stable over last two decades and on average coefficient of variation was 4.7%.

Fiscal policy is lead so far independently by any EU Member State, even within eurozone. Some countries finally worked out their taxation system and do not amend the rules significantly, whereas the others continuously amend the system by increasing or decreasing the role of government in the economy.

Therefore, it seems reasonable to estimate the trend for total tax revenues for each state for the verified period. To eliminate any seasonal or cyclical factors simple linear function seems most appropriate:

$$y_t = at + b$$



Where  $t$  is a year from the period 1995–2016,  $a$  is the gradient of the function and  $b$  is the intercept. Trend line was estimated using OLS method which minimizes the sum of the squared errors in the data series and hence provide for best possible fit to the empirical data.

Table 1 – Average total tax revenues for the Member States in the period 1995 – 2016 including standard deviation and coefficient of variation

State	Standard deviation	Average total tax revenues	Coefficient of variation
Cyprus	3,5	29,9	11,8%
Slovakia	3,2	32,3	10,1%
Greece	3,2	34,3	9,4%
Malta	2,8	31,1	8,9%
Ireland	2,6	30,1	8,8%
Bulgaria	1,8	28,6	6,4%
Lithuania	1,6	29,6	5,6%
Estonia	1,7	32,5	5,1%
Portugal	1,6	34,3	4,8%
Poland	1,6	34,5	4,7%
Sweden	2,1	45,9	4,6%
Romania	1,3	28,1	4,5%
Latvia	1,2	29,4	4,2%
Spain	1,3	33,9	4,0%
Finland	1,6	43,1	3,7%
United Kingdom	1,2	33,8	3,7%
Italy	1,5	41,1	3,5%
France	1,3	44,8	3,0%
Netherlands	1,0	37,0	2,8%
Hungary	1,0	38,1	2,7%
Austria	1,1	43,3	2,7%
Germany	1,0	39,6	2,5%
Denmark	1,1	47,8	2,4%
Czech Republic	0,8	33,7	2,4%
Luxembourg	0,8	38,5	2,1%
Belgium	0,8	45,6	1,7%
Slovenia	0,5	37,2	1,4%

Source: Authors' own calculations.

Table 2 – Estimated trend function for total tax revenues of EU Member States for the period 1995 – 2016

State	Gradient	Intercept
Cyprus	0,48	24,3
Greece	0,44	29,2
Malta	0,39	26,7
Portugal	0,23	31,6
Italy	0,15	39,4
France	0,14	43,2
United Kingdom	0,14	32,1
Luxembourg	0,05	37,9
Belgium	0,04	45,1
Czech Republic	0,04	33,2
Spain	0,01	33,8
Hungary	-0,01	38,2
Latvia	-0,02	29,6
Estonia	-0,02	32,7
Slovenia	-0,02	37,5
Netherlands	-0,03	37,4
Denmark	-0,04	48,3
Romania	-0,05	28,7
Bulgaria	-0,05	29,2
Germany	-0,08	40,4
Lithuania	-0,08	30,5
Austria	-0,10	44,4
Finland	-0,12	44,6
Poland	-0,19	36,6
Sweden	-0,29	49,3
Ireland	-0,34	34,0
Slovakia	-0,40	36,8

Source: Authors' own calculations.

Such trend line estimated for the whole EU is almost constant. In 1995 so estimated tax revenues are at 36.1% of GDP and are increasing by 0.01% p.a. to reach 36.22% in 2016. Yet, the empirical data differ substantially and at 0.05 significance level the F statistics suggests that there is no linear linkage with the real values. This seems to be due to the fact that the trend for particular Member States is either generally increasing, decreasing or there is no clear trend. Detailed data is presented in a table below [6].

As we see the gradient value is modest for most countries. This suggest that the changes in tax revenues are relatively small. However, it turned out that at 0.05 significance level the estimated functions are statistically significant only for 14 states (using F statistics). This means that there is no clear linear trend for the rest of the sample. For details please refer to the table below.

This finding may suggest that ca. half of EU Member States have led stable tax policy over the last years. It does not mean of course that the tax revenues did not change. They did, but such changes were proportional over time. In fact, tax revenues were generally either increasing, decreasing or remain constant but always followed a statistically significant trend line for the period considered [7].

The higher the coefficient of determination (calculated both for the empirical data and for the estimated trend line) the more balanced the tax revenues should be. Naturally for the countries where the Pearson correlation coefficient is closer to zero (i.e. for Luxembourg, Belgium and following countries in the bottom of the above table) it does not mean that there is no linkage between volume of tax revenues and the estimated trend line. The only information is that the relation is non-linear. This issue is, however, also an important finding as it confirms that in 13 cases the tax revenues of these EU Member States do not follow linear trend and hence we can assume their higher volatility or unpredictability [8].

Estimated linear trends allow us to calculate coefficients of residual variation. Due to statistical reasons their values obviously should be smaller in any case than calculated earlier coefficient of variation. Due to the nature of such estimation this of course holds for each country with no exception. The comparison of the values is included in the table below. Only countries with statistically significant trend lines were taken into consideration.

Table 3 – Coefficient of determination, correlation coefficient and results of F statistics for the estimated trend lines for EU Member States for 1995 - 2016

State	R2	Correlation coefficient	Is there linear correlation?
Portugal	0,80	0,89	Yes
Malta	0,79	0,89	Yes
Sweden	0,76	0,87	Yes
Cyprus	0,75	0,87	Yes
Greece	0,75	0,87	Yes
Ireland	0,66	0,81	Yes
Slovakia	0,60	0,77	Yes
Poland	0,54	0,74	Yes
United Kingdom	0,52	0,72	Yes
France	0,46	0,68	Yes
Italy	0,43	0,65	Yes
Austria	0,29	0,53	Yes
Germany	0,24	0,49	Yes
Finland	0,24	0,49	Yes
Luxembourg	0,14	0,38	No
Belgium	0,13	0,36	No
Czech Republic	0,12	0,34	No
Lithuania	0,10	0,31	No
Slovenia	0,07	0,27	No
Romania	0,07	0,26	No
Denmark	0,06	0,25	No
Netherlands	0,04	0,20	No
Bulgaria	0,03	0,18	No
Latvia	0,01	0,08	No
Spain	0,00	0,07	No
Estonia	0,00	0,07	No
Hungary	0,00	0,04	No

Source: Authors' own calculations.

From the above we see that on average the coefficient of residual variation is lower than the coefficient of variation by 35.3%. The higher the R2 value, the higher the percentage difference of coefficient of residual variation and coefficient of variation. This results from mathematical calculations and fully corresponds with the common sense. Unsurprisingly the higher the correlation of the trend line with the empirical data (and also the R2) and hence the fit of the trend line is better, the lower difference between the coefficient of variation calculated on empirical non-modelled data and the coefficient of residual variation calculated on the trend line [9].

The analysis made so far focused on revenues from all key taxes. Yet, the question arises how good particular taxes are in these countries in providing stable inflows to the government. To answer that question, I made similar calculations for all material kinds of taxes – i.e. D2 - Taxes on production and imports, D5 - Current taxes on income, wealth, etc. and D61 - Net social contributions.

For each type of tax, the absolute changes were calculated. At first only two years – i.e. 2016 and 1995 were considered. For details please refer to the below table.

During the analysed period the smallest change were recorded for social security with the average value of 1.4 percentage point of total EU GDP (the figure is calculated as absolute value). Higher average change was for production taxes of 1.7 points and the highest for income taxes of 1.9 points. Naturally, this could be related to the fact that in percentage terms these three categories of taxes play different role in rising budget revenues. Whereas taxes imposed on production on average provide for highest budget revenues (13.6% of GDP for all EU Member States), both income taxes and social security are of lesser importance (11.5% of GDP each). When these shares are taken into account it strikes that income taxes are most volatile as such average relative change was 0.17, whereas for production taxes and social security it amounted for 0.12. These simple calculations lead to interesting conclusion, which is in line common sense. Namely, due to the fact that income taxes are particularly prone to tax competition among states, the volatility among them is above that for other taxes. The exposure of CIT for tax competition has been discussed widely in the literature from perspective of capital mobility investment location decisions of multinationals (e.g.

Table 4 – Coefficient of residual variation of total tax revenues

State	coefficient of variation	coefficient of residual variation	coefficient of residual variation lower than coefficient of variation
Portugal	4,8%	2,1%	55%
Malta	8,9%	4,0%	54%
Sweden	4,6%	2,3%	51%
Cyprus	11,8%	5,8%	50%
Greece	9,4%	4,7%	50%
Ireland	8,8%	5,1%	42%
Slovakia	10,1%	6,4%	37%
Poland	4,7%	3,2%	32%
United Kingdom	3,7%	2,5%	31%
France	3,0%	2,2%	27%
Italy	3,5%	2,7%	24%
Austria	2,7%	2,2%	15%
Germany	2,5%	2,2%	13%
Finland	3,7%	3,2%	13%
<b>Average</b>	<b>5,9%</b>	<b>3,5%</b>	<b>35%</b>

Source: Authors' own calculations.

(Winner, 2005), (Devereux & Griffith, 1998), (Becker & Fuest, 2010), (Büttner & Ruf, 2007), (Overesch & Wamser, 2010), (Ghinamo, Panteghini, & Revelli, 2010), (Barrios, Huizinga, Laeven, & Gaëtan, 2009), (Nicodème, 2009) etc.)

The above calculations considered only two years from the analysed period. Therefore, the information produced is not complete as the years 1996 – 2015 were disregarded. Therefore – similarly to the earlier calculations for total taxes - I computed also standard deviation of revenues for each category of taxes for each state for the whole verified time span. To assure comparability of volatility among EU Member States I considered the share of particular tax in building budget revenue in a given country. As a result, (i) standard deviation applicable for each state and for each type of tax was referred to (ii) average tax revenues for such tax type for each country. This provided for coefficient of variation [10].

From these calculations stems out that the highest average coefficient of variation for EU states for the period 1995 – 2016 is for D5 - Current taxes on income, wealth, etc. with the value of 11%. This is followed by 8.5% for D61 - Net social contributions and 6.7% for D2 - Taxes on production and imports [11].

The findings provided by these statistics are more robust and reliable than calculated before. However, the key information is the same. Namely, these are income taxes that are characterized by highest volatility. However, this time the results are different for the remaining taxes. In particular, social security ranked second with average coefficient of variation of 8.5%, whereas taxes on production proved to be most stable in providing budget revenues (average coefficient of variation of 6.7%).

In the following step I estimate with OLS method the linear trend for each type of tax revenues for each EU state for the considered period. I do this using the same function as earlier in this article  $y_c = at + b$  (where  $t$  is a year from the period 1995 – 2016,  $a$  is the gradient of the function and  $b$  is the intercept).

The gradient value in a number of cases is lower than for total taxes analysed before. This suggests that in general the volatility in tax revenues from each type of tax should be small in most countries.

However, it turned out that at 0.05 significance level the estimated functions are significant only from 16 to 17 states (depending on the type of tax). Conclusion is similar to the one applicable to total taxes – i.e. there is no clear linear trend for the rest of the sample. For details please refer to the table below.

From the above we see that there are seven countries, where the revenues from all different kinds of taxes changed over time in a linear way (highlighted in dark grey). For 11 countries the inflows of money from taxes followed a linear pattern only with respect to two kinds of taxes (highlighted in medium dark grey). For the remaining states only one tax provided for revenues, which fluctuated linearly (highlighted in bright grey) or there was no such tax at all (Netherlands and Spain).

Finally, we see that both (i) taxes on production and (ii) current income taxes in 17 states provided for linear tax inflows and in this respect were slightly better than social contributions, which gave linear revenues for 16 countries over the analysed period.

Table 5 – Estimated trend function for different types of tax revenues of EU Member States for the period 1995 – 2016

State	Taxes on production and imports		Current taxes on income		Social contributions	
	gradient	intercept	gradient	intercept	gradient	intercept
Cyprus	0,25	10,58	0,11	8,01	0,12	5,72
Bulgaria	0,22	11,65	-0,16	7,99	-0,11	9,59
Hungary	0,14	14,93	-0,11	9,84	-0,03	13,42
Greece	0,14	11,64	0,13	7,24	0,17	10,32
Romania	0,14	10,14	-0,16	8,76	-0,03	9,78
Italy	0,11	12,91	0,04	13,70	0,01	12,79
Malta	0,10	11,80	0,33	7,18	-0,05	7,69
Estonia	0,09	12,24	-0,13	9,40	0,02	11,08
Czech Republic	0,09	10,11	-0,07	8,69	0,02	14,39
United Kingdom	0,04	11,72	0,03	14,01	0,07	6,41
Portugal	0,03	13,63	0,10	8,00	0,10	9,98
Latvia	0,03	12,35	0,05	6,98	-0,09	10,24
Germany	0,03	10,50	0,03	11,15	-0,13	18,79
Luxembourg	0,02	12,32	-0,03	14,56	0,06	11,07
Finland	0,02	13,49	-0,13	18,54	-0,01	12,53
Belgium	0,01	12,99	-0,01	16,38	0,04	15,68
Spain	0,01	11,08	0,01	10,05	0,00	12,62
Netherlands	0,00	11,64	-0,02	11,07	-0,02	14,67
France	-0,01	15,60	0,15	9,43	0,00	18,16
Poland	-0,03	13,93	-0,15	9,47	-0,01	13,23
Sweden	-0,04	23,06	-0,11	20,51	-0,14	5,70
Austria	-0,04	15,14	0,00	13,31	-0,06	15,91
Denmark	-0,04	17,48	0,05	28,75	-0,05	2,07
Slovenia	-0,05	15,62	0,02	7,39	0,01	14,49
Lithuania	-0,06	12,75	-0,20	9,65	0,19	8,08
Slovakia	-0,15	13,35	-0,15	8,93	-0,09	14,52
Ireland	-0,23	14,79	-0,10	13,87	0,00	5,32

Source: Authors' own calculations.

Table 6 – Testing the linear trend of revenues from particular taxes of EU Member States for the period 1995 – 2016

State	Taxes on production and imports			Current income taxes			Social contributions		
	R2	Correlation coefficient	Linear correlation?	R2	Correlation coefficient	Linear correlation?	R2	Correlation coefficient	Linear correlation?
Slovakia	0,76	0,87	Yes	0,53	0,73	Yes	0,27	0,52	Yes
Cyprus	0,54	0,73	Yes	0,32	0,57	Yes	0,86	0,93	Yes
Bulgaria	0,50	0,71	Yes	0,63	0,79	Yes	0,32	0,57	Yes
Czech Republic	0,49	0,70	Yes	0,38	0,61	Yes	0,19	0,43	Yes
Malta	0,42	0,65	Yes	0,92	0,96	Yes	0,63	0,79	Yes
Greece	0,41	0,64	Yes	0,52	0,72	Yes	0,92	0,96	Yes
Lithuania	0,29	0,54	Yes	0,53	0,73	Yes	0,65	0,81	Yes
Ireland	0,79	0,89	Yes	0,53	0,73	Yes	0,00	0,02	No
Romania	0,48	0,69	Yes	0,48	0,69	Yes	0,02	0,15	No
Hungary	0,47	0,69	Yes	0,36	0,60	Yes	0,12	0,34	No
Estonia	0,46	0,68	Yes	0,49	0,70	Yes	0,03	0,17	No
Austria	0,38	0,62	Yes	0,00	0,01	No	0,50	0,71	Yes
Germany	0,36	0,60	Yes	0,06	0,24	No	0,78	0,89	Yes
Denmark	0,29	0,54	Yes	0,07	0,27	No	0,62	0,79	Yes
United Kingdom	0,25	0,50	Yes	0,06	0,24	No	0,78	0,88	Yes
Sweden	0,14	0,37	No	0,38	0,62	Yes	0,68	0,83	Yes
Portugal	0,13	0,37	No	0,42	0,65	Yes	0,78	0,88	Yes
Latvia	0,03	0,18	No	0,33	0,58	Yes	0,51	0,71	Yes
Italy	0,43	0,65	Yes	0,11	0,33	No	0,00	0,06	No
Slovenia	0,32	0,57	Yes	0,06	0,24	No	0,00	0,06	No
Belgium	0,14	0,38	No	0,01	0,12	No	0,29	0,54	Yes
Poland	0,10	0,32	No	0,39	0,63	Yes	0,01	0,07	No
Luxembourg	0,05	0,22	No	0,09	0,31	No	0,52	0,72	Yes
Finland	0,03	0,18	No	0,47	0,69	Yes	0,02	0,13	No
France	0,03	0,17	No	0,57	0,75	Yes	0,00	0,03	No
Netherlands	0,00	0,04	No	0,04	0,20	No	0,02	0,13	No
Spain	0,00	0,04	No	0,01	0,09	No	0,00	0,07	No
<b>Number of significant coefficients of determination</b>			<b>17</b>			<b>17</b>			<b>16</b>

Source: Authors' own calculations

Finally, I calculate coefficients of residual variation (for countries where trend lines were statistically significant) and compare them with coefficient of variation [12].

From the above calculations we see that the difference between coefficient of residual variations and coefficient of variations are particularly high for social contributions (a mean of 39.1% for EU states, for which linear correlation was statistically significant). This means that although the volatility of revenues

from social security could be sizeable, the revenues from that tax follow a linear trend more than in case of revenues from current income taxes or taxes on production [13].

Finally, the calculation is made separately for (i) revenues from CIT and for (ii) revenues from payroll – i.e. PIT including social security.

The above analysis provides for very interesting finding. The average coefficient of variation for payroll for all EU Member States for the period 1995 - 2016 is just 6.1%, which is the lowest value among analysed taxes. This suggests that taxing workforce provides for exceptionally stable fiscal revenues.

On the other hand, coefficient of variation for CIT is on average for EU countries over the analysed period on the level of 22.2%. This value is by far the highest among the considered types of taxes. It may be stated that taxation of corporations has not provided stable tax revenues for the verified sample.

Both findings correspond with the common perception of elasticity of workforce and mobility capital as well as reflect the composition and aim of applicable taxation acts (i.e. employee's remuneration is relatively stable and their income is taxed with PIT and social security, whereas income of corporations greatly depends on business cycle and hence is more volatile, which transforms into unstable revenues from that tax).

Table 7 – Average tax revenues for (i) PIT including Social security and (ii) CIT for the EU Member States in the period 1995–2016 including standard deviation and coefficient of variation

State	PIT + Social security Average			CIT Average			Total coefficient of variation
	Standard deviation	revenue for the period	Coefficient of variation	Standard deviation	revenue for the period	Coefficient of variation	
Lithuania	1,20	15,96	7,5%	0,65	1,52	43,0%	50,5%
Bulgaria	1,53	11,56	13,2%	0,98	2,81	34,7%	48,0%
Slovenia	0,70	20,08	3,5%	0,69	1,61	42,7%	46,2%
Malta	0,68	13,02	5,2%	1,53	4,45	34,3%	39,6%
Greece	2,01	16,89	11,9%	0,67	2,46	27,1%	39,1%
Finland	1,22	25,48	4,8%	0,96	3,10	30,8%	35,5%
Slovakia	1,53	16,72	9,2%	0,79	3,07	25,9%	35,1%
Estonia	1,25	17,62	7,1%	0,41	1,59	26,0%	33,1%
Romania	1,00	13,10	7,7%	0,66	2,81	23,6%	31,2%
Spain	0,43	19,67	2,2%	0,78	2,76	28,3%	30,5%
Hungary	1,12	19,39	5,8%	0,46	1,95	23,7%	29,5%
Latvia	0,66	14,76	4,4%	0,42	1,80	23,3%	27,7%
Netherlands	1,16	21,05	5,5%	0,70	3,17	22,0%	27,5%
Cyprus	0,89	10,43	8,5%	0,97	5,27	18,4%	26,9%
Ireland	1,11	14,49	7,7%	0,55	3,02	18,3%	26,0%
Italy	1,23	23,86	5,1%	0,52	2,61	19,7%	24,9%
Sweden	1,78	20,17	8,8%	0,44	2,79	15,8%	24,6%
Luxembourg	1,22	19,40	6,3%	1,00	5,84	17,2%	23,5%
Poland	1,23	18,23	6,7%	0,36	2,19	16,6%	23,3%
Germany (until 199	1,07	25,97	4,1%	0,39	2,27	17,0%	21,1%
Portugal	1,40	16,83	8,3%	0,36	3,00	12,0%	20,3%
Denmark	1,24	27,02	4,6%	0,41	2,73	15,1%	19,7%
France	0,96	25,93	3,7%	0,36	2,51	14,5%	18,2%
United Kingdom	0,95	16,58	5,7%	0,37	2,95	12,4%	18,1%
Austria	0,79	25,30	3,1%	0,29	2,21	13,1%	16,2%
Czech Republic	0,46	18,59	2,5%	0,47	3,64	13,0%	15,4%
Belgium	0,70	28,69	2,4%	0,34	3,00	11,4%	13,8%
<b>Average coefficient of variation</b>			<b>6,1%</b>			<b>22,2%</b>	

Source: Authors' own calculations.

This finding is also well confirmed by calculation of trend lines and calculation of their explanatory value and testing [14].

The above table suggests that for payroll in 20 cases the estimated trend line is robust and well reflects reality. This is the highest figure among the analysed earlier in this article. This contributes to the hypothesis of relatively stable tax revenues that are provided by the work force [15].

On the other hand, only for 11 countries the estimated linear trend for CIT revenues proved to be applicable. This is the lowest figure among those considered for the sample. This finding also supports the claim that inflow of sources from that tax are especially volatile and non-linear.

**Discussion.** Stable fiscal revenues are supposedly desirable by most governments. As available research show balanced government budgets should support investment and economic growth of states. In

the period 1995-2016 the average coefficient of variation for the whole EU (except for Croatia) for total tax revenues was 4.7%. Thus, indeed taxes in general provide for relatively stable budget inflows and hence may support local EU economies.

However, the volatility of taxes depends on the objects they are levied on. Corporate income taxes provide for particularly unstable revenues to the budgets (where the average coefficient of variation for the considered sample of countries and states is 22.2%). This is followed by taxes levied on production with 8.1% and payroll taxes (i.e. PIT plus social security), where such value is 6.1%. These findings are generally in line with common sense as they reflect the sensitivity of particular taxes to business cycles. Yet they are interesting, as expectations are confirmed in empirical data. It is worth to underline that inflows from CIT proved to be approximately three times more volatile than those from payroll taxes and taxes levied on production.

Table 12 – Testing the linear trend of revenues from particular taxes of EU Member States for the period 1995 – 2016

State	PIT + Social security			CIT		
	R2	Correlation coefficient	Linear correlation?	R2	Correlation coefficient	Linear correlation?
Greece	0,87	0,94	Yes	0,21	0,46	Yes
Luxembourg	0,71	0,84	Yes	0,69	0,83	Yes
Cyprus	0,65	0,81	Yes	0,43	0,66	Yes
Romania	0,59	0,77	Yes	0,74	0,86	Yes
Poland	0,48	0,69	Yes	0,39	0,63	Yes
Bulgaria	0,47	0,69	Yes	0,59	0,77	Yes
Malta	0,29	0,54	Yes	0,90	0,95	Yes
Italy	0,24	0,49	Yes	0,42	0,65	Yes
Ireland	0,20	0,44	Yes	0,37	0,61	Yes
Portugal	0,87	0,93	Yes	0,00	0,06	No
Sweden	0,84	0,92	Yes	0,04	0,19	No
France	0,70	0,84	Yes	0,15	0,39	No
Germany	0,60	0,78	Yes	0,10	0,31	No
Hungary	0,57	0,75	Yes	0,14	0,37	No
United Kingdom	0,40	0,64	Yes	0,14	0,37	No
Slovakia	0,38	0,61	Yes	0,13	0,36	No
Austria	0,33	0,58	Yes	0,02	0,13	No
Estonia	0,31	0,55	Yes	0,01	0,08	No
Latvia	0,20	0,45	Yes	0,06	0,24	No
Czech Republic	0,19	0,43	Yes	0,04	0,19	No
Finland	0,18	0,42	No	0,34	0,58	Yes
Netherlands	0,08	0,28	No	0,54	0,73	Yes
Spain	0,15	0,39	No	0,01	0,11	No
Denmark	0,06	0,25	No	0,00	0,02	No
Belgium	0,02	0,15	No	0,09	0,29	No
Slovenia	0,02	0,14	No	0,13	0,36	No
Lithuania	0,02	0,13	No	0,01	0,08	No
<b>Number of significant coefficients of determination</b>			<b>20</b>			<b>11</b>

Source: Authors' own calculations

Particularly curious is the fact that a set of PIT including Social security provide for considerably less volatile tax revenues than CIT. Therefore, although both PIT and CIT are income taxes and so are categorized by Eurostat, their joint analysis (which was done earlier in the article for comparison purposes and in other previous literature) may provide for misleading results in terms of behaviour of these sources of budget income.

When the trend line was estimated for analysed set of taxes the information produced was similar. For CIT only in 11 out of 27 cases such estimation was statistically reasonable. This means that in most EU states inflows from that tax did not follow linear pattern. The results were considerably better for taxes on production (17 countries) and the best outcome produced employee levies (20 states). Therefore, the linear trend is much more appealing to for these two latter taxes. Hence it should be concluded that revenues they produce are more foreseeable. As a result, governments with greater certainty may assume revenues from production and especially payroll taxes when planning future budget expenditures[16].

Summarizing, direct income taxes are believed to be more volatile than sales taxes. Yet, according to findings presented in this article, indeed this is the case but only for CIT. Payroll taxes in EU assured over

last years for exceptionally stable inflows. This is contradictory to most previous literature, where sales taxes were claimed to provide for least volatile revenues (although it should be admitted that in my research the difference between payroll taxes and taxes levied on production is not significant). Thus, my results basically correspond with those presented in some literature (e.g. (Tucker, 2015)). However, other researchers arrived at different findings for other jurisdictions and time (e.g. as mentioned earlier Dye And McGuire, who work on data for US found that sale taxes could be less stable than income taxes (Dye & McGuire, 1991) or Felix, who estimated that sales taxes are least volatile (Felix, 2008)).

Therefore, from this perspective governments should prize particularly taxes imposed on workforce and on production. CIT seems least desirable. However, resigning from corporate income taxation is not an option for most EU countries. Even knowing the deficits of that tax, it still provides for important share of budget sources. Moreover, it acts also as a backstop for PIT – which as I calculated shows smaller variability. There are also several other arguments in favour of CIT existence, which include progressiveness of taxation system connected vertical justice issues or fewer distortions to the economy, which is easier to achieve with multiple but low taxes.

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#### ЕВРО ОДАҚТАҒЫ ФИСКАЛДЫҚ АРТЫҚШЫЛЫҒЫНЫҢ ТҰРАҚТЫЛЫҒЫ: САЛЫҚТЫ НЕ ҮШІН ТӨЛЕУ КЕРЕК?

**Аннотация.** Белгілі бір және болжанатын салықтық түсімдер мемлекеттердің салық саясатын бірқалыпты жүргізіп, бизнес циклдерінің кез келген жағымсыз әсерлерін азайтуды қалайды. Соңғы бірнеше онжылдықта ЕО мүше-мемлекеттерінің көпшілігінде үкіметтік бюджеттер шамалы өзгеріске ұшырады. Алайда, белгілі бір салық түрлері әр түрлі дәрежеде тұрақтылыққа ықпал етеді. Бұл мәселе мемлекеттік бюджет тұрғысынан маңызды болғанымен, ол бұрын-соңды талданып көрмеген, әсіресе ЕО-да. Макроэко-номикалық деректерді статистикалық талдауға сүйене отырып, жалақыға салынатын салықтардан түсетін түсімдер өте төмен өзгергіштікке ие және бюджеттің тұрақтылығына оң әсер етеді деп есептедім. Уақыт өте келе өзгерістер өндіріске салынатын салықтар үшін біршама үлкен. Корпорациялардың кірістеріне салық салудан түскен түсімдер әсіресе тұрақсыз. Бұл нәтижелер бюджет кірістерін жобалау кезінде саясаткерлерді қолдауы мүмкін.

Кеңейту фискалдық саясаты экономикалық өсуге ықпал етеді деп санайды ((Ащауер, 1989), (Муннелл, 1990)). Дәстүрлі түрде мемлекеттік инвестициялар экономиканың ұзақ мерзімді өсуін қолдайды (Barro, Endogenous қарапайым үлгісіндегі үкіметтің шығыны, 1990). Екінші жағынан, төмен салықтар экономиканың дамуын қолдауы керек ((Энген и Скиннер, 1992), (Давери и Табеллини, 2000), (Каррас & Фурцери, 2009), (Падовано және Галли, 2001) немесе (Ли & Гордон), 2005 ж.) Тек таңдаған зерттеулер туралы айту керек). Мысалы, Ромер мен Ромер ЖІӨ-ге қатысты салықтың 1% -ға артуы кейінгі үш жыл ішінде өнім шығаруды 3% дейін қысқартады деп санайды (Ромер & Ромер, 2007). Маунтфорд пен Ухлинг салықтың азаюы, тіпті бюджет тапшылығынан қаржыландырылған болса да, экономиканың өсуі тұрғысынан тиімді деп санайды (Маунтфорд и Ухлинг, 2008). Бланчард пен Перотти салықтық күйзелістер инвестицияларға, тұтынуға және өндіруге әсер ететінін анықтады (Blanchard & Perotti, 2002).

Алайда, кейбір эмпирикалық талдау ЖІӨ мен салық ставкалары арасындағы байланыстың маңыздылығын растай алмады ((Easterly & Rebelo, 1993), (Мендоза, Милеси-Ферретти, & Асеа, 1997)). Салық ставкасы мен шығу деңгейі арасындағы байланыс шынымен теріс, бірақ кейде жоқ болып шықты. Бұл нәтижелер жалпы мағынасына сәйкес келеді. Алайда ұзақ мерзімді перспективада мемлекеттік шығыстарды төмен салықтармен біріктіру мүмкін емес (егер салық аз бюджетке түсетін болса). Экспансиялық фискалдық саясаттың нәтижесінде туындауы мүмкін жоғары қоғамдық тапшылық болашақта экономикалық өсу үшін зиянды болып табылады. Сондықтан салықтардан қанағаттанарлық түсулер қажет.

Теңгерімді бюджеттерді сақтау - бұл әлемдік экономиканың әдеттегі міндеті. Бұл талап бірыңғай валютаны пайдаланатын, демек ортақ ақша-несие саясатын жүргізетін Еуропалық Валюта Одағының мемлекеттері үшін маңызды болып табылады [1]. Сол елдердің экономикалық тұрақтылығын жақсарту және саясатқа араласпайтын құралдарды қамтамасыз ету үшін оларға салық саясатына қатысты белгілі бір талаптар қойылды. Конвергенция критерийлері бойынша (Маастрихт өлшемдері деп те аталады) сәйкес (i) үкіметтің жылдық тапшылығының ЖІӨ-ге қатынасы 3 пайыздан аспауы керек және (ii) мемлекеттік қарыздың ЖІӨ-ге қатынасы 60 пайыздан аспауы керек. Алайда, бірнеше мүше мемлекеттер бюджеттің жоғары тапшылығымен күресуде, оның салдарынан мемлекеттік қарыздар артып келеді. ЕО-ға мүше көптеген мемлекеттер соңғы жылдары

теңгерімге қайта оралды және 2017 жылы олардың жартысына жуығы үкіметтің профицитін тіркеді. Алайда, жалпы ЕО үшін бюджет тапшылығы әлі де айтарлықтай болып табылады және 2017 жылы оның ЖІӨ-нің 81,6% құрады. Бұл 2007 жылғы дағдарысқа қарағанда ЖІӨ-нің 57,5% -ын құраған дағдарысқа қарағанда әлдеқайда көп. Сонымен қатар, 2014 жылы ең жоғарғы деңгейден бастап үкіметтің жалпы қарызы бірқатар мүше мемлекеттерде орташа есеппен азайды, алайда 2017 жылы 12-ден 12-ге жетті. Маастрихт критерийлерімен байланысты еуроаймақтың 19 елі қарызды жергілікті ЖІӨ-нің 60% деңгейінен асып түсті. Мемлекеттік кірістердің сенімді көздерін анықтау осы мәселелерді шешудің пайдалы құралы болуы мүмкін.

**Түйін сөздер:** табыс салығы, республикалық бюджет, мемлекеттік қаржы, кіріс, салық.

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### **УСТОЙЧИВОСТЬ ФИСКАЛЬНЫХ ПРЕИМУЩЕСТВ В ЕС: ЧТО ОБЛАГАТЬ НАЛОГОМ?**

**Аннотация.** Определенные и предсказуемые налоговые поступления желательны для государств, чтобы гладко проводить налогово-бюджетную политику и минимизировать любые негативные последствия деловых циклов. За последние десятилетия размеры государственных бюджетов в большинстве стран-членов ЕС претерпели довольно небольшие преобразования. Однако определенные виды налогов в разной степени способствуют этой стабильности. Хотя этот вопрос важен с точки зрения государственного бюджета, он не был тщательно проанализирован ранее – особенно в ЕС. На основании статистического анализа макроэкономических данных я подсчитал, что доходы от налогов на заработную плату имеют особенно низкую изменчивость и положительно влияют на постоянство бюджета. Изменения со временем немного больше для налогов, взимаемых с производства. Поступления от налогообложения доходов корпораций особенно нестабильны. Эти выводы могут помочь лицам, определяющим политику, в надлежащем планировании доходов бюджета.

Экспансионистская налогово-бюджетная политика, как полагают, стимулирует экономический рост (Aschauer, 1989), (Munnell, 1990)). Традиционно считается, что государственные инвестиции поддерживают долгосрочный рост экономики (Барро, «Государственные расходы в простой эндогенной модели», 1990). С другой стороны, низкие налоги также должны поддерживать развитие экономики ((Engen & Skinner, 1992), (Daveri & Tabellini, 2000), (Karras & Furceri, 2009), (Padovano & Galli, 2001) или (Lee & Gordon, 2005), чтобы упомянуть только избранные исследования). Например, по оценкам Ромер и Ромер, увеличение налогообложения на 1% по отношению к ВВП приводит к сокращению производства до 3% в течение следующих трех лет (Romer & Romer, 2007). Маунтфорд и Улинг утверждают, что сокращение налогов – даже если оно финансируется за счет дефицита бюджета – наиболее эффективно с точки зрения роста экономики (Mountford & Uhlig, 2008). Бланшар и Перотти обнаружили, что налоговые потрясения влияют на инвестиции, потребление и выпуск продукции (Blanchard & Perotti, 2002).

Тем не менее, некоторые эмпирические исследования не смогли подтвердить значимость связи между ВВП и налоговыми ставками ((Easterly & Rebelo, 1993), (Mendoza, Milesi-Ferretti & Asea, 1997)). Было установлено, что корреляция между уровнем налоговой ставки и выпуском действительно отрицательная, но иногда отсутствует. Эти результаты соответствуют здравому смыслу. Однако в долгосрочной перспективе высокие государственные расходы не могут сочетаться с низкими налогами (при условии, что низкие налоги переходят в меньшие доходы бюджета). Высокий государственный дефицит, который может возникнуть в результате экспансионистской фискальной политики в конечном итоге наносит ущерб экономическому росту в долгосрочной перспективе. Поэтому удовлетворительные поступления от налогов желательны.

Поддержание сбалансированных бюджетов является типичной задачей нескольких мировых экономик. Тем не менее, это требование кажется ключевым для государств Европейского валютного союза, которые используют единую валюту и, следовательно, проводят общую монетарную политику [1]. Чтобы повысить экономическую стабильность этих стран и обеспечить, по крайней мере, затрудненные инструменты для выработки политики, им были наложены определенные требования, связанные с фискальной политикой. Согласно так называемым критериям конвергенции (также известным как критерии Маастрихта), (i) отношение годового дефицита государственного бюджета к ВВП не должно превышать 3 процентов, и (ii) отношение государственного долга к ВВП не должно превышать 60 процентов. Тем не менее, несколько государств-членов борются с высоким дефицитом бюджета, за которым следуют чрезмерные государственные долги. Большинство государств-членов ЕС возвращаются к балансу в последние годы, и в 2017 году почти половина из них зафиксировала профицит государственного бюджета. Тем не менее, дефицит бюджета ЕС в целом по-



прежнему значительный и в 2017 году составил 81,6% его ВВП. Это намного больше, чем до кризиса 2007 года, когда была зафиксирована цифра в 57,5% ВВП. Более того, хотя с пика в 2014 году общий государственный долг в среднем уменьшился в ряде государств-членов, все еще в 2017 году целых 12 из 19 стран еврозоны, связанных по маастрихтским критериям, зафиксировали задолженность выше необходимого уровня в 60% местного ВВП. Определение надежных источников государственных доходов может стать полезным инструментом для решения этих проблем.

**Ключевые слова:** подоходный налог, национальный бюджет, государственные финансы, доходы, налогообложение.

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## **DURING THE FIRST WORLD WAR GERMANY AND AUSTRIA – HUNGARY PRISONERS OF THE AULIEATA COUNTY**

**Abstract.** The First World War was the largest event in the history of mankind, which had a significant impact on the fate of many peoples, including states. One of the main factors was the capture of troops and individuals on the front of the war between warring states and the flight of soldiers as a result of the war. During the war, neighboring states, political allies captured each other's armies and citizens. The capture of citizens of each other took place between the Entente and the central powers. The Russian Empire, which was part of the Entente and was considered the main participant in the war, detained people from the central powers. Citizens of the central powers captured during the war were sent to all regions of the Russian Empire, which also extended to the steppe and Turkestan provinces. Based on this, the Turkestan Territory was considered one of the key regions of the Russian Empire, in which Europeans were accepted.

In the era of the empire, European prisoners lived in the Aulieata district of the Turkestan governor general in the SyrDarya region. Representatives of European nationality have lived in the region since the end of the nineteenth century, and this continued during the years of the First World War. During World War I, the Aulieata district was considered one of the districts where European prisoners and refugees were received. Although the number of prisoners of war from the central powers (Germany, Austria-Hungary) in the Aulieata district is small, traces of political prisoners of war still remain from these states. The article discusses the history of prisoners of war deported to Aulieata district during the war years. The socio-political status of the citizens of Germany and Austria-Hungary who arrived in Aulieata County, their life is studied. The nationality and surname of the captives will be determined, and their standard of living will be determined.

**Key words:** Aulieata, World War I, army, refugees, prisoners, Germany, Austria-Hungary, Germans.

**Introduction.** In modern Kazakhstan, which encompassed the steppe and most of the Turkestan region, during the war years opposing empires were brought from Austria-Hungary and Germany by prisoners of war and volunteered people. Citizens from those countries who were taken as prisoners were also relocated by the Ministry of Internal Affairs of the Russian Empire to the Steppe Region and Turkestan. The main reason for the distribution of prisoners of war in the regions of Kazakhstan and Turkestan, those areas were far from the border and prevented a shortage of labor in the region. Prisoners from Austria-Hungary and Germany, which are in one direction with the Central powers, also settled in the counties and districts of the Turkestan region, but were smaller in size than the Steppe region. In particular, Austro-Hungarian and German prisoners were also sent to Aulieata county, which is part of the Syr Darya Region of the Turkestan region.

**Materials and methods.** The fundamental theoretical opinions and conclusions of domestic and foreign scientists have been used in writing the scientific work. In addition, archival materials were included in the scientific circulation. The methods of historical comparability, historical systematization of historical science were used in the research. Also, as a theoretical and methodological basis, in narrating historical events modern and auxiliary methods of historical science were used in the consideration of political historical processes. Such methods made it possible the sending of prisoners to Aulieata and to determine the arrival, social life and fate of the volunteer citizens during the war. The principles of studying domestic and world history are currently based on the writing of the research. Arrival of prisoners in political relations between members of Entente and the Central Powers during the First World War and in analyzing their

destiny, in identifying human factors, the principles of honesty, impartiality, versatility, objectivity and principles were the main focuses.

**Initial measures to relocate Austro-Hungarian and German prisoners to Kazakhstan.** The first batch of prisoners of the Austro-Hungarian and German wars arriving in the territory of modern Kazakhstan began with the arrival in the Steppe. The first group of prisoners of war were sent to Siberia, to the northeastern parts of the Steppe, where they arrived in August 1914. Most European prisoners were from Germany and Austria-Hungary. However, at that time the Steppe Region and Turkestan were not yet ready to accept the prisoners. At the outset of the war there were no special camps for receiving and accommodating prisoners of war. Therefore, at first there were a number of problems. Providing food to the prisoners and keeping them in a warm place was not easy. People were placed in sheds, often relocated from place to place. Due to bad weather and poor food supplies, the death toll from prisoners to prison was high. Until the spring of 1915, there were no special places for captives in modern Kazakhstan. In connection with this, places were gradually allotted for the reception of prisoners of war, in a short time many decisions were made and camps for detaining prisoners were established [1].

Comparing the number and status of prisoners in the Steppe and Turkestan regions of Kazakhstan during the war years, there were many peculiarities. The bloody battles on the fronts caused a great surge of prisoners of war, most of them were sent to Akmola, Pavlodar and Semipalatinsk regions, which belonged to the Steppe region. A large number of prisoners arrived in Akmola region. In the region the number of people from other countries increased every day. Places to catch the first strangers were built in this Akmola region. At the beginning of 1915, the number of foreign prisoners in more than 150 settlements in Akmola region was estimated at more than 22,000 people [2]. There are more than 8.5 thousand prisoners in rural areas of Akmola region. Similar high rates were registered in Semey region too. At the beginning of 1915 in the Semipalatinsk, Ust-Kamenogorsk, Zaisan, Pavlodar counties of the Semipalatinsk region there were more than seven thousand prisoners, among them were Austro-Hungarian and German citizens [3].

**Arrangements for prisoners of war in the Turkestan region.** As for the prisoners of war in oblasts of Turkestan region, their number was not small as well. Prisoners of war, who settled in the southern regions of Kazakhstan, namely in Syrdarya and Zhetysu oblasts of the military-administrative division within Turkestan region and the winter camps in the Turkestan military district are a vivid example. From the earliest days of the war, European prisoners of war and voluntary refugees arriving in the Turkestan region began to settle mainly in the districts within the Syrdarya oblast. Kazalinsk, Perovsk, Turkestan, Chernyaev, Aulieata districts of the Syrdarya region were among the main districts receiving prisoners of war [4, 44-47p.].

During the First World War, the Aulieata district belonged to the Turkestan region, which was governed from Tashkent. The military authority of the Russian Empire established Turkestan (TurkVO) Military District in Turkestan at that time, which functioned actively during the war and resolved all war issues under its influence. As such, this body dealt with the issues of prisoners of war in the region. Throughout the war, receiving, relocating prisoners of war, and providing them with social security caused a great deal of a hardship.

From the earliest days of the war, citizens of Austria-Hungary and the Imperial Germany who yielded themselves prisoners were considered enemies in all parts of the Russian Empire. The same situation was observed in Aulieata district. It was possible that a unique new order be adopted for such German and Austro-Hungarian citizens, recognizing the Russian Empire's political and military authority. It was primarily due to the opposition of Austria-Hungary and Imperial Germany towards the Russian Empire prior to World War I. Even before the outbreak of war, under the command of the Russian military authorities, strict control was exercised on all foreigners and military personnel bearing European surnames and their day-to-day activities were monitored.

On July 23, 1914, a telegram from St. Petersburg's General Staff Office was received and it instructed to arrest German citizens in the Imperial army as prisoners of war. The directive first came to the regional military governor, who was ordered to keep control of German nationals who had previously surrendered to Russia, until a specific decision was made. He was then asked for a list of former German citizens in the region and their number. The primary reason for this was the doubt that there would be more intelligence agents and spies among surrendered German citizens [5]. The next directive from the Turkestan General Governor's Office to the military governor of the region states that the same measures must be taken against former citizens of the Austro-Hungarian Empire. This document was signed by Lieutenant General

V.E.Flug, who then governed the Turkestan Military District and by others [6]. According to the directive, Austro-Hungarian citizens, like the Germans, were temporarily monitored.

Such political and military actions of Russian authorities have been carried out as quickly as possible in a very short period of time. The order was strengthened in the region. On July 28, after the outbreak of war and as the Russian Empire became a major belligerent, actions concerning Turkestan were organized more intensively. On July 30, the assistant to the Minister of Internal Affairs and the military commander of the Russian Empire V.F. Dzhunovsky issued an order, instructing to keep strict control of Turkestan men aged 18-45 capable of bearing firearms and other weapons. In addition, decisions have been made to relocate them to other regions [7].

However, over time, Russia's initial strict control measures for former citizens of Austria-Hungary living in Turkestan who had received Russian citizenship and accepted imperial authority, seemed to be a little relieved. Russians, Czechs, Serbs and Slovaks among the Austro-Hungarian citizens were a primary reason. On August 14, 1914 a secret telegram was sent from St. Petersburg, requiring Austro-Hungarian citizens not to go abroad, approach the war front, nor to commit any disturbance [8]. It is clear that the Russian authorities were trying to demonstrate their affinity and sympathy for the Slavic nations.

There was a big number of prisoners of war taken captive during the war. According to official data, the number of prisoners of war in the region had exceeded 148,000 people by June 1915. They were placed in specially created camps, barracks and other units of Turkestan Military District (TurkVO), quickly adapted for other people. According to historians, 82,425 and 3812 prisoners of war from Austria-Hungary and Germany, respectively, arrived to the Turkestan region in 1915 [9, 49p.].

During the years 1914-1915 300-350 called "Civilian prisoners" or "prisoners without military grades" were brought to Turkestan with prisoners of war. They were Austro-Hungarian and German citizens who were taken out of the combat zone by the Russian army and those who voluntarily surrendered. Although, initially (for several months) isolated from the locals, many of them gained some freedom later on. By mid-1916, most of the "civilian prisoners" were released from security outposts and lived under police control with no right to leave. That is why a significant part of their time, especially of working people, was spent outside of their permanent residence. Initially, they (several months) were isolated from local residents, later many expanded the circle of freedom. By mid-1916, most of the "civilian prisoners" were released from security posts, where they were under police control and lived without the right to leave. Therefore, most of the time, especially workers, spent outside the residence.

In addition, the influx of Europeans into the Turkestan region was facilitated by refugees fleeing the war. Refugees began arriving in the area in July 1915. As a result, about 7-8,000 refugees were registered in the region. The concentration of prisoners in Turkestan, accompanied by the arrival of refugees, significantly worsened the material well-being of the local population and led to a food and housing crisis. They were also sometimes recruited as voluntary citizens. Thus, by the beginning of 1916, the total number of prisoners of war in the region reached 200,000. Their number began to exceed the cities in which they were located. The local authorities were very concerned about the situation, because at any moment of the day there could be unrest, which could aggravate the situation.

Thus, the increase in the number of prisoners, citizens and refugees from Austria-Hungary and Germany has caused social problems in the region. Governor General of Turkestan F.V. Martson requested the release of prisoners of war from Turkestan, aggravating popular upheaval, worsening economic conditions, extreme situations (including climate) and increasing the number of prisoners escaping. Due to the reduction in the number of prisoners, protection is due to the withdrawal of local regular units by the front and rear. The political and social status of German and Austro-Hungarian prisoners in Turkestan was in this status in the early years of the war [9, 49-50p.].

**German and Austro-Hungarian prisoners in the Aulie-Ata area.** These events have occurred in the Auliatskiy area since the start of the war. The Germans and other Germanic peoples were among the people captured during the war in Aulie-Ata. They came mainly from Germany and Austria-Hungary. In fact, the Germans have long known about the Central Asian and Turkestan territories. For example, the Germans began to move to Kazakhstan before the First World War and during the First World War. Most of them moved to Kazakhstan from the border of the Russian Empire with Europe and from the interior of the empire to Kazakhstan, including the Auliya district. The main sources of their existence were agriculture and animal husbandry, as well as the development of the national economy in the Aulie-Ata region [10]. During

the war, German settlers moved to Turkestan, including to the Auliatskiy district from other regions of Russia, and European Germans from the other side [11].

Although the Aulie-Ata region was not the largest prisoner of war camp since the first days of the war, there were quite a few citizens from Austria-Hungary and Germany in this area. The names of two German citizens who arrived in the village of Nikolaypol in the Auliat district were mentioned on August 23, 1914. They are:

1. Oswald Gergold;
2. Rudolph Bonn [12].

In general, the Germans lived for a long time on the site of Nikolaypol, which belonged to the Auliat district. But, as mentioned earlier, they were local Germans, citizens of the Russian Empire, lived and worked with local people. However, initially they remained in place, but those German citizens who were captured would soon be transferred to another area and transferred to Verny. Oswald Gergold and Rudolph Bonn were to be delivered by specially controlled internal troops [13]. Although these citizens did not move to Verny, it was clear that they were separated from the local inhabitants.

The motives for detaining prisoners separately from local residents were described as suspicious behavior and that they could provoke local Germans. In the same way, German prisoners of the Aulieata were transferred to Adolf Wiese and Arthur Tsele and Austro-Hungarian Georg Lener to Verny. They, too, were first brought to Aulie-Ata County, and then relocated [14]. On September 19, a message was sent to Aulie-Ata district about the whereabouts of these persons in Verny. Nevertheless, the authorities provided them with various benefits depending on their loyalty and personal behavior towards the Turkestan region, including Europeans detained in the Syr Darya region [15].

As of September 1914, there were only 11 prisoners of war in Aulieata county. About half of them were sent to Verny, and the rest remained in the Aulieata region under various circumstances. The remaining Germans in the family were Jacob Huber of Bavarian descent and citizens of Austria-Hungary. The remaining ethnic Austrian-Hungarian citizens were Czechs and Slovaks [16]. Prisoners who were of Slavic origin and spoke fluent Russian had a lot to do. Most of the citizens who came from Austria-Hungary to Turkestan and later were considered prisoners of war belonged to the Slavic peoples. In turn, they were also offered discounts depending on their behavior. The imperial authorities were also guided by the provision of privileges to Slavic ethnic groups among prisoners of the Turkestan military district [17].

Cases of the arrival of German prisoners in Aulie-Ata and their departure to other areas have taken place in recent years. Similar events continued from the first month of 1915. In January, a German citizen who survived a number of problems filed a petition for his health with Vitold Golsky, who was subsequently taken prisoner [18]. Even reports of his imprisonment in Tashkent were received for a certain time [19] based on the suspicion that Vitold Golsky had connections with foreign forces. However, he was soon released in March 1915, after which he urged the military leadership of the Aulie-Ata district to stay here, and not in the city of Verny. This request was accepted, and Vitold Golsky remained in Aulie-Ata.

Similar requests were made in July 1915 by a prisoner of war considered German citizens Ferdinand Johann, Jacob's brothers and Heinrich Germendemens asked to continue his life in Aulieata, however their request was not fulfilled and settled in the Zhetysu district [20].

In the spring of 1915, there were about 5,000 prisoners in the Aulieata area. They fled from different fronts and rear. Of course, these, too, prisoners from Germany and Austria-Hungary were of some quantity. In May 1915 special decisions were made to improve the condition of prisoners. and their place of residence. And the prisoners will be transferred to a warm place and their social status will be in good shape [21].

By the end of 1915 by the leadership of the Turkestan Territory gave the order to collect the number and nationality of European prisoners living in the districts. It was a great start for collecting social data, as is the case in the region of other nations the number of how long they live, as well as their condition [22]. In turn, this is due to the domestic policy of the state in the country determination of political activity and work of representatives of other nationalities.

The table shows that these people settled in Aulieata forever and did not come to Vernyi or to other areas. It is noteworthy that these individuals are actively working among prisoners who arrived in Aulieata. And the number of persons does not show all the inhabitants. Shown above says that prisoners and citizens from European nations had quite a few groups in Aulieata. They mainly lived in the city of Aulieata and in Merki.

Austria-Hungary, who came to the Aulieata region from the first years of the war and German citizens

№	Names-last names	Nation	Country of arrival	Age
1	Dulla Joseph Ivanovich	Czech	Austria-Hungary	48
2	Fabry Joseph Iosifovich	Czech	Austria-Hungary	23
3	Dulla Ivan Ivanovich	Czech	Austria-Hungary	35
4	Von Siebengyuner Antonovich	Czech	Austria-Hungary	62
5	Brna Ivan Ivanovich	Czech	Austria-Hungary	21
6	Huber Yakov Yakovlevich	German	Germany	38

Inventory of prisoners in Turkestan continued organize. Another key point in collecting such data. The reason for this is the spies who were among the captives in the suburbs of Russia. During the war in the Turkestan region, a German spy named Magnend Pratap worked. He provided information about Turkestan to Germany. 1917 in May military governor of the Syrdarya aregion, informed the administration of Aulieata county that there could be the presence of this spy in the Aulieata area. In general, during the war there were among the volunteers there are a lot of such spies [23].

**The Soviet government and the political fate of prisoners in Aulieata.** Two coups that occurred in the Russian Empire in 1917 fundamentally changed the political situation in the country. After the October Revolution of 1917 The Bolshevik Party, which came to power after the coup. They announced that Russia withdrew from the First World War. From now on and the civil war that began in the country in 1918 is a foreign war in the country had a significant impact on the political fate of prisoners. It has a different nature. The main one is the relationship between the Bolsheviks and prisoners was closer. Bolsheviks represent all organs in the state with local residents during the capture and liquidation of the imperial system in Russia together with foreign prisoners. Empire Center amidst the beliefs and people that have taken place in the provinces widely, the Bolsheviks had a great propaganda practice. The revolutionary events stirred up prisoners of war, accelerated the process of opening their social borders at the front awareness of the catastrophic consequences of the massacre. During the Civil War, various prisoners of war were also involved. It is worth noting that the Bolshevik party rules in the Russian Empire. But the old empire and all peoples.

The proclamation of national equality takes place in the same district as in other regions. The names of previously unknown people began to be on the list. More precisely in other words, people who hid their names in the past came from Austria-Hungary and Germany "New names" appeared among people. Such situations are different there were many nations. Coming from other regions there were some prisoners who received special civil status and received regarded as part of society. Of course, in the state the situation is different determine the number of national representatives and the history of their arrival in Kazakhstan gave a great opportunity [24].

It has been said above that German and Austro-Hungarian captives were only in the Aulieata and Merke area, but now it is said that there were other settlements and in other cities. This is shown in the table below. List of prisoners from Germany and Austria-Hungary. There may be a mass of political prisoners who grew up, Poles, Bulgarian, Serbian and others, the creation of social democratic organizations conditions were favorable. Usually local The Bolsheviks are revolutionizing activists inside prisoners of war, they tried to spread the movement and they did their best to get to them and tried to catch. Also in particular in the Aulieata region and prisoners from Austria-Hungary and from Germany public policy began to pay attention to them [25].

On this basis, the life of the captured Aulieata and prisoners changed dramatically. In 1919–1920, the former prisoners of Aulieata were released, and they, like other Soviet citizens, were free to live. In all settlements, their lists were compiled, their future life was discussed, and appropriate decisions were made. One striking example of this was the order of the Aulieata section of the city for national affairs of August 24, 1920 to request, list and register all nationalities in the list of prisoners in all constituencies. Similar events were held in other countries. Lists of former prisoners from Kazan and Blagoveshchensky counties were also compiled and submitted to the district section on national affairs [26].

As can be seen from the table, most of the citizens of Austria-Hungary are Slavic nationalities. Formerly unknown in the Aulieata region, these citizens remained in close contact with local Russians and Ukrainians until the end of the war and the Bolsheviks declared freedom in Turkestan. Due to the movement

List of Austro-Hungarian and German citizens captured in Petrovsky, Kazan and Blagoveshchensky Aulieata districts

№	Full Name	Nationality	State of arrival	Age
1	Osif Simchuk		Austria-Hungary	29
2	Grigory Martinsky	Russian	Austria-Hungary	27
3	Vasily Goleshino	Russian	Austria-Hungary	31
4	Ludwig Kesheri	Hungarian	Austria-Hungary	41
5	Michael Tsar	Russian	Austria-Hungary	41
6	Grigory Ardilyants	Romanian	Austria-Hungary	31
7	Alexey Brondil	Romanian	Austria-Hungary	35
8	Ivan Birlin	Romanian	Austria-Hungary	28
9	Ferdinand Wesyak	German	Austria-Hungary	27
10	Aleksey Fozekosh	Hungarian	Austria-Hungary	31
11	Fedor Buchin	German	Germany	29
12	Ilya Mreglot	Russian	Austria-Hungary	36
13	Peter Aleinikov	Polish	Austria-Hungary	36
14	Yuzik Pilny	Polish	Austria-Hungary	30
15	Joseph Kovalik	Polish	Austria-Hungary	47

of prisoners to other places, they found it dangerous. In general, the most difficult time for German and Austro-Hungarian citizens living and being held captive here in Aulieata was their relocation to Semirechye and other areas. The main reason for this was that prisoners from both countries spoke German and Russian fluently and could speak unanimously with local Germans and Slavic people.

**Conclusion.** During the First World War the socio-political life of the region underwent significant changes during the period under review due to the arrival of prisoners of war from Austria-Hungary and Germany in Aulieata and its adjacent areas, as well as in other areas of modern Kazakhstan. Among other things, the importance of showing the problem can be explained by the fact that people from different backgrounds have been involved in the Civil War later. Many of them, eagerly enlisted in the squads of Red Army soldiers or their opponents, intensified in the fiery battles that encompassed the vast Kazakh region, and the newly formed national paramilitary squad only in areas where there was a need for instructors who could train thousands of yesterday's nomads with endurance to military art. were added to the list. Holy Land, like other lands, has been a refuge for many during the First World War. German and Austro-Hungarian citizens, who escaped from the European war fronts, are now considered captives and have spent the next life in Turkestan, including Aulieata. The high concentration of local European ethnic groups, including the Germans and Slavic peoples, from the inner regions of the Russian Empire in the past in the Aulieata has especially contributed to the rapid integration of prisoners of war into the region.

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### БІРІНШІ ДҮНИЕЖҮЗІЛІК СОҒЫС ЖЫЛДАРЫНДА ӘУЛИЕАТА УЕЗІНДЕГІ ГЕРМАНИЯ ЖӘНЕ АВСТРО-ВЕНГРИЯ ТҮТҚЫНДАРЫ

**Аннотация.** Бірінші Дүниежүзілік соғыс – адамзат тарихындағы аса ірі оқиға, ол мемлекеттермен қатар, көптеген халықтардың тағдырына ерекше ықпал етті. Соның ең негізгі факторларының бірі – соғысушы мемлекеттер арасында әскерилер мен жеке азаматтардың соғыс майданында тұтқынға түсуі және жауынгерлердің соғыстан қашуы болды. Соғыс кезінде бір-бірімен жақын көрші, саяси одақтас болған мемлекеттер бір-бірінің әскерлері мен азаматтарын тұтқынға түсіріп отырды. Бір-бірінің азаматтарын тұтқынға алу Антанта мен Орталық державалар арасында көптеп орын алды. Антанта құрамында болып, соғыстың басты қатысушысы

саналған Ресей империясы Орталық державалардан шыққан азаматтарды тұтқынға алып отырды. Соғыс кезінде тұтқынға түскен Орталық державалардың азаматтары Ресей империясының әр аймақтарына жіберіліп, соның ішінде Дала өлкесі мен Түркістан өлкесіне де таралды. Осының негізінде Түркістан өлкесі Ресей империясының құрамында еуропалық ұлт өкілдерін қабылдаған басты аймақтардың бірі саналды.

Империялық дәуірде Түркістан генерал-губернаторлығының Сырдария облысына қарасты болған Әулиеата уезінде еуропалық тұтқындар өмір сүрген. Аймақта XIX ғасырдың соңынан бастап еуропалық ұлт өкілдері өмір сүріп, ол жағдай Бірінші Дүниежүзілік соғыс жылдарында да өз жалғасын тапты. Бірінші Дүниежүзілік соғыс жылдарында Әулиеата уезі еуропалық соғыс тұтқындары мен босқындарын қабылдаған аудандардың бірі болды. Әулиеата уезіне Орталық державалардан (Германия, Австро-Венгрия) келген соғыс тұтқындарының қатары аз болғанымен, бұл аймақта аталған мемлекеттерден келген саяси-әскери тұтқындардың өзіндік іздері қалған. Мақалада соғыс жылдарында Әулиеата уезіне жер аударылған соғыс тұтқындарының тарихы қарастырылады. Әулиеата уезіне келген Германиялық және Австро-Венгриялық азаматтардың саяси-әлеуметтік жағдайы мен олардың тұрмысы және өмір тағдыры зерттеледі. Тұтқын болып келген азаматтардың ұлты мен тегі айқындалып, олардың өмір сүру деңгейі көрсетіледі.

**Түйін сөздер:** Әулиеата, Бірінші Дүниежүзілік соғыс, әскер, босқын азаматтар, тұтқындар, Германия, Австро-Венгрия, немістер.

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### **НЕМЕЦКИЕ И АВСТРО-ВЕНГЕРСКИЕ ЗАКЛЮЧЕННЫЕ В УЕЗДЕ АУЛИЕАТА ВО ВРЕМЯ ПЕРВОЙ МИРОВОЙ ВОЙНЫ**

**Аннотация.** Первая мировая война является крупнейшим событием в истории человечества, которое оказало значительное влияние на судьбу многих народов, в том числе государств. Одним из основных факторов между воюющими государствами был захват пленных, а также бегство солдат с фронтов войны.

Во время военных действий соседние государства, политические союзники захватывали территории и население друг друга. Захват граждан в большей степени имел место между Антантой и центральными державами. Российская империя, входившая в состав Антанты и считавшаяся главным участником войны, систематически захватывала в плен граждан центральных держав. Граждане центральных держав, захваченных во время войны, были отправлены во все регионы Российской империи, постепенно распространяясь в степные и туркестанские провинции. Исходя из этого, Туркестанский край считался одним из ключевых регионов Российской империи, в который были приняты представители европейских национальностей.

В эпоху империи европейские заключенные жили в округе Аулиеата Туркестанского генерал-губернаторства в Сырдарьинской области. Представители европейской национальности жили в регионе с конца XIX века, что нашло продолжение и в годы Первой мировой войны. Во время Первой мировой войны округ Аулиеата считался одним из районов, где принимали европейских заключенных и беженцев. Хотя число военнопленных из центральных держав (Германия, Австро-Венгрия) в округе Аулиеата было невелико, в этом регионе все еще остаются следы присутствия политических военнопленных из этих государств. В статье рассматривается история военнопленных, депортированных в округ Аулиеата в годы войны. Изучается социально-политический статус граждан Германии и Австро-Венгрии, прибывших в округ Аулиеата, их бытовая жизнь и судьбы отдельных личностей. Определены национальность и фамилии пленников, показан уровень их жизни.

**Ключевые слова:** аулиеата, Первая мировая война, армия, беженцы, заключенные, Германия, Австро-Венгрия, немцы.

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## **CONTEMPORARY MANAGEMENT OF COMMERCIAL BANKS**

**Abstract.** The development of a market economy is characterized by instability of both external and internal organizational environment, which leads to the succession of the influence of the compared competitive advantages of credit and financial market entities on the formation of their competitive positions, which, in turn, means that the competitiveness of banks, like other financial institutions, is a relative concept. Competition is a rather subtle and flexible concept. In conditions of reduced demand for banking products and services, banking organizations that provide low-quality banking services are experiencing the greatest difficulties. With all of the scale of competition, the bank that analyzes and fights for its competitive position wins.

The article explains and studies the reasons for the low competitiveness of banks in the modern banking system, which characterize the inability of banks to uphold and expand market share, promote banking products, and fully satisfy consumer interests. It is revealed that at the present stage, a quantitative assessment of the level of competitiveness of products and services of a bank and its management becomes an important issue, since it is a rather laborious, integrated process consisting of interconnected components and on which the competitiveness of the entire bank depends. On the basis of the study, relevant conclusions were identified.

**Key words:** commercial banks, banking system, banking product, competition, competitive advantage, competitiveness

**Introduction.** Assessment of the level of competitiveness is the most difficult work, because, firstly, competitiveness records all indicators of quality and resource intensity of work of all personnel at all stages of the object's life cycle, and, secondly, there are no international documents, methodological developments to assess the competitiveness of various facilities and, in particular, banks.

Analysis of the competitiveness of the bank as a system is a set of the subject engaged in analytical work, the analysis mechanism and the object of analysis, the functioning of which is aimed at generating the necessary information to manage the competitiveness of the bank.

Analysis of the bank's competitiveness as a process is a purposeful set of actions that provide systematic processing of available information about the factors affecting the level of competitiveness of a bank and can change its level.

The importance of studying methods for assessing the competitiveness of banks is explained by decisive role of the banking sector as the latter as a decisive factor in the economic growth and stability of the banking system.

**Literature review.** The research questions of theoretical and methodological problems of competition and competitive advantages of economic entities are widely covered in the works of foreign scientists, such as I. Ansoff [1], D. Keynes [5], A. Marshall [4], M. Porter [2], D. Ricardo [5], F. Hayek (2018), E. Chamberlin [6], J. Schumpeter [7], Noel.D. Johnson, Mark Koyama [3], Richard David Ramsey [11] and many others.

Among the researchers involved in the problems of providing, evaluating and managing the competitiveness of commercial banks in the current state of the economy: Korzeb Zbigniew [8], Bazadze K.M. [9], Nabiyev R.A., Anokhin V.A. [11], Rozhkovskaya K.V. [12], Vetoshko G.V., Kuznetsova K.S. [13,14],

Vovk V.Ya. [15], Zilaliyeva Z.Kh. [16], Pashkov R.V. [25], Ezrokh Yu.S. [27], Erenzenova V.A. [28], Merkulova N. [22], Ostrizhnyaya Yu.S. [24], and others.

Despite the significant amount of foreign works in the field of competitiveness, competitive advantages of commercial banks and socially responsible activities, as well as instruments for its financing, the problem of forming and evaluating the strategic competitive advantages of enterprises in this sector of Kazakhstan has not been studied enough. This led to the need for this study.

**Discussion.** The concept of sustainable competitive advantage has been studied in detail and reviewed by Michael Porter. Porter believed that product has a competitive advantage when it has such distinctive features that make it possible to obtain a higher rate of return from the sale of a product or service than the market average [2].

Table 1 – List of external factors of competitive advantage of the organization

External factor of competitive advantage of an organization	What needs to be done to achieve and use competitive advantage
The level of competitiveness of the country	To open an organization in a country with a high level of competitiveness or increase the competitiveness of your country
State support of small and medium-sized enterprises in countries and regions	Redesign the legal framework for small and medium enterprises, focusing on the effective and law-abiding business
Legal regulation of the functioning of country's economy and regions	Revise the legislative framework for the functioning of the economy as a system of codes and rights (competitive, antitrust, administrative, labor, etc.)
Openness of society and markets	Development of international cooperation and integration, international free competition
National standardization and certification system	Intensification of work in this area, strengthening control over compliance with international standards and agreements, legal support of harmonization within the international system

Basically, the more an organization has competitive advantages over current and potential competitors, the higher its competitiveness, vitality, efficiency, and perspective. It is important to understand that for achieving this, it is necessary to increase the scientific level of management, to gain new competitive advantages and to look into the future more boldly [10].

**Methods.** Calculation and analysis of quantitative indicators of a commercial bank has paramount importance in assessing its competitiveness.

It is advisable to start the assessment of the competitiveness of commercial banks with the choice of coefficients that comprehensively characterize both each bank and the operation of the banking system as a whole. To assess the financial performance of banks we used the following indicators (table 2).

Table 2 – Financial performance of a commercial bank

№	The name of the coefficient	Definition	Formula for calculating
1	Coefficient of security of investments (Csi)	The ratio of equity I to assets (A) of the bank	$Csi = E/A$
2	Coefficient of the scale of the operations (Cso)	The ratio of equity I to liabilities (L) of the bank	$Cso = E/L$
3	Coefficient of the specific share of equity (Csse)	The ratio of equity I and share capital (Sc) to equity I of the bank	$Csse = (E - Sc)/E$
4	Coefficient of inflation (Ci)	The ratio of the required reserves fund (Rrf) to equity I of the bank	$Ci = Rrf/E$
5	Coefficient of efficiency use of client funds (Ceucf)	The ratio of liquid assets (La) to liabilities (L) of the bank	$Ceucf = La/L$
6	Coefficient of liquidity	The ratio of liquid assets (La) to assets (A) of the bank	$Cl = La/A$
7	Coefficient of efficiency use of attracted resources (Ceuar)	The ratio of profit before tax (Pbt) to liabilities (L) of the bank	$Ceuar = Pbt/L$
8	Coefficient of efficiency of operations (Ceo)	The ratio of profit before tax (Pbt) to assets (A) of the bank	$Ceo = Pbt/A$
9	Coefficient of efficiency using equity (Ceue)	The ratio of profit before tax (Pbt) to equity I	$Ceue = Pbt/E$
10	Coefficient of bank efficiency (Cbe)	The ratio of profit after tax (Pat) to share capital (Sc)	$Cbe = Pat/Sc$

Let's consider the activities of JSC "Sberbank". Subsidiary Bank Sberbank of Russia began its history in Kazakhstan at the end of 2006, when Sberbank of Russia, the flagship of the Russian financial system, the largest financial institution in Central and Eastern Europe, acquired 99.99% of TeksakBank, which is recognized as a bank with the best customer service level according to the National Business magazine.

According to BCG, the ratio of the growth rate of the market for a given firm and its share determine the relative competitive position of the firm in the future. For each SAM, an estimate of future growth rates is made, market shares and the volume of their sales are calculated.

We denote the main products of SB JSC "Sberbank": SAM 1 – Loans that the bank issues to legal entities, SAM 2 – Mortgage loans, SAM 3 – Car loans, SAM 4 – Loans that the bank issues to individuals.

We will calculate the growth rate, market share and sales volume of each banking product (SAM) in table 3 on the example of the activities of the commercial bank JSC "Sberbank".

Table 3 – Indicators of the main products of SB JSC "Sberbank"

	Growth rate, %	Market share, %	Volume of sales, %
SAM 1 Loans to legal entities	16	15	46
SAM 2 Mortgage loans	20	12	15
SAM 3 Car loans	5	7	4
SAM 4 Consumerloans	11	8	35

According to the indicators obtained from the table, we will construct the BCG matrix for the main products of SB JSC "Sberbank" (figure 1).

High (15-30%)	Stars	Wild cats SAM 1, SAM 2
Low(0-15%)	Cash cows	Dogs SAM 3, SAM 4
	High (30-60%)	Low (0-30%)

Figure 1 – BCG matrix for the main products of SB Sberbank JSC

By constructing and analyzing the matrix of the Boston Consulting Group, we can conclude that services such as mortgages and loans to legal entities fall into the category of "Wild cats", which means that companies need large efforts and costs to increase their market share. Consumer loans and loans to legal entities are in the "Cash Cows" category. It should be ensured to obtain the maximum possible profit from them, for as long as possible.

Groups such as car loans and consumer loans fell into the "Dogs" category. Their growth rate and market share are low. The reason for this are special loan programs of manufacturers and salons, which offer low interest rates. Increase of the market share in this position is unlikely.

It can be concluded from the figure that products such as SAM 1 (Loans to legal entities) and SAM 4 (Consumer loans) that are at the stage of the "Maturity" life cycle will continue to grow, increasing market share and sales volumes.

Product SAM 2 (Mortgage loans), located at the stage of the life cycle "Growth" will also occupy an increasing part of the market, increasing sales volumes.

Product SAM 3 (Car loans), as described earlier, is at the stage of decline and can be abandoned later.

In accordance with the developed methodology, the comparability of all indicators is achieved by translating them into qualitative analogs and bringing them to a common basis, determined in accordance with specified levels of competitiveness.

**Conclusions.** Kazakhstani banks operate in constantly changing conditions in the state: these include inflation, devaluation, political situations, etc. Therefore, in order to be resistant to such factors and be competitive, the bank must constantly adapt to this situation in the country. The bank must maintain pricing policy, monitor the range of banking services offered by competitors (table 4) [9,11,35].

Table 4 – Financial indicators for assessing the competitiveness of commercial banks

№	Performance indicators	JSC Halyk Bank of Kazakhstan	JSC Kaspi Bank	SB JSC "Sberbank"	JSC BCC
1	Coefficient of security of investments (Csi)	1,046	0,561	0,952	0,898
2	Coefficient of the scale of the operations (Cso)	1,168	0,595	1,052	0,987
3	Coefficient of the specific share of equity (Csse)	0,972	0,933	0,901	0,734
4	Coefficient of inflation (Ci)	0,004	0,004	0,004	0,004
5	Coefficient of efficiency use of client funds (Ceucf)	0,206	0,107	0,586	0,471
6	Coefficient of liquidity (Cl)	0,184	0,101	0,533	0,426
7	Coefficient of efficiency use of attracted resources (Ceuar)	0,282	0,342	0,172	0,597
8	Coefficient of efficiency of operations Ceo)	0,252	0,323	0,156	0,539
9	Coefficient of efficiency use of equity (Ceue)	0,241	0,575	0,174	0,567
10	Coefficient of bank efficiency (Cbe)	10,287	5,372	4,075	2,157

The formation of a rational model of competitiveness is aimed at ensuring the sustainability and high rating position of a commercial bank in the face of fierce competition in the financial market of Kazakhstan.

The key point in creating a competitiveness model is to identify areas of optimization of attracting and placing funds, promoting banking products in the Kazakhstani financial market, and developing a stable client base. Thus, competitiveness determines the position of the bank in the financial market.

This stage provides large preliminary study from forecasting and planning to implementation and obtaining additional profit. To implement this stage, it is necessary to divide the direction by sector: development of a service or product, development of a pricing system, determining sales channels, developing a system of motivation to stimulate bank customers.

The method allows to obtain the integral coefficient of competitiveness, and is based on an assessment of the internal and external environment of banks - the main competitors by calculating a number of criteria presented in figure 2.

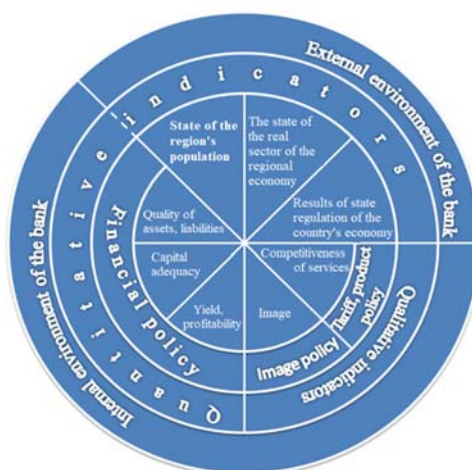


Figure 2 – Criteria that shape banking competitiveness.

The components of the competitiveness of a commercial bank reflect the quantitative and qualitative development directions and the internal and external main success factors of the STB, the positive change of which contributes to the strength of its competitive position in the financial market.

**Results.** Assessment of the competitiveness of the financial sector of Kazakhstan, which, as the rating shows, has improved somewhat, nevertheless remains the weakest of all indicators. Last year, the research

methodology of the financial sector, the sample of respondents, and the quality of compilation (or translation) of questions were criticized, which may have to some extent affected the respondents' awareness and survey results [28,29].

In total, the development of the financial market of Kazakhstan in 2017 ranked 114th place in the world.

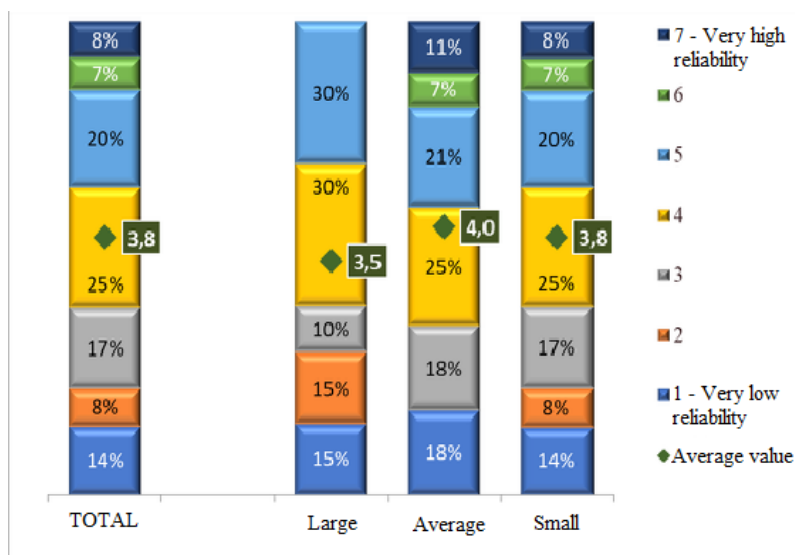


Figure 3 – Evaluation by entrepreneurs of the stability of banks [34]

Let's compare the SB JSC "Sberbank" with its main competitors in such indicators as competitive advantages and competitive disadvantages in table 5.

Table 5 – Comparison of SB JSC "Sberbank" with its main competitors

Bank	Competitive advantages	Competitive disadvantages	Bank's market share
JSC Halyk Bank of Kazakhstan	Reliable customer-oriented bank, a wide network of service points	Bank has high price of commissions on operations	35,5%
JSC Kaspi Bank	Famous bank	Low quality of service	10%
SB JSC Sberbank	Popular bank with foreign participation	Insufficient level of automation of individual business processes, which does not make it possible to fully use the competitive advantages of the bank	12%

**Conclusion.** Research has shown that sustainable competitive advantages enable commercial banks to succeed in the long term. However, the changing external environment (the emergence of new competitors, changing consumer preferences, etc.) require that bank management should pay close attention to maintaining their competitive advantages.

The result of the achievement of strategic guidelines for the main activities should be the strengthening of competitive positions in the banking market.

The main elements of the conceptual approach for ensuring the competitiveness of banks are:

- setting strategic goals and sub-goals (among the latter - ensuring the competitiveness of banks), taking into account the analysis of the external and internal environment;
- formulation of indicators that aggregate a set of specific tasks to ensure the competitiveness of banks;
- determination of factors of competitiveness of banks;
- selection of indicators characterizing factors of banking competitiveness.

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### КОММЕРЦИЯЛЫҚ БАНКТЕРДІ ЗАМАНАУИ БАСҚАРУ

**Аннотация.** Нарықтық экономиканың даму үрдісі сыртқы және ішкі ұйымдық ортаның тұрақсыздығымен сипатталады, несие-қаржы нарығының субъектілерінің салыстырмалы бәсекелі артықшылықтарының олардың бәсекелік позицияларына әсер етуінің алмасуын тудырады, ал бұл, өз кезегінде, банктердің де бәсекеге қабілеттілігі, басқа да қаржылық мекемелердікі сияқты, салыстырмалы түсінік екендігін білдіреді.

Бәсеке барынша нәзік және икемді ұғым. Банк өнімдері мен қызметтеріне сұраныстың қысқаруы жағдайында сапасыз банк қызметін ұсынатын банк мекемелері үлкен қиыншылықтарды бастан кешіреді. Бәсекелік күрестің кең ауқымында өзінің бәсекелік позициясын сараптайтын және сол үшін күресетін банктер жеңіп шығады.

Бәсекелестік күрестің барлық ауқымдылығы кезінде өзінің бәсекелестік ұстанымдарына талдайтын және күресетін банк ұтады. Өнімнің тұрақты бәсекелестік артықшылығын қалыптастыру және оған қол жеткізу кез келген компания үшін басымдық болып табылады. Бәсекелестік артықшылық тұрақтылықты, ұзақ мерзімді өсу мүмкіндігін қамтамасыз етеді, жаңа ойыншылардың нарыққа шығуы үшін кедергілер жасайды, компанияға өз өнімдерін сатудан неғұрлым жоғары пайда нормасын алуға мүмкіндік береді.

Тұрақты бәсекелестік артықшылығы ұғымы "компанияның күшті жақтары" ұғымымен жиі шатастырады. Бірақ бұл екі ұғымдар өзара іргелі айырмашылық бар. Күшті жақтары-бұл ұйым бәсекелестерінен асып түсетін өнімнің сипаттамалары. Бәсекелестердің өнімдері де осы сипаттамаларға ие, бірақ әлсіз деңгейде. Тұрақты бәсекелестік артықшылығы-бұл нарықта тек белгілі бір ұйым ғана ие бірегей сипаттама. Бірегей бәсекелестік артықшылықты кез келген объект үшін табуға болады, бірақ нарықты және бәсекелестерді дұрыс талдау маңызды.

Коммерциялық банктер банк ресурстарын қалыптастыруға үнемі көңіл бөледі. Бұл клиенттердің қаражаты үшін күресті күшейтетін, сондай-ақ банктердің оңтайлы кірістілігін тұрақты қолдауды талап ететін банктік қызметтер нарығындағы қатаң бәсекелестікпен түсіндіріледі. Банктердің жеткілікті және дұрыс теңдестірілген ресурстық базасы олардың табыстылығының, жеткілікті өтімділік пен нарыққа қатысушылар тарапынан сенімді қолдаудың маңызды шарты болып табылады. Жаңа бәсекелестердің пайда болу қаупі үшінші орында тұр. Нарыққа кірудің жоғары кедергілерінен бұл қауіп аз емес. Самой минимальной была угроза появления товаров-заменителей и сила поставщиков. Ең аз қауіпті алмастырғыш тауарлардың пайда болуы және жабдықтаушылардың күштілігі туғызды.

Сондықтан зерттеу тақырыбының өзектілігі оның маңыздылығымен анықталады. Банктердің бәсекеге қабілеттілігін бағалау әдістерін зерделеудің маңыздылығы экономикалық өсудің шешуші факторы ретінде банк секторының айқындаушы рөлімен және банк жүйесінің тұрақтылығымен түсіндіріледі.

Мақалада заманауи банк жүйесіндегі банктердің нарықтағы өз үлесін қорғау мен кеңейтуге, банк өнімдерін ілгерілетуге, тұтынушының мүдделерін толық көлемде қанағаттандыруға қабілетсіздігін сипаттайтын банктердің бәсекеге қабілеттілігінің төмен болуының себептері зерттелді және негізделді.

Қазіргі кезеңде банк өнімдері мен қызметтерінің бәсекеге қабілеттілік деңгейін сандық бағалау мен оны басқару маңызды мәселе екендігі анықталды, өйткені ол еңбек сыйымды, өзара байланысты құраушылардан тұратын кіріктірілген үрдіс және одан барлық банктің бәсекеге қабілеттілігі тәуелді. Жүргізілген зерттеулер негізінде сәйкесінше тұжырымдар анықталды.

Коммерциялық банктердің бәсекеге қабілеттілігін арттыру мақсатында келесі шаралар ұсынылды:

- орта және шағын бизнес сегментіне бағдарлану, қажетті сараптама тәжірибесін дамыту, бұл осы нысаналы сегментте бәсекелестік артықшылықтарды қамтамасыз етуге мүмкіндік береді;

- қазіргі заманғы басқару әдістерін енгізу арқылы активтер мен пассивтердің теңгерімді құрылымын қамтамасыз ету;

- ұзақ мерзімді депозиттер негізінде ресурстық база құрылымын әртараптандыру және жетілдіру;

- қызметті кеңейтуді қамтамасыз ету үшін меншікті капитал құрылымын ұлғайту және оңтайландыру;

- банктік қадағалау және реттеу талаптарын сақтау мақсатында банктің қаржылық тұрақтылығын нығайту;

- банктің тарифтік және баға саясатын жетілдіру;

- ақпараттық технологияларды енгізу негізінде көрсетілетін қызметтердің сапасын бір мезгілде арттыру кезінде шығындарды оңтайландыру есебінен банк жұмысының тиімділігін арттыру;

- Банктік қадағалау және реттеу органдарының өндірістік міндеттері мен талаптарына жауап беретін материалдық-техникалық базаны жетілдіру.

**Түйін сөздер:** коммерциялық банктер, банк жүйесі, банк өнімі, бәсекелік артықшылық, бәсекеге қабілеттілік.

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### **СОВРЕМЕННОЕ УПРАВЛЕНИЕ КОММЕРЧЕСКИМИ БАНКАМИ**

**Аннотация.** Процесс развития рыночной экономики характеризуется нестабильностью как внешней, так и внутренней организационной среды, влечет сменяемость влияния сравниваемых конкурентных преимуществ субъектов кредитно-финансового рынка на формирование их конкурентных позиций, это, в свою очередь, означает, что конкурентоспособность банков, как и остальных финансовых учреждений, является относительным понятием.

Конкуренция является достаточно тонким и гибким понятием. В условиях сокращения спроса на банковские продукты и услуги наибольшие трудности испытывают банковские организации, которые предоставляют некачественные банковские услуги. При всей масштабности конкурентной борьбы выигрывает тот банк, который анализирует и борется за свои конкурентные позиции. Формирование и достижение устойчивого конкурентного преимущества продукта является приоритетом для любой компании. Конкурентное преимущество обеспечивает стабильность, возможность долгосрочного роста, создает барьеры для выхода на рынок новых игроков, позволяет компании получать более высокую норму прибыли от реализации своей продукции.

Часто понятие устойчивого конкурентного преимущества путают с понятием “сильные стороны компании”. Но эти два понятия имеют фундаментальное различие между собой. Сильные стороны – это характеристики продукта, по которым организация превосходит своих конкурентов. Продукты конкурентов также обладают этими характеристиками, но на более слабом уровне. Устойчивое конкурентное преимущество – это уникальная характеристика, которой на рынке обладает только определенная организация. Уникальное конкурентное преимущество всегда можно найти для любого объекта, но важно правильно проанализировать рынок и конкурентов.

Коммерческие банки постоянно уделяют внимание формированию банковских ресурсов. Это объясняется жесткой конкуренцией на рынке банковских услуг, которая обостряет борьбу за средства клиентов, а также требует постоянной поддержки оптимальной доходности банков. Достаточная и правильно сбалансированная ресурсная база банков является важным условием их прибыльности, поддержания достаточной ликвидности и доверия со стороны участников рынка. Угроза появления новых конкурентов стоит на третьем месте. Из-за высоких барьеров входа на рынок эта угроза невелика. Самой минимальной была угроза появления товаров-заменителей и сила поставщиков.

Поэтому актуальность темы исследования определяется ее важностью. Важность изучения методов оценки конкурентоспособности банков объясняется определяющей ролью банковского сектора как решающего фактора экономического роста и стабильности банковской системы.

В статье исследованы и обусловлены причины низкой конкурентоспособности банков современной банковской системы, которые характеризуют неспособность банков отстаивать и расширять долю рынка, продвигать банковские продукты и удовлетворять интересы потребителя в полной мере. Выявлено, что на современном этапе важной проблемой становится количественная оценка уровня конкурентоспособности продуктов и услуг банка и управление ею, так как это достаточно трудоемкий, интегрированный процесс, состоящий из взаимосвязанных составляющих и от которого зависит конкурентоспособность всего банка. На основе проведенного исследования определены соответствующие выводы. В целях повышения конкурентоспособности коммерческих банков были предложены следующие меры:

- ориентироваться на сегмент среднего и малого бизнеса, развивать опыт необходимой экспертизы, что позволяет обеспечить конкурентные преимущества в данном целевом сегменте;

- обеспечение сбалансированной структуры активов и пассивов путем внедрения современных методов управления;



- диверсификация и совершенствование структуры ресурсной базы на основе долгосрочных депозитов;
- увеличение и оптимизация структуры собственного капитала для обеспечения расширения деятельности;
- укрепление финансовой устойчивости банка в целях соблюдения требований банковского надзора и регулирования;
- совершенствование тарифной и ценовой политики Банка;
- повышение эффективности работы банка за счет оптимизации затрат при одновременном повышении качества предоставляемых услуг на основе внедрения информационных технологий ;
- совершенствование материально-технической базы, отвечающей производственным задачам и требованиям органов банковского надзора и регулирования.

**Ключевые слова:** коммерческие банки, банковская система, банковский продукт, конкуренция, конкурентное преимущество, конкурентоспособность.

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## PSYCHOLOGICAL NATURE OF THE ART OF AITYS

**Abstract.** The main purpose of present research was to investigate the psychological nature of Kazakh Aitys and its impact to personal development, ethnocultural values and other skills of Kazakh young People, which required by modern market world. Also the opportunity of creating the communicative and interactive model of creative process of Aitys is considered.

According to the results of the present research there are considered that the Aitys is a joint dialogical creative cognitive activity, which psychological structure has communicative-interactive nature and depends on Kazakh ethnic picture of the world. Aitys as a kind of folklore has a change trends.

Process of communication in the Kazakh ethnos has its features. Aitys isn't result and a victory of one person during competition, since Aitys is result of joint creativity of listeners and poets, because they are representatives of the same ethnos. With the influence of an Aitys uniform ethnic integrity of the Kazakh people is created. During an Aitys there is a co-authorship, empathy of the same problems and conditions of the people.

Aitys introduces novelty and according to the contents it leads to particular change in human minds. In the intellectual sphere of young people there are the development and flexibility, resourcefulness. In this regard, one more function of Aitys in the process of communication is the development of critical thinking of youth, and also a new creative position in a communication process.

**Key words:** Aitys, Kazakh folklore, ethnic and cultural values, psychological nature of Aitys, interactive-communicative model.

**Introduction.** The traditions of oral arts of folklore, particularly of Aitys are the psychological basis of ethnicity research. The definition of Aitys – is an oral creative competition of Kazakhs. In other words, Aitys is a competition in improvisation of songs [1,2]. It was spent publicly in front of people who were both the listener and the critic. Ancient Kazakhs practiced the poetry of creative Aitys, which helped to form the communicative and internal psychological connection between listeners and poets, i.e.

Aitys poets by being representative of particular ethnos, protected values and the honor of Kazakh people. Thus, the listeners, Aitys poets are forming the holistic unity of Kazakh ethnos.

Aitys is a competition in improvisation of songs [3].

It was performed publicly, in front of people who were both listeners and critics. The songs were improvisation, and only in the Kazakh language. Masterful performance, well-aimed expressions, potential, and poetic talent of the singers carried the listeners away, causing admiration in some and hatred in others.

The purpose of this study is to analyze the psychology of the creative process of aitys through transactional analysis [4].

In the Kazakhstan Psychological School there are few works on the psychological study of the work of the aitys of the Kazakh ethnos, folklore in general, among which the most important, relevant ethno-psychological studies are the works of M. Mukanov. The study of M. Mukanov (he analyzed the statement in an empirical context, and not through an experiment, understanding the text of the aitys in a meaningful

aspect) [5] and his student, K. Nurgaliev (the experiment devoted only one type of folklore to the study of puzzles) [6].

In his studies, M. Mukanov is faced with the problem of understanding, the two-planned thinking (symbolic and functional) [7].

The value of Aitys also includes the advantage of saying the problems and important issues of the nation, which was permissible by local Khans (i.e. the King of Kazakh nation). And both, the Khans and Kazakh people have respectful attitude to the creative poetry of Aitys.

The main difference of Aitys from other types of Kazakh folklore is the structured creative oral poetry, which is always connected with the modern state of Kazakh people, the valuable orientations and market, economical conditions. Therefore the popularity of Kazakh Aitys is actual nowadays. Also it is important to mention that the modern life of young people worldwide requires having competences of being able for competitive activity, Aitys also requires these skills from poets and listeners, therefore the impact of Aitys on modern thinking and modern state of the life is very compatible and adaptive.

The importance to develop such skills as creative thinking, personality development, cultural and ethnic values (potential) requires analyzing the nature of arts and ethnic-cultural heritage and Aitys of Kazakh nation [8].

**Methods.** Psychological research of Aitys in laboratory condition is impossible because it is creative process which requires special organization of this process, and presence of both, the Aitys singers and people who are at the same time the listeners and the critic. Therefore in this research it was used the historical content analysis method and analyzed classical texts of Aitys=117 [1,2].

There was used the transactional analysis of E .Berne [9], by means of which we analyzed the creative process of Aitys with the purpose of investigating it's nature and creating new communicative and interactive model of creative process of Aitys. Transactions were found and analyzed in all of these Aityses.

**Results.** As a result of historical and content analysis of Aitys texts there were structured main types of Aitys and their discriptions. Details are in table 1.

Table 1 – The historical and literature description of an Aitys

Aitys types	Description
1. Traditional Aitys:	From centuries, life of the Kazakh people and public activity, all vital events were transmitted through national songs and creative folklore. These national songs carried out function of pleasure, grieves and pressing problems of the people. Also by means of songs poets calmed the people generalizing national experience in the songs. Therefore Aitys heritage passed through generations for preservation of ethnic and cultural values and history of the Kazakh people.
2. Critical Aitys;	Critical Aitys is a kind of an Aitys where are used the signs, traditional beliefs by means of which the national psychotherapy was carried out
3. Wedding	Wedding Aitys - a kind of an Aitys where girls and young men competed in verbal creative competition in front of the groom and the bride. From the groom side there are young men who praise participated and emphasized qualities of the groom. From the bride side there are girls who praise acted and emphasized qualities of the bride.
4. Gender competition Aitys	Gender competition Aitys - a kind of an Aitys where the young man and the girl compete among themselves in a humoristic form
5. Religion Aitys (the Aitys between alive and death people)	Religion Aitys - among the people of Central Asia the Kazakh people least introduced religious views in creative folklore of an Aitys since before Islam Kazakhs practiced Shamanism, Zoroastrianism and other beliefs. People practiced a singing in terms of conversation with the died people, by means of songs talked to the died people. Also Kazakh people validly treated cattle, and included them in their songs.
2. Aitys of poets: 1) Professional poets Aitys;	Each poet has the specific features and the general contents and motives of execution. Therefore, during the Aitys poets used all types of this competition. This type of creativity still remained in the Kazakh ethnos since it is the only type of folklore which is socially resolved and within which it is possible to state all problems of all Kazakh people.
2) Rapid answer Aitys.	Rapid answer Aitys is a kind of an Aitys where people compete in resourcefulness and speed of verbal creativity during an Aitys. For this type of Aitys it is not necessary to be professional in it. Ordinary people could also use this type of Aitys in their everyday life.

According to the results of the present research there are considered that the Aityts is a joint dialogical creative cognitive activity, which psychological structure has communicative-interactive nature and depends on Kazakh ethnic picture of the world.

Process of communication in the Kazakh ethnos has its features. Aityts is not a result and a victory of one person during competition, since Aityts is result of joint creativity of listeners and poets, because they are representatives of the same ethnos. With the influence of an Aityts uniform ethnic integrity of the Kazakh people is created. During an Aityts there is a co-authorship, empathy of the same problems and conditions of the people.

Aityts introduces novelty and according to the contents it leads to particular change in human minds. In the intellectual sphere of young people there are the development and flexibility, resourcefulness. In this regard, one more function of an Aityts in the process of communication is the development of critical thinking of youth, and also a new creative position in a communication process.

In turn, the critical thinking corresponds to an adequate condition of the adult according to E. Berne [9]. Studying Aityts as joint and dialogical thinking process, we consider only communicative and interactive components of communication.

1) Aityts in communicative aspect is practical thinking in the form of dialogue; 2) In interactive aspect it is critical sequence of transactions between two poets; 3) in perceptual aspect it is a perception of speech remarks and understanding, and also an emotional condition of poets. The perceptual part of communication for definition of the psychological nature of Aityts does not play a special role in the Aityts process, because the emotional perception of listeners and poets is an ordinary practice during competition which condition is first of all search of novelty in speech statements

During the investigation of Aityts the special communicative interactive model of Aityts, which based on scientific conception of joint dialogue thinking activity of S.M. Jakupov [10], and transactional analysis of E. Berne [9] was created. According to TA developed by E. Berne in this research have described the three Ego states of Aityts singers (see table 2).

Table 2 – Diagnostic characteristics of Ego states in Aityts

Ego state:	«Parent»	«Adult»	«Child»
Means of the Ego states during Aityts	Aityts singers give an estimated judgment with ingrained voice of authority, absorbed conditioning	Aityts singers have ability to think, which based on received data. They can control their emotions. Their arguments are logical sequence of the statement	Aityts singers may have spontaneous emotional reaction with negative, impulsive statements, unreasoned estimations

According to the mentioned conceptions used in the present study there were created the communicative-interactive model of psychological structure of Aityts (see table 3).

Table 3 – The communicative-interactive model of psychological structure of Aityts

Psychological structure of Aityts	Communicative components		Interactive components		
	Procession	Contextual	Parent	Adult	Child
Diagnostically criterion	Sequence	Question-Answer	Aityts singers give an estimated judgment with ingrained voice of authority, absorbed conditioning	Aityts singers have ability to think, which based on received data. They can control their emotions. Their argument are logical sequence of the statement	Aityts singers may have spontaneous emotional reaction with negative, impulsive statements, unreasoned estimations
The functional structure of Aityts					
Educational			Educative		Developing
Aityts forming the general information fund about culture, values and histories of Kazakh ethnos. As well as giving the information in Kazakh ethnos about adaptation ways to Kazakh culture			Aityts forming an ethnic identity, an ethnic consciousness and ethnic system of values		Aityts forms ethnic relationships based on the Ego state “Adult”, also develop self-control, self-regulation, and logic thinking

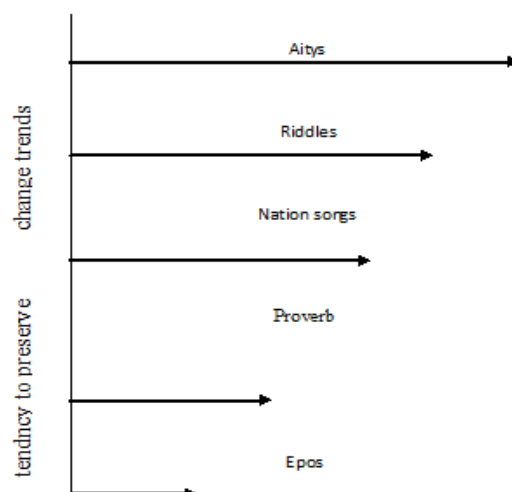


Figure 1 – Psychological classification of Kazakh folklore

According to the results of the present research there are considered that the Aitys is a joint dialogical creative cognitive activity, which psychological structure has communicative-interactive nature and depends on Kazakh ethnic picture of the world. Aitys as a kind of folklore has a change trends (see figure 1).

Aitys singer can be in each Ego state during aitys. And all these ego states may change during aitys. Transactions during aitys process are completed, but the last one may be incomplete because the weak aitys singer can stop the aitys process.

For example, in youth aitys between Dzhambul and Aikumis (which was in 1871) have found 7 transactions, one of them was incomplete transaction [2]. Among them Dzhambul was in “Adult” Ego state in 5 transactions. He was in “Parent” position only in one transaction. Aikumis was in “Parent” Ego state in 5 transactions, and only one was in “Adult” Ego state (see figure 2-4). The winner of this aitys was Dzhambul.

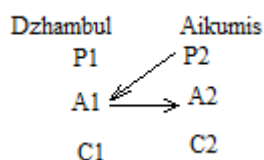


Figure 2 –  
Example of the 2-nd transaction in aitys  
between Dzhambul and Aikumis

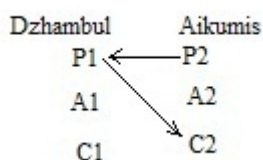


Figure 3 –  
Example of the 3-rd transaction in aitys  
between Dzhambul and Aikumis

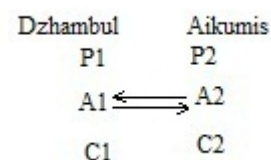


Figure 4 –  
Example of the 4-th transaction in aitys  
between Dzhambul and Aikumis

The victory in aitys is provided with a position of "Adult" because this position can control emotional states of aitys singer and give a logic creative thinking and reflection. Ego state “Child” not effective in aitys because it can cause a conflict situation by emotional reaction of aitys singer. And also Ego state “Parent” not effective in aitys because it characterized as authoritative position, which may cause negativism.

Aitys is a technique, training, practice of creative thinking development. Aitys is still popular in our days because it is a unique kind of folklore which allows expressing in socially comprehensible form of Kazakh people opinions about positive and negative sides of social life.

**Conclusions.** Thus, ethnopsychological research of an Aitys allows to draw the following conclusions:

1. Aitys is a type of folklore which is focused on change, expansion of consciousness and development of the identity of the person as the developing psychological practice. As a result of joint practical activities Aitys develops not only the intelligence, but develops also the personality in general.
2. The process of Aitys from a position of a system approach is a combination of process and the content, unity of communication and knowledge. Aitys is the joint creative thinking and creative competition having the communicative and interactive nature. At the same time, Aitys defines an ethnic picture of the world of the personality. Aitys is the beginning of national consciousness and a basis of psychological research.

3. According to the concept of the transaction analysis of E. Berne, by criteria of three Ego states the empirical experimental base for future researches of an Aityts as creative cognitive joint and dialogical activity of the personality was created.

4. From a position of system approach the main function of Aityts is a strengthening of feeling of ethnic identification. Considering critical and productive cogitative activity of participants of process of Aityts definition of process of Aityts as psychological component is given.

5. As a result of our research there was a structured future pilot studies of Aityts, such as: research of structure of cognitive activity of poets, internal dialogue of process of Aityts, interpersonal relation of process of an Aityts.

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### **АЙТЫС ӨНЕРІНІҢ ПСИХОЛОГИЯЛЫҚ ТАБИҒАТЫ**

**Аннотация.** Бұл зерттеудің негізгі мақсаты қазақ айтыстарының психологиялық табиғатын зерттеу және олардың тұлғалық дамуға және этномәдени құндылықтардың дамуына, сондай-ақ қазақстандық жастарға қажетті дағдылардың дамуына әсерін зерттеу болып отыр.

Айтыс – халық ауыз әдеби творчествосының негізі-этносты зерттеудің қайнар көзі болып табылады. Бір жағынан қазақ мәдениетінің терең тарихи тамыры ретінде және екінші жағынан психотехниканың рөлін орындай алатын творчестволық сөз жарысын тұлғалық қабілетті дамытатын қасиетті халық өнерінің мәнді құндылықтары ретінде этнопсихологиялық бағытта зерттеулер аса маңызды.

Басқа фольклордың түрлерінен ерекше айырмашылғы сонда творчестволық сөз жарысы өнері – айтыс жастық шаққа тән жарысу сипатына ие, қазіргі нарық қоғамына және жаңа дәуірдің талаптарына жауап бере алатын көптеген сапаларды игерген.

Алайда, қазіргі жаңа жағдайларда творчестволық сөз жарысының мәдени мұраның ерекше формасы ретіндегі оның психологиялық табиғатын талдамайынша жастардың творчестволық қабілетін (потенциалын, этномәдени құндылықтарын дамыту мүмкін емес.

Неге «айтыс» өнері өте танмал болды? Біріншіден, «айтыс» ақынның қабілетін, дарындылығын, талан-тын, творчество нәтижесінің мәнділігін бекіту қажеттілігі бола отырып, ақынның «айтысқа» қатысуының өзі оның шеберлігін шыңдады. Екіншіден, рухани қажеттіліктерді қанағаттандырды және «творчество процесін» іштей көруге деген қалаулары болды.

Тыңдаушылар диалогты сөз жарысына қатыса отырып сол шарықтаудың тууына тікелей әсер етіп отырды. Себебі айтыста ерекше күйге түсіретін, шарықтататын керемет дүниелер халықтың жадында жақсы сақталып отырды. Айтыс өз тыңдаушыларын ән мен әзілдер арқылы эмоциялық қозуларға алып келе алды.

Фольклор да өзінің бір жүйесіне ие. Зерттеу барысында жүйелік ықпал тұрғысынан қазақ фольклор түрлеріне психологиялық жүйелеу жасалды. айтыстың психологиялық табиғаты екі бағытта дамиды: 1) сақтау тенденциясы тұрғысынан тұлғаның психодиагностикасы мен ұлттық сәйкестікті дамытады; 2) өзгеру тенденциясы тұрғысынан айтыс әрі оқыту және тәрбиелеу.

Өзгеру тенденциясына ие фольклордың бір түрі айтыс тек айтыскер ақындармен ғана емес әрі тыңдаушылармен де бірлескен диалогты іс-әрекетке түсе отырып, олардың тұлғалық және интеллектуалды дамуын қамтамасыз етеді.

Осыған байланысты келесі қорытындылар жасалды:

Айтыста өзгеру тенденциясы үстем болады ( адамды өзгертеді, творчествоны дамытады және қоғамдық талаптарға сай олардың мазмұны да өзгеріп отырады.

Мақалдар мен мәтелдерде сақтау тенденциясы басым болады, сондықтанда халық оларды сақтауға ұмтылады, ал халық әндері әрі сақтау әрі өзгеру тенденцияларына ие болады, жұмбақтар болса өзгеру тенденциясына ие болады.

Творчество процесі басқа бір психологиялық күйді талап етеді, дәлірек айтсақ, белгілі бір эмоциялық тәуелсіздік күйі, яғни саналы түрде қарсыласының әсеріне түспеу үшін сол күйден шықпауға және оны қадағалап отыруға тырысады. Осы айтылған жағдайлар Э. Берннің концепциясына сәйкес келеді. Яғни нақты айтатын болсақ «Ересек» эго күйі. Сондықтанда айтыстағы жеңісті «Ересек» эго күйі қамтамасыз ете алады.

Айтыс уақыт категориясы тұрғысынан интеракциялар жиынтығы, онда әрбір трансакциялар қарсыласының позициясына орай өз позицияларын сақтап немесе өзгертіп отырады («Ата-ана», «Ересек», «Бала» эго күйлері).

Біздің ойымызша айтыстың осы айтылған психологиялық ерекшеліктері Э. Берннің трансакциялық анализ концепциясы негізінде ашылады. Сондықтанда зерттеушінің міндеті осы концепция негізінде творчестволық сөз жарысын (айтыс) талдау үшін әдістемелік талаптарды жасады. Осыған орай айтыстың психологиялық табиғатын анықтау үшін Э. Берннің «Ата-ана», «Ересек», «Бала» эго күйлері негізінде эмпирикалық зерттеу ұйымдастырылды,

Э. Берннің трансактілік талдау концепциясы бойынша диагностикалық зерттеу үшін әрбір позицияның критерийлері жасалды (АЕБ: «Ата-ана», «Ересек», «Бала» эго күйлері). Осы критерийлерге сүйеніп, қарым-қатынас позициясын талдай отырып, зерттеуге қатысқан сыналушылардың жауаптарын бағалап, біз айтыстың психологиялық табиғатын ашатын кри-терийлерін жасай аламыз.

Э. Берннің трансактілік концепциясы негізінде, яғни «Ата-ана», «Ересек», «Бала» эго күйлері бойынша творчестволық бірлескен танымдық іс-әрекет айтысты зерттеудің эмпирикалық-эксперименттік негізі жасалды.

**Түйін сөздер:** айтыс, қазақ фольклоры, этномәдени құндылықтар, айтыстың психологиялық табиғаты, интерактивті-коммуникативті модель

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## **ПСИХОЛОГИЧЕСКАЯ ПРИРОДА ИСКУССТВА АЙТЫСА**

**Аннотация.** Основная цель настоящего исследования состояла в том, чтобы исследовать психологическую природу казахских айтысов и их влияние на развитие личности, этнокультурные ценности и другие навыки казахстанской молодежи.

Айтыс – это основа народного устного литературного творчества – психологический ключ к исследованию этноса. С одной стороны, в качестве глубоких исторических корней казахской культуры, с другой стороны, творческое словесное состязание, выполняющей роль психотехники, очень важно исследовать в этнопсихологическом направлении как одно из значимых ценностей священного искусства народа, которое развивает личностную способность

Отличительной особенностью искусства творческого состязания от других видов фольклора явилось то, что она характерна молодости, обладает многими качествами соперничества, которое свойственно для современного рыночного общества и отвечает всем требованиям и запросам новой эпохи. Не изучив в нынешних условиях искусство творческого состязания как особую форму этнического наследия, без этнопсихологического анализа ее природы, невозможно развивать творческих способностей, этнокультурных ценностей (потенциалов) и личностного роста молодежи.

Почему «айтыс» получил такую широкую популярность? Во-первых, «айтыс» как потребность подтверждения значимости продуктов творчества, таланта, одаренности, способностей поэта, кроме того, участие в «айтысе» прославляло и возвышало мастерство. Во-вторых, удовлетворение духовных потребностей и желание увидеть воочию “процесс творчества”. Слушатели, участвуя в диалогическом состязании, напрямую содействуют рождению этого творения. Так как это были очень зрелищные, завлекающие и завораживающие события, поэтому хорошо запечатлевал в народной памяти. Айтыс завораживал своих слушателей эмоциональным напряжением, драматизацией песен и искрометным юмором.

Фольклор также имеет свою систему. Была проделана психологическая систематизация видов казахского фольклора с позиции системного подхода. Психологическая функция айтыса осуществляется в двух направлениях: 1) тенденция сохранения – развитие национальной идентичности и психодиагностики личности; 2) тенденция изменения – обучение и воспитание. Айтыс как один из видов фольклора, в котором доминирует тенденция изменения, осуществляет личностное и интеллектуальное развитие за счет совместной диалогической деятельности не только состязающихся поэтов, но и слушателей. Поэтому были сделаны следующие выводы:

В айтысе доминирует тенденция к изменению (изменяет человека, развивает творчество, в зависимости от общественного строя изменяется и его содержание). В пословицах и поговорках преобладает тенденция



сохранения, поэтому этнос стремится их сохранять; народные песни обладают тенденцией и сохранения и изменения; загадки же обладают тенденцией к изменению.

Процесс творчества требует другого психологического состояния, а точнее определенной эмоциональной независимости, где требуется, сознательно контролируя противника, не подпасть под его воздействие. Эти положения соответствуют основным положениям концепции Э. Берна, то есть критериям позиции «Взрослого». А значит победу в айтысе обеспечивает позиция «Взрослого».

Таким образом, айтыс с точки зрения категории времени развивается как набор интеракций, где в каждой транзакции состояющийся поэт в отношении с соперником стремится или сохранить или изменить свои позиции («Родитель», «Взрослый», «Ребенок»).

По нашему мнению, эта психологическая особенность айтыса раскрывается на основе транзактного анализа концепции Э. Берна. Поэтому задача исследователя – на основе этой концепции разработать методические требования для анализа творческого словесного поединка (айтыс). В связи с чем для выявления психологической природы айтыса было организовано эмпирическое исследование, для раскрытия на основе концепции Э. Берна свойства позиций «Родитель», «Взрослый», «Ребенок».

По транзактному анализу, согласно концепции Э. Берна, были созданы символы критериям каждой позиции («РоВРе: «Родитель», «Взрослый», «Ребенок»), специально для диагностического исследования. Опираясь на эти символы, анализируя позиции общения, эмпирико-экспериментальные протоколы ответов оценщиков во время исследования, мы можем установить основные критерии, выявляющие психологическую природу айтыса.

На основе транзактного анализа концепции Э. Берна, согласно критериям свойств позиций «Родитель», «Взрослый», «Ребенок», была создана эмпирико-экспериментальная основа творческой совместно-диалогической познавательной деятельности айтыса.

**Ключевые слова:** айтыс, казахский фольклор, этнокультурные ценности, психологическая природа айтыса, интерактивно-коммуникативная модель.

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## **HUMAN RESOURCE MANAGEMENT AND DYNAMIC CAPABILITIES OF EDUCATIONAL ENTERPRISES: PSYCHOLOGICAL, SOCIAL AND ECONOMICAL ASPECTS**

**Abstract.** This paper focuses on the dynamic capabilities theory and foresight theory in whole to the problem of the human capital in education and its management. The main channel for building up dynamic abilities and foresight competencies of educational enterprises and specialists, as well as the focus of foresight research in modern science and management practice is working with human resources, with the human capital of firms, communities, and countries. This work also includes work with social and cultural capital, focused on improving the culture of relationships in communities, including the culture of the state, society and business. The orientation of the world social development to increase the innovation component in the economic, social and spiritual spheres of society and in its education, led to the recognition of human capital as a leading and decisive factor in the socio-economic development of systems of various scales and levels. Scientists notes that in modern conditions of globalization of markets and transnationalization of economic relations, as well as a significant level of intellectualization of modern business processes, human capital and education in business and in other spheres is a decisive factor in the competitiveness of national economy on the different levels. This moment is especially noticeable in the studies of the dynamic abilities of educational enterprises and the management of educational enterprises. This moment is also especially noticeable in foresight studies and other reconstructions of the past, present and future development of organizations. Dynamic capabilities are required if the firm is to sustain itself as markets and technologies change, although some firms will be stronger than others in performing some or all of these tasks. Foresight is a system of methods of transformation of priorities in the sphere of economy and production, social and cultural development, and in education. Human resource management in education is an important part of the problem of the dynamic abilities of educational enterprises. The management of selection, training, retraining and personnel development, the formation and enrichment of technologies for managing professional and career development are naturally part of a dynamically and steadily developing enterprise. Foresight of the development of the educational enterprise as a leading aspect includes a general assessment of the professional and career potential of the organization's employees, as well as the dynamic abilities of the organization's manager (his ability and willingness to diversify activities, training and retraining, etc.) and other specialists. The purpose of the study – analysis of foresight competence as a component of dynamic capabilities (competences) of the educational enterprises and specialists of educational enterprises in context of the human capital problems. Foresight involves the use and transformation meta-technology ("routines") of enterprise and innovation in the field of production and relations of production. It is aimed at the allocation and use of markers of change – weak and strong signals of future and probable changes. Active and accurate identification of these markers changes in education, including application and modification of routine or meta-technology of enterprise management, not only allows to predict "unpredictable", but also to intervene in the process flow, correcting them with the least expenditure of forces, material, mental and spiritual resources. In addition, it allows you to influence the

markets themselves and the surrounding enterprise reality in general. Thanks to the foresight competence and ability, the specialist in education and his company productively adapt to changes in environment (market and society), but also participate in changing it.

**Keywords:** human resource, management, human capital, human capital development management, dynamic capabilities, learning organizations, education, foresight, routine, innovation, meta-technology foresight competence.

**Introduction.** The orientation of the world social development to increase the innovation component in the economic, social and spiritual spheres of society, led to the recognition of human capital as a leading and decisive factor of the development in the socio-economic development of systems of various scales and levels (Abel, Deitz, 2012; Barney, 1991; Becker, 2009; Huselid, 1995; Molloy, Coff, Lepak, Wright, Delery, and Zenger, 2009; Ployhart, 2004; Wright, Dunford, and Snell, 2001; Crook, Todd, Combs, Woehr, & Ketchen, 2011). Human abilities, professionalism and qualification, formed from a complex of knowledge, competencies and professional experience. They serve as the fundamental basis of the modern economy, and determine not only the value of their carrier, but also create a new impetus to the development of cognitive-creative abilities and competencies, and also multiplier effect in relation to other factors of production, which determines the relevance of the study. The need to identify modern factors of qualitative transformation of human capital in education, as a dynamic strategic resource for the modern development of all spheres of society, implies its study at the main levels of formation, and provides for the integration of knowledge from various fields of science and education (Panichkina, Burova, and Masych, 2016; Panichkina, and Masych, 2016; Panichkina, and Masych, 2017).

**Target setting.** Human capital, as a concentrated amount of knowledge and competences in society (Abel, Deitz, 2012; Barney, 1991; Becker, 2009; Huselid, 1995; Molloy, Coff, Lepak, Wright, Delery, and Zenger, 2009; Ployhart, 2004; Wright, Dunford, and Snell, 2001; Crook, Todd, Combs, Woehr, & Ketchen, 2011). Analyzing the trends of human capital formation at the different levels, we can see that should be noted that in modern conditions of globalization of markets and transnationalization of economic relations, as well as a significant level of intellectualization of modern business processes is a decisive factor in the competitiveness of national economy. This moment is especially noticeable in the studies of the dynamic abilities of educational enterprises and the management of educational enterprises. This moment is also especially noticeable in foresight studies and other reconstructions of the past, present and future development of organizations. In addition, the level of human capital development is of key importance not only for the country's economy, but also for the successful functioning of its political, social and civil institutions. It is associated with the quality of education, medicine, law enforcement and other areas of human activity. The most important role is played by human capital in the formation and development of cultural capital, that is, the kind of capital that sets the goals and values of human development and humanity, determines its future, sets the framework for reflection of the past and awareness of the present. Human capital in many respects determines the place and role of the country in the system of modern international relations, in the "world table of ranks" It is necessary to emphasize that in turn, the level of human capital development depends on the strategic goals of the state and the development of its state and public institutions. Greater or lesser equality of opportunities for citizens in education, social, economic, medical and law enforcement assistance, state employment policies and other parameters will contribute to the successful transformation of human potential into capital, coupled with economic development processes, performance management of social and political institutions, business organizations, science and education, culture and nature (Abel, Deitz, 2012; Barney, 1991; Becker, 2009; Huselid, 1995; Molloy, Coff, Lepak, Wright, Delery, and Zenger, 2009; Kenzhaliyev, B. K., Gladyshev, S. V., Abdulvaliyev, R. A., Kuldeev, E. I., Beisembekova, K. O., Omarova, S. A., Manapova A. I., 2018; Kenzhaliyev, B. K., Kul'deev, E. I., Luganov, V. A., Bondarenko, I. V., Motovilov, I. Y., & Temirova, S.S., (2019; Zhapbasbayev, U., Ramazanova, G., Kenzhaliyev, B., Sattinova, Z., & Shakhov, S., 2016; Kenzhaliyev, B. K. Surkova, T. Yu. Berkinbayeva, A. N., 2019; Ployhart, 2004; Wright, Dunford, and Snell, 2001; Crook, Todd, Combs, Woehr, & Ketchen, 2011).

**The purpose and method of the study.** The purpose of the study – analysis of foresight competence as a component of dynamic capabilities (competences) of the educational enterprises and specialists of educational enterprises in context of the human capital problems. Research method – theoretical analysis of foresight competence as a component of dynamic capabilities (competences) of the educational enterprises and specialists of educational enterprises in context of the human capital problems.

**Literature Review.** *Theoretical background: Dynamic capabilities and foresight*

D. J. Teece proposed an elaborated framework consisting of three factors; sensing, seizing, and reconfiguring. Dynamic capabilities can usefully be thought of as belonging to three clusters of activities and adjustments: (1) identification and assessment of an opportunity (sensing); (2) mobilization of resources to address an opportunity and to capture value from doing so (seizing); and (3) continued renewal (transforming) (Arpentieva, 2017; Di Stefano, & Verona, 2010; Teece and Pisano, 1994; Teece, Pisano and Shuen, 1997; Teece, 2007; Winter, 2003). These activities are required if the firm is to sustain itself as markets and technologies change, although some firms will be stronger than others in performing some or all of these tasks. Reconfiguration requires the company to maintain strong leadership, business model redesign and asset-realignment activities. Sensing is the main foresight competence (capability) component. Foresight is a system of methods of transformation of priorities in the sphere of economy and production, social and cultural development. Human resource management is an important part of the problem of the dynamic abilities of educational enterprises. The management of selection, training, retraining and personnel development, the formation and enrichment of technologies for managing professional and career development are naturally part of a dynamically and steadily developing enterprise. Forecasting the development of the enterprise (foresight) as a leading aspect includes a general assessment of the professional and career potential of the organization's employees, as well as the dynamic abilities of the organization's manager (his ability and willingness to diversify activities, training and retraining, etc.) (Arpentieva, 2017; Cordes-Berszinn, 2013; Eisenhardt and Martin, 2000; Heger, and Rohrbeck, 2012; Højland, & Rohrbeck, 2018; Lehr, Lorenz, Willert, and Rohrbeck, 2017; Rohrbeck, 2010; Rohrbeck, 2012; Rohrbeck, and Kallehave, 2012; Rohrbeck, and Kum, 2018; Teece, 2007; Winter, 2003).

Analysis of foresight competence as a component of dynamic capabilities (competences) of the educational enterprises / managers of educational enterprises shows their leading role in the implementation of other dynamic capabilities. It shows the fact that foresight educational enterprises and industries is having a transformative impact on the development of the system, helping to transform and not just to predict the development of the industry or enterprise (Eisenhardt and Martin, 2000; Heger, and Rohrbeck, 2012; Højland, & Rohrbeck, 2018; Lehr, Lorenz, Willert, and Rohrbeck, 2017; Rohrbeck, 2010; Rohrbeck, 2012; Rohrbeck, and Kallehave, 2012; Rohrbeck, and Kum, 2018; Teece, 2007; Winter, 2003). Foresight involves the use and transformation meta-technology ("routines") of enterprise and innovation in the field of production and relations of production. It is aimed at the allocation and use of markers of change – weak and strong signals of future and probable changes. Active and accurate identification of these markers changes, including application and modification of routine or meta-technology of enterprise management, not only allows to predict "unpredictable", but also to intervene in the process flow, correcting them with the least expenditure of forces, material, mental and spiritual resources. In addition, it allows you to influence the markets themselves and the surrounding enterprise reality in General. Thanks to the foresight competence and ability, the specialist and his company productively adapt to changes in environment (market and society), but also participate in changing it (Arpentieva, 2017; Arpentieva, Gorelova, Duvalina, Braitseva, Roznova, 2018; Bykasova, Arpentieva, Gorelova, Bogomolova, 2019). The main channel for building up dynamic abilities and foresight competencies of educational enterprises and specialists, as well as the main focus of foresight research in modern science and management practice is working with human resources in situational problems, (di)stress, innovations and reforms, partial or total distractions, with the human capital of firms, communities, countries (Arpentieva, Kassymova, Lavrinenko, Tyumaseva, Valeeva, Kenzhaliyev, Triyono, Duvalina, Kosov, 2019; Arpentieva, 2015; Kassymova, Stepanova, Stepanova, Menshikov, Arpentieva, Merezchnikov, Kunakovskaya, 2018; Kassymova, Tokar, Tashcheva, Slepukhina, Gridneva, Bazhenova, Shpakovskaya, Arpentieva, 2019; Kassymova, Tyumaseva, Valeeva, Lavrinenko, Arpentieva, Kenzhaliyev, Kosherbayeva, Kosov, Duvalina, 2019; Kassymova, Kosherbayeva, Sangilbayev, Schachl, Cox, 2018; Kassymova, Valeeva, Stepanova, Goroshchenova, Gasanova, Kulakova, Menshikov, Arpentieva, Garbuzova, 2019). This work also includes work with social and cultural capital, focused on improving the culture of relationships in communities, including the culture of the state, society and business and its projections in education.

*Theoretical background: human capital in learning organization*

Scientists and practitioners allocate various indices of human capital:

- Capacity, which included literacy rates and the proportion of people with primary, secondary, and higher education in different age groups; - Development, including indicators of coverage and quality

obtained: primary education, vocational education, tertiary (higher) education, professional diversity of university graduates; - Deployment, which included the proportion of the employed population, unemployment rate, underemployment and their gender characteristics, - Know-how - uses data on the availability of trained personnel for high-tech industries.

As at the national level, researchers to the development of a lifelong education system attribute the process of transforming human potential into human capital at the level of economic entities aimed at improving the professional qualities of an employee throughout life ("life-long learning"). As evidenced by the results of foreign and domestic studies, continuous professional education and retraining of personnel are one of the most effective ways to form human capital. Today, an employee of the organization requires not only professional competence, but the willingness and ability to learn new knowledge and skills as the basis for its constant growth and development. The task of the organization is to create optimal conditions for continuous professional training and personnel development.

Employee development is an integral element of the human resource management system of a modern organization. The accumulation of human capital at the organizational level is largely determined by the system of professional development of personnel adopted by the company.

Today, there are several types of professional development systems. These types are most widely used in work with the labor potential of an organization in Russia: external, academic, and internal corporate and combined.

External systems include the services of T & D- (Training and Development) providers. As the results of the research show, the most demanded services of T & D providers, most of which are concentrated in Moscow (more than 50%), are short-term training: conducting ready-made trainings; training internal customer coaches; business simulations; master classes; coaching.

The specificity of the so-called academic systems consists in the fact that they are university-based tuition for prolonged educational courses (often the MBA format). For example, MBA programs, including jointly with American and British universities, are being implemented by such major domestic universities as the Financial University under the Government of the Russian Federation, the State Institute of Management, the Russian Academy of National Economy and Public Administration, etc.

Traditionally, the intra-corporate training system remains in demand, the key task of which is the applied development of the necessary competences of employees in the workplace. Finally, combined systems or, as they are also called, corporate universities (CU), are a complex of internal and external staff development tools adapted to the individual needs of a particular organization. According to experts, the last decade has been marked by Russia with an unprecedented increase in the number of corporate universities. The most developed corporate training in the banking sector, manufacturing, insurance. CU Sberbank, CU Alfabank, CU Sibur, Rosatom Corporate Academy, CU Gazpromneft, CU Russian Railways, CU MTS, CU Rostelecom, etc. corporations are among the leaders in corporate education in Russia.

At the same time, research results indicate that the attitude of Russian organizations to personnel training is much differentiated. We identify the following options for staff training strategies in Russia:

1. The complete lack of training / complete removal of the organization from the training of its employees. According to this strategy, an employer attracts personnel who already possess the necessary degree of professional competence. In addition, if the level of knowledge and skills of an employee becomes obsolete, then the responsibility for solving this problem lies on the shoulders of the employee.

2. Lack of training in the organization, but actively encouraging the employee's own efforts to improve their skills and unleash their potential. Since it is impossible to accurately calculate the effectiveness of investments in human capital, the organization refuses to train staff, but it encourages those who invest in themselves (bonus systems, business career development, etc.).

3. Formal learning. The most common strategy in Russia, which is not so much conducive to the real development of personnel, as it creates the appearance of it.

4. Selective learning. This type of strategy is used in organizations that do not have sufficient financial resources to train all categories of personnel who need it. The company invests in the most talented employees, who, after completing the training, are charged with transmitting the knowledge gained to their colleagues in the course of in-house training.

5. Systematic staff training. In this case, the personnel training system is present, but it is often modular in nature, i.e. It is formed from training programs offered by T & D providers or universities.

6. Full internal training of personnel. The principal difference of this approach is in its complex nature, aimed at systematic, consistent development of personnel. Despite the use of third-party training programs, internal components play a priority (strategic) role. It is within the framework of this strategy that corporate universities (CU) are formed.

According to a number of studies, an increasing number of successful domestic companies, implementing their own development strategy, are implementing the concept of a "learning organization" (Fulmer, Keys, 1998; O'Keeffe, 2002; Papa, Daniels, & Spiker, B. 2008; Pedler, Burgogyne, and Boydell, 1997; Santos-Vijande, López-Sánchez, Trespalacios, 2012; Serenko, Bontis, and Hardie, 2007; Senge, Kleiner, Ross, Roth, and Smith, 1999).

The learning organization is constantly in the process of self-improvement, increasing the dynamic qualities that allow it too flexibly and fully adapt to changes in the markets, as well as to shape the changes them as individuals and professionals in the development of the organization, its various structures and parties. It is important to note that in the context of a learning organization, learning is not just the accumulation of knowledge and skills, but also a meaningful development of the ability to use, change, etc.

Learning organizations are the organizations with best chance to succeed and thrive in the future.

Modern research identifies a number of characteristics of the learning organization:

- "Learning" approach to strategy development. The strategy and policy of the company are considered as continuously changing and procedural phenomena. Business plans are constantly changing, improving in the light of emerging factors.

- "Participatory" or intersubjective, "evergetical" (Arpentieva, 2017) policy management. Employees of the organization take part in the formulation of the strategy and policy of the company, in the implementation of their decisions. The organization's policy reflects the values of the entire team, not just its top management.

- Informational openness, including openness on the organizational "vertical", dialogical ways of interaction of the organization's substructures. Information from "weak" and "strong voices" is more used to understand what is happening, what happened and anticipate the future in order to make the right decisions, and not as a basis for reward or punishment.

- Audit, accounting and control of the organization. Audit, accounting, budgeting and analysis systems are structured in such a way as to be useful in the process of learning and improving, including analysis of the past, present and future states of the organization. Financiers and other specialists act as consultants on special issues of using information. Financial and other subsystems of the company are built in such a way that everyone feels responsible for the resources that are at his disposal.

- Internal exchange of services and information. Each unit supplies and consumes services. Units, departments, sections have real opportunities to act on their own.

- Flexible reward mechanisms. The term "remuneration" is considered broader than just pay. All employees are involved in the process of determining the most optimal forms of remuneration. The main principle of determining remuneration is the employee's contribution to the overall performance of the organization.

- "Creating opportunities" structure. Units and other "boundaries" are considered rather as a temporary structure that can be changed if necessary. Positions and roles are defined in such a way as to create conditions for experimentation and growth. An organization has a set of regulations and procedures, but they are not decisive and can always be changed after relevant discussions.

- Constant "scanning" of the environment, assessment of the immediate and distant prospects for the development of markets, capital, social and other changes, the consequences of our own activities and the activities of competitors, etc. It is the responsibility of each employee to collect information for the organization about what is being done outside of it. Each meeting of employees of the organization includes an overview of what is happening in its business environment.

- Joint projects of the organization and related groups. The organization builds partnerships with suppliers and consumers of services. The organization acts as an initiator in the implementation of joint projects with consumers, suppliers, does not miss the opportunity for joint training.

- Learning climate. The main principle of work for each employee of the organization is to always strive to study and improve what you are doing. Every employee of the organization has the right to make mistakes. Employees of the organization have the time to discuss and analyze the practice, to learn from their own experience.

- Constant self-development of each employee, working with the career prospects of the individual in the professional and educational, family and personal, social and leisure spheres.

In the concept of P. Senge, work with dynamic abilities in the context of the tasks of "educational organization" includes five basic "organizational skills" (Fulmer, Keys, 1998; Senge, 2014). He notes that the educational organization is the "organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together", "Real learning gets to the heart of what it means to be human. Through learning, we re-create ourselves. Through learning, we become able to do something we never were able to do. Through learning, we re-perceive the world and our relationship to it. Through learning, we extend our capacity to create, to be part of the generative process of life. There is within each of us a deep hunger for this type of learning." (Senge, 2006: 5-6; Senge, 2014). The first "skill" is personal mastery in the perfection of the personality. Despite the fact that energetic people come into business, only a few of them remain "on the rise" over time. Most are starting to take care of themselves in order to do something that really warms the soul over the weekend. As a result, a person quickly "loses dedication, a sense of his personal value and inspiration," begins to look for other channels of inspiration and self-realization. However, only a few companies encourage their employees to move forward, and the rest as a result have "unused, wasted resources": "Personal mastery is the discipline of continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively" (Senge, 2006: 7). The second "skill" is intellectual models. Models or stereotypes in relation to various managerial, professional, career and other situations prevent the introduction of new ideas. They must be sufficiently flexible, conscious and wide, so that new management ideas will be implemented. The third "skill" is a common vision. Unfortunately, many managers do not attach importance to the fact that their personal understanding of the development of an organization is not understood and is not shared by all employees. According to P. Senge, thanks to a common understanding, people learn not because they were told this, but because they want it (Senge, 2014). The fourth "skill" is group learning (team learning) as a free exchange of views in groups - dialogue. It is the dialogue between employees that leads to discoveries and innovations. These innovations may be completely inaccessible to everyone individually: "teams, not individuals, are the fundamental learning unit in modern organizations." (Senge, 2006: 10). The fifth "skill" is a systemic understanding ("systemic thinking"). Without it, all other skills and knowledge will remain "scattered tricks, fashionable innovations in management. We could argue that organizational learning is the 'activity and the process by which organizations eventually reach the ideal of a learning organization' (Finger, and Brand, 1999: 136; Senge, 2014). The systems viewpoint is generally oriented toward the long-term view. That's why delays and feedback loops are so important. In the short term, you can often ignore them; they are inconsequential. They only come back to haunt you in the long term (Senge, 2006: 92).

Learning organizations: provide continuous learning opportunities; use learning to reach their goals; link individual performance with organizational performance; foster inquiry and dialogue, making it safe for people to share openly and take risks; embrace creative tension as a source of energy and renewal.; are continuously aware of and interact with their environment.

There is a "bottom-up" or democratic approaches to organizational learning: Learning organizations are characterized by total employee involvement in a process of collaboratively conducted, collectively accountable change directed towards shared values or principles. (Watkins and Marsick 1992: 118). There is a nondemocratic approaches to organizational learning (as something that are initiated and developed by senior management – they involve a top-down, managerial imposed, vision): f Learning Company is an organization that facilitates the learning of all its members and continuously transforms itself (Pedler, Burgoyne, and Boydell, 1996: 1). There is a technical and social approaches to organizational learning: focused on interventions based on such concepts as the "learning curve" and on the process of learning. Learning organizations are organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together. (Senge 2006: 3). As you know, the key advantages of a learning organization are efficiency and proactivity. The learning organization responds flexibly to the "challenges" of the external and internal organizational environment; moreover, it

is characterized by a proactive approach to understanding the needs for adjusting organizational policies and strategies.

The use of the “learning organization” concept in building a system of continuing professional education for the organization’s personnel, in our opinion, is an important condition for the effectiveness of development and accumulation of human capital.

Distinctive features of the training program when using the concept of "learning organization" in the modern world are as follows:

- concreteness, which is manifested primarily in the presence in the educational process of exclusively those disciplines that are necessary for the development of skills and abilities in specific professional and functional knowledge in a single organization in a specific period of time. In addition, the principle of specificity is reflected in the specifics of the curriculum, formed on the identified needs of a specific organizational structure and built in accordance with the policy and strategy of personnel development of the company;
- active-activity approach, which is implemented in the direct participation of middle managers in planning the career opportunities of the company's employees, in engaging in the decision-making process in matters of political and strategic management of organizational human potential;
- focus on the end result of training, which allows in the process of training and retraining of managerial personnel and company employees to minimize the gap in knowledge, skills and their practical implementation;
- self-management, which is manifested in the initiation by the subject of training of vocational training and retraining programs;
- systematic approach allows companies to move from a fragmented and unrelated learning process to a fundamentally different level - the level of continuity of measures in the field of personnel policy and strategy;
- digitalization of education, professional and managerial activities;
- high speed and flexibility to respond to market needs, foresight studies and foresight competencies (dynamic competencies) of educational enterprises and their employees.

Every year, new developments for both offline training and various online platforms appear on the corporate training market. Distance learning systems (DLS) are becoming more and more popular especially with large companies; there is an active development of online formats due to instant messengers and chat bots]. Today, the most popular and high-tech service is the LMS (Learning Management Systems) online learning platform, which has a number of tangible benefits (Romanenko, Stolbov, Kalachova, 2009; Davis, Carmean, Wagner, 2009; The eLearning Guild, 2018).

First, with the help of LMS, you can create a single database of e-courses and educational materials. Secondly, the LMS allows you to manage courses and learners. Thirdly, it is an electronic system, and, therefore, learning with remote access is possible. Fourth, LMS has extensive automation capabilities: validation, statistics collection, report preparation, etc. Finally, the use of an e-learning system can significantly save the budget allocated by organizations for the training and development of personnel, as well as reduce the time spent on training. In recent years, training programs based on virtual and augmented reality (VR/AR solutions) have been actively implemented in the technology of personnel training. According to experts, immersive technologies have enormous potential for increasing the efficiency of production processes. However, despite the weighty advantages of LMS-systems and VR / AR-solutions in the context of the implementation of corporate training, they cannot be assigned all the tasks related to the training and development of staff.

Modern trends in the post-industrial society are connected, in particular, with the intensification of information exchange processes in various spheres of human life and professional activity. These trends form the need for the advanced development of personnel characteristics necessary for effective interaction between people among specialists of any professions. Rapid social changes, intensive increment of information, instability, uncertainty, complexity and ambiguity of the modern world - all these characteristics of the surrounding reality determine the need for interdisciplinary coordination of the activities of a large number of different specialists in various fields of activity. If earlier it was most often discussed developing the capacities for dialogical and the flexible construction of relations between employees and companies with each other with respect to certain collective professions and firms structures, then in modern conditions the problem of developing dynamic abilities of educational enterprises and all employees. Foresight capacities (competencies) is the competencies of the "polyphonic game" on all psychological, social, econo-



mic, technological and other instruments. For example, previously these competencies were significant for professions of the human-human group”, managers of the department of strategic development. Now they turn out to be important for every employee and every department of a company, every organization, including specialists, who have traditionally not been specially engaged in planning and anticipating development paths - neither their own nor other colleges, nor other departments and aspects of organizations.

Thus, the qualitative and quantitative parameters of human capital, focused on continuous and dynamic improvement, largely determine the pace and nature of the evolutionary development of systems of various levels and scales. The task of developing human capital is among the national priorities of modern Russia and many other countries of the world. Human capital is the decisive factor in the competitiveness of the national economy and in many respects determines the place and role of the country in the system of international relations. Unfortunately, in Russia the concept of "human resources" still prevails, considering a person and his work from the point of view of their consumption and reproduction as other "consumables". This significantly reduces the dynamic abilities of educational enterprises and workers who are inclined to accept themselves as an "application" to the enterprise, and not its leading, most significant part. The understanding that human capital needs to be accumulated and created, including transferring potential abilities to actual ones, engaging, thanks to dialogic interaction and intersubjective management of the organization, thanks to regular and joint, taking into account the interests and positions of all subjects of the organization, foresight sessions and foresight, is declining. -audits, and due to the transformation of the organization into a platform of continuous self-education and mutual education, the whole palette of knowledge and skills of the members of the organization (conception of tacit knowledge).

A multi-level approach to the formation of human capital is needed, which takes into account the reflection of its past, the awareness of the present and the design of the future. The analysis of conditions and indicators is important. the productivity and efficiency of the accumulation and development of the human capital of firms, holdings, regions and countries at the macro-, meso- and micro- levels. A systematic analysis of the dynamic capabilities of the employees of the organization and the organization as a whole can be used to develop organizational, regional, federal, etc. programs. They aimed at creating optimal conditions for the formation and development of human capital, in the practice of organizations in building a system of continuous professional education of personnel / population, as well as choosing methods and technologies for training and developing people as individuals and specialists.

**Conclusion.** Analysis of the processes and results of the transformation of human potential into human capital at the different levels shows that they are directly related to the development of the system of continuing education and the foresight practices. Continuing vocational education and retraining of personnel is one of the most effective ways of building human capital, increasing its dynamic abilities and foresight competencies. The accumulation of human capital at the organizational level is largely determined by the system of professional development of personnel adopted by the company. The condition for the effectiveness of the development and accumulation of human capital at the different levels is the use of the concepts of a “learning organization” in building a system of continuing professional education of the organization’s personnel, as well as the creation of a system of continuous professional education of staff based on corporate training centers. Measures and programs to improve the quality of education and self-education of people in individual regions, countries and the world as a whole are also needed. Analysis of the prospects and global trends, which are reflected in the technologies of corporate training, leads to the conclusion that it is necessary to achieve a balance between online and offline learning formats. Particular attention in the system of personnel development should be paid to the search for effective methods for the development of foresight competence of staff, from managers to ordinary workers, employees, etc. The main channel for building up dynamic abilities and foresight competencies of educational enterprises and specialists, as well as the focus of foresight research in modern science and management practice is working with human resources, with the human capital of firms, communities, and countries.

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## АДАМИ РЕСУРСТАРДЫ БАСҚАРУ ЖӘНЕ БІЛІМ БЕРУ МЕКЕМЕЛЕРІНІҢ ДИНАМИКАЛЫҚ ҚАБІЛЕТТЕРІ: ПСИХОЛОГИЯЛЫҚ, ӘЛЕУМЕТТІК ЖӘНЕ ЭКОНОМИКАЛЫҚ ӘСЕРЛЕР

**Аннотация.** Мақала білім беру мен білім беруді басқарудағы адами капиталды жинақтау мен сақтау проблемалары контекстіндегі білім беру ұйымдарының динамикалық мүмкіндіктері теориясы мен жиынтық теориясына арналған. Білім беру ұйымдары мен мамандардың динамикалық қабілеттері мен форсайттық құзыреттерін қалыптастырудың, сонымен қатар қазіргі ғылым мен басқару тәжірибесінде форсайттық зерттеулердің негізгі арнасы адами ресурстармен, фирмалармен, қауымдастықтармен және елдердің адами капиталдарымен жұмыс жасау болып табылады. Бұл жұмыс сонымен қатар қоғамдастықтардағы қарым-қатынас мәдениетін, оның ішінде мемлекет, қоғам және бизнес мәдениетін жақсартуға бағытталған әлеуметтік және мәдени капиталды жұмысты қамтиды. Әлемдік әлеуметтік дамудың қоғамның экономикалық, әлеуметтік және рухани салаларында инновациялық компонентті жоғарылатуға бағдарлануы адам капиталын әртүрлі құндылықтар мен деңгейлер жүйелерінің әлеуметтік-экономикалық дамуындағы жетекші және шешуші фактор ретінде тануға әкелді. Ғалымдар нарықтық жаһандану мен экономикалық қатынастардың трансұлттық жағдайында, сондай-ақ заманауи бизнес-процестердің интеллектуалды деңгейінің, адами капиталдың және бизнестегі және басқа да салалардағы білімнің әр түрлі деңгейлердегі ұлттық экономиканың бәсекеге қабілеттілігінің шешуші факторы болып табылатындығын атап өтті. Бұл мәселе әсіресе оқу орындарының динамикалық қабілеттерін және оларды басқаруды зерттеуде байқалады. Бұл сәт, әсіресе, форсайт зерттеулерінде және білім беру ұйымдарының өткен, қазіргі және болашақтағы қайта құрылуында ерекше байқалады. Егер ұйым өзгеріп жатқан нарықтар мен технологиялар жағдайында өзін қолдауы керек болса, білім беру ұйымының серпінді мүмкіндіктері айрықша маңызды. Олар бәсекелес фирмалар білім беру жүйесінің кез-келген немесе барлық міндеттерін орындауда оған қарағанда күшті болған кезде маңызды. Форсайт - экономика және өндіріс, әлеуметтік-мәдени даму және білім саласындағы басымдықтарды өзгерту тәсілдерінің жүйесі. Білім берудегі адам ресурстарын басқару білім беру кәсіпорындарының динамикалық мүмкіндіктерінің маңызды бөлігі болып табылады. Кадрларды іріктеу, даярлау, қайта даярлау және дамытуды басқару, кәсіби және мансаптық өсуді басқару технологияларын қалыптастыру және байыту динамикалық және тұрақты дамып келе жатқан кәсіпорынның табиғи бөлігі болып табылады. Жетекші аспект ретінде білім беру кәсіпорнын дамытудың болжамына ұйым қызметкерлерінің кәсіби және мансаптық әлеуетін жалпы бағалау, сонымен қатар ұйым басшысының динамикалық қабілеттері (оның қызметін әртараптандыру, оқыту және қайта даярлау қабілеті және т.б.) және басқа мамандар кіреді. Зерттеудің мақсаты - адами капитал проблемалары контекстінде білім беру кәсіпорындары мен мамандарының білім беру ұйымдарының динамикалық қабілеттерінің (құзіреттерінің) құрамдас бөлігі ретінде форсайттық құзіреттіліктерді талдау. Форсайт кәсіпорынның мета-технологияларын («күнделікті») қолдану мен қайта құруды және өндіріс пен өндірістік қатынастар саласындағы инновацияны қамтиды. Ол өзгеріс маркерлерін бөлуге және қолдануға бағытталған - болашақ және ықтимал өзгерістердің әлсіз және күшті белгілері. Білім беру саласындағы өзгерістерді, соның ішінде оқу орнын басқарудың күнделікті немесе мета-технологиясын қолдану мен модификациялауды белсенді және дәл анықтау, «болжанбайтынды» болжауға ғана емес, күш, материалдық, ақыл-ой және рухани ресурстарды аз жұмсау арқылы түзетуге араласуға мүмкіндік береді. Сонымен қатар, бұл сізге білім беру және оған қатысты нарықтар мен тұтастай алғанда оқу орнының айналасындағы шындыққа әсер етуге мүмкіндік береді. Біліктілік пен қабілеттердің алдын-ала болжауының арқасында білім беру саласындағы маман және оның мекемесі қоршаған ортадағы өзгерістерге нәтижелі бейімделеді (нарық пен қоғам), сонымен бірге оны өзгертуге қатысады.

**Түйін сөздер:** адами ресурстар, менеджмент, адами капитал, адами капиталды дамытуды басқару, динамикалық мүмкіндіктер, білім беру ұйымдары, білім беру, форсайт, жоспарлау, жаңашылдық, мета-технологиялық форсайт, құзіреттілік.

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### УПРАВЛЕНИЕ ЧЕЛОВЕЧЕСКИМИ РЕСУРСАМИ И ДИНАМИЧЕСКИЕ СПОСОБНОСТИ ОБРАЗОВАТЕЛЬНЫХ УЧРЕЖДЕНИЙ: ПСИХОЛОГИЧЕСКИЕ, СОЦИАЛЬНЫЕ И ЭКОНОМИЧЕСКИЕ АСПЕКТЫ

**Аннотация.** Посвящена теории динамических возможностей образовательных учреждений и теории форсайта в контексте проблем накопления и сохранения человеческого капитала в образовании и управлении образованием. Основным каналом формирования динамических способностей и форсайт-компетенций образовательных предприятий и специалистов, а также направлением форсайт-исследований в современной науке и практике управления является работа с человеческими ресурсами, с человеческим капиталом фирм, сообществ и стран. Эта работа также включает работу с социальным и культурным капиталом, направленную на улучшение культуры взаимоотношений в сообществах, включая культуру государства, общества и бизнеса. Ориентация мирового общественного развития на повышение инновационной составляющей в экономической, социальной и духовной сферах общества и в его образовании привела к признанию человеческого капитала как ведущего и решающего фактора социально-экономического развития систем различного значения и уровня. Ученые отмечают, что в современных условиях глобализации рынков и транснационализации экономических отношений, а также значительного уровня интеллектуализации современных бизнес-процессов, человеческого капитала и образования в бизнесе и в других сферах является решающим фактором конкурентоспособности национальной экономики на разных уровнях. Этот момент особенно заметен при изучении динамических способностей образовательных учреждений и управлении ими. Этот момент также особенно заметен в форсайт-исследованиях и других реконструкциях прошлого, настоящего и будущего развития образовательных организаций. Динамические возможности образовательной организации особенно значимы, если организация должна поддерживать себя в условиях изменения рынков и технологий. Они важны, когда фирмы-конкуренты сильнее ее в выполнении отдельных или всех стоящих перед системой образования задач. Форсайт - это система методов трансформации приоритетов в сфере экономики и производства, социально-культурного развития и образования. Управление человеческими ресурсами в образовании является важной частью проблемы динамических способностей образовательных предприятий. Управление отбором, обучением, переподготовкой и развитием персонала, формирование и обогащение технологий управления профессиональным и карьерным развитием являются естественной частью динамично и стабильно развивающегося предприятия. Форсайт развития образовательного предприятия как ведущего аспекта включает общую оценку профессионального и карьерного потенциала сотрудников организации, а также динамических способностей руководителя организации (его способности и желания разнообразить деятельность, обучение и переподготовку, и др.) и другие специалисты. Цель исследования – анализ форсайт-компетенций как компонента динамических способностей (компетенций) образовательных предприятий и специалистов образовательных предприятий в контексте проблем человеческого капитала. Форсайт предполагает использование и преобразование мета-технологий («рутин») предприятия и инноваций в области производства и производственных отношений. Он направлен на выделение и использование маркеров изменений – слабых и сильных сигналов будущих и вероятных изменений. Активное и точное выявление этих маркеров изменений в образовании, включая применение и модификацию рутинной или мета-технологии управления образовательным учреждением, позволяет не только прогнозировать «непредсказуемые», но и вмешиваться в ход процесса, исправляя их с наименьшими затратами силы, материальные, умственные и духовные ресурсы. Кроме того, он позволяет влиять на образовательный и смежные с ним рынки и окружающую действительность учреждения образования в целом. Благодаря предвидению компетентности и способностей, специалист в области образования и его учреждение не только продуктивно адаптируются к изменениям в окружающей среде (рынок и общество), но также участвуют в ее изменении.

**Ключевые слова:** человеческие ресурсы, управление, человеческий капитал, управление развитием человеческого капитала, динамические возможности, обучающиеся организации, образование, предвидение, рутина, инновация, мета-технологическое предвидение, компетенция.

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## **INSTITUTIONAL TRIAL OF MINORS CONDEMNED: INTERNATIONAL EXPERIENCE**

**Abstract.** The article presents the international positive experience of the probation service for juvenile convicts in the post-prison period, orienting the convict in the process of social adaptation to independent development. An individual who cares about his family and close relatives, benefits the state and society through labor, is a law-abiding citizen who meets all the requirements and generally accepted principles of a legal, modern society and sovereign state.

The author of the article formulates the main conclusions, which determine that the main goal of “probation services” is to promote the successful social adaptation of persons of juvenile convicts released from prison. First of all, this assistance consists in rendering assistance to a juvenile convicted person in restoring socially useful ties, social welfare, employment, providing psychosocial, qualified legal and medical assistance, as well as preventing their recidivism.

The good practice of the Probation Service of such sovereign states of the World as the Republic of Kazakhstan, Finland, France, Germany, Sweden, Switzerland and Japan is presented.

**Key words:** Probation, post-prison probation in the Republic of Kazakhstan, social work in prisons in Switzerland, MIS Finland, Finnish Probation Service, post-prison adaptation of juvenile offenders, Japan Probation Service, MIS of Japan, international experience, The concept of the Federal Target Program for the Development of the MIS of Russia (2017–2025).

At present, the urgency of the problems of social adaptation of juvenile prisoners in the post-prison period in recent years in Russia is growing. But, unfortunately, there are no definite positive decisions yet.

Thus, in the Concept of the Federal Target Program for the Development of the MIS of Russia (2017–2025)<sup>1</sup>, the state structures of Russia, state authorities of the constituent entities of the Federation, public associations set specific goals for improving the work with people released from prison. Teenagers who have been freed from the penitentiary institutions of the FSIN of Russia often remain without social assistance and support from close relatives and, of course, the state itself. Often, juvenile offenders who are freed up cannot find work without hindrance, and many of them have no housing - and therefore there is no way to create their own family home. This “hopelessness” is a fundamental factor in involving juvenile convicts released from places of deprivation of liberty in the criminal environment. From this it follows that in Russia the reform of the post-prison process of adaptation of juvenile convicts released from places of deprivation of liberty is required. It should be based on new approaches focused on the socio-economic, political development of modern Russia [2, p.1-2].

Today, any civilized state of the world, such as England, the Netherlands, Norway, France, Germany, Finland, the Republic of Kazakhstan and Japan, is urging the development of a set of measures of a socio-economic, regulatory, political, and organizational-educational nature in order to socially-moral and moral recovery of society as a whole. This is due, first of all, to the fact that the fate of not only the people who have been released from places of deprivation of liberty, but also of the entire modern society of any sovereign state of the world, largely depends on the adoption by the state of the necessary and correct

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<sup>1</sup>The concept of the federal target program “Development of the penal system (2017 - 2025)” was approved by Decree of the Government of the Russian Federation of 23.12.20016 No. 2808-p.

decision. If today the state does not provide timely social, moral, psychological and qualified legal assistance to those who have freed themselves, then these people will lose their attempt to break out of the vicious circle of offenses. But, unfortunately, in Russia there is no system of social rehabilitation work with minors released from places of imprisonment. The spectrum of social technologies and social work with juvenile convicts, both in places of deprivation of liberty and in the post-prison period, was also insufficiently formed. Such a vacuum is the result of insufficient practice in Russia in working with this category of persons during penal and post-penitentiary periods of the formation of the personality of the convicted person [5, p.2-3].

According to statistics from the Federal Penitentiary Service of Russia in the Russian Federation, up to 300,000 convicted persons, including 70-95 minor convicts, are released from places of deprivation of liberty annually<sup>1</sup>. And for the most part these are people of working age (from 16 - 60 years old), who, by definition, must find their place among the law-abiding citizens of Russia. But on this path there are many problems that the freed person must solve on his own: lack of daily income for food, basic clothes, problems associated with permanent housing and registration, stable work and, consequently, income. However, at all times, no matter how complicated and difficult they may be, the choice of the further path of development has remained and remains for the person who has been released from prison.

Therefore, once having violated the law, a person sentenced to a real term of imprisonment should, from the very beginning of serving a criminal sentence, think about what awaits him after his release from the penitentiary institution of the Federal Penitentiary Service of Russia. If possible, he must do everything possible to ensure that he maintains ties with his family, friends, and labor collectives in which he worked until the commission of the criminal offense [5, p.3].

So, according to Associate Professor P.V. Golodova (2011), the most common connotation of the term “probation” is associated with its activity in the execution of criminal sentences that are not related to isolation of an individual from society. “Probation” means criminal supervision or criminal custody of a convicted person. In the legal systems of foreign countries of the world, this criminal-legal institute presents the possibility of adopting alternative forms of punishment for committed criminal offenses, in return for the actual deprivation of liberty of the convicted person, naturally, if there are grounds established by law. In this meaning, “probation” covers the “pre-trial stage”, the stage of “sentencing from criminal measures” (impact), as well as the final “post-prison” stage [6].

***From international good practice:***

For example, in **Finland**, employees of all penitentiary institutions deal with the social adaptation of juvenile offenders. Social adaptation consists in establishing business contacts with social security and employment bodies of local municipalities and other state and non-state institutions (charitable foundations and religious organizations). They begin to carry out this work from the moment the court determines the teenager in the institution of the penal system of Finland.

An important component of this activity is the preservation of a place for his or her residence for a period of serving a minor by a criminal punishment or receiving such after release from places of deprivation of liberty. Also, the social worker of the penitentiary institution of the penal system of Finland, together with the employment authorities, is trying to find an opportunity for training, subsequent employment of the released person. He also helps in matters related to the communication of a minor convict with his family or the restoration of socially useful relations in society.

Despite this, some minors are released from places of deprivation of liberty without any prospect of finding a job, applying for studies or obtaining permanent residence and registration at the place of residence. The problem with housing and further employment in orphans is especially acute. Under Finnish law, under parole for minors released from places of deprivation of liberty, total supervision may be established for the period of not served part of the criminal punishment in the educational colony.

The main objective of the Finnish Probation Service is determined by the implementation of adequate comprehensive assistance - for example, legal advice of various kinds; the implementation of qualified psychological support for the convict throughout the term. And also this help consists in restoration of socially useful relations with relatives and friends; in resolving issues on reconciliation of the parties through

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<sup>1</sup>Analytics and Statistics of the Federal Penitentiary Service of Russia. [Electronic resource] / access mode: <http://fsin.su> (accessed date: December 25, 2019).



restorative justice. And, of course, such issues as housing, the issue of further education and professionalization, as well as the issue of employment of a convicted teenager and much more, do not go unnoticed [4, p.116-117].

In the **French** criminal theory on the nature and purpose of punishment, two main concepts compete: 1) "perfect neoclassicism"; 2) "new social protection".

So, according to Professor I.D. Kozochkina (2003), Professor N.E. Krylova (2012), punishment is the norm of public reaction to the commission of a criminal act, traditionally pursuing two main goals: "retaliation" and "intimidation"<sup>1</sup>. In this regard, the punishment should be "painful" and "painful" for the criminal as much as the grave act committed by him in relation to other persons or their property.

Representatives of another concept (M. Ansel) oppose such an interpretation. As the main goals of punishment, they consider the education of a juvenile offender and his social adaptation after release from prison. Thus, social protection should primarily pursue the goal of returning the convicted person to society, but with a different model of behavior in relation to society, individuals and their property [4, p.120].

The execution of sentences against juvenile offenders in France is monitored by the Office of the Judicial Defense of the Fifth Republic. Juvenile offenders are placed for 6 - 12 months in educational hostels - emergency accommodation centers and closed educational centers [13, p.14-15].

Priority is given to socio-pedagogical and corrective measures before criminal prosecution. The main goal of providing social, psychological and educational assistance to adolescents who are in the Educational Center is to prepare a more or less socialized person who is self-orientated in all vital social issues in society in the post-prison period [11, p.32-33].

Much attention in the socio-pedagogical work with juvenile convicts is given to leisure (cultural events held in educational centers). This is the key to successful re-socialization of juvenile convicts in prisons [10]. With the support of the Ministry of Culture and the Ministry of Youth and Sports of France, the Center's pupils have free access to cultural values (libraries, meetings with creative groups, museums), as well as their active involvement in sports [7, 11, p.32].

Also, in the French criminal justice system, short-term trips of juvenile offenders outside the penitentiary institution for family reasons are currently practiced - to meet with a possible employer after release. In addition, a convicted person can be released from punishment for a crime if he proves to the court that he has fully adapted to conditions outside places of deprivation of liberty, and the damage caused by him will be 100% compensated to the injured party. Thus, 60% - 70% of juvenile convicts serving more than 2/3 of the term of criminal punishment in the form of imprisonment are released on parole, which positively characterizes the work of the prison system in France in relation to convicts [4, p.121].

Of particular interest to the MIS of Russia is also the positive experience of **Germany**. It is well known that the criminal law of Russia has historically developed under the influence of the Romano-German legal system, and this could not but affect the domestic criminal executive legislation and the practice of its application in the current period [4, p.116-117].

In Germany, juvenile offenders are treated more humanely and, as a rule, they are sentenced to real terms of imprisonment not exceeding five years. The criminal liability of juvenile offenders in Germany is regulated by the German Penal Code and the Law on Juvenile Justice §3. They, in turn, regulate the basic doctrine of criminal punishment and the execution of criminal sentences against juvenile convicts in Germany.

All penitentiary institutions in Germany for juvenile convicts for household equipment and hygienic rules for the maintenance of these institutions comply with the norms and rules for the maintenance of convicts in isolation from society. There are three main prison regimes: 1) "enhanced"; 2) "ordinary"; 3) "open". Being in the third - "open" regime of detention, convicts have the right to leave the penitentiary institution, visit relatives and friends, go to the city to study (professional lyceum) and attend (temporary) work lasting no more than 4 hours a day.

The personality of the convict in places of deprivation of liberty is not subjected to suppression; here they teach to respect the opinions of peers of convicts and jointly make important decisions in these situations.

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<sup>1</sup>See: Criminal law of foreign states. / Ed. and with the foreword: I.D. Kozochkina - M.: Omega-L, IMPE named after A.S. Griboedova, 2003. - 576 p. ISBN: 5-88774-057-4; 5-901386-60-4.

While imprisoned, convicted adolescents have the right to freely receive general (secondary) education, a profession, and also to prepare for independent life outside places of deprivation of liberty. Technologies for restorative justice have been adapted in all the penitentiary institutions of the Federal Republic of Germany - a minor convicted person has the opportunity to establish relations with the injured party and, if possible, to compensate for the damage caused to it. These programs (technologies) are not implemented under coercion of the parties, which makes it possible for the guilty party to first realize the deed, and then independently decide on the reconciliation of the parties, make every effort to solve the problem.

The expected effect is that the individual, firstly, is released without unnecessary mental burden and tension (any anger) on the current life situation; secondly, receives forgiveness from the injured party, which from a moral point of view facilitates the mental burden of the offender; thirdly, a teenager gets the opportunity of communicative practice, which is useful in the first post-prison period. Thus, the task of the penitentiary institutions of Germany for juvenile convicts is not so much totally punitive measures as educating the personality of a teenage convict, preparing him for an independent and law-abiding life in modern German society [4, p.116].

It can also be stated that the institute of social workers was created and operates in Germany, which already during the period of serving a criminal sentence of deprivation of liberty helps to establish socially useful relations of the convict with his relatives and relatives.

To solve the problem of employment of juvenile convicts, the administration of the educational colony establishes contacts with various employers, making them interested in the fact that each week they can invite the number of workers that they need at a given time. All these measures contribute to the preservation of labor skills of adolescents, as well as maintaining communication with the outside world. In addition, juvenile convicts who are released from the educational colony receive money from the institution to travel to their place of permanent residence, necessary food, and, if necessary, clothes purchased with funds that they deposited into their personal account during the entire term of serving the sentence in places of imprisonment [4, p.116–117].

The social workers of all German penitentiary institutions orient the convicted colony to maintaining existing socially useful contacts with relatives and relatives, which he could count on in the present period and in the future. The teenager also finds new contacts through authorized correspondence, phone calls, video chatting on Skype with relatives and friends, friends at school. A juvenile convict in a colony gets the opportunity to visit his parents and close relatives; attending cultural events outside the colony; getting the opportunity to go home on a short vacation 1 - 3 days [11, p.30].

The main task of all penitentiary institutions for juvenile convicts in **Switzerland** is to bring the organization of social work closer to the family education of convicted and street children.

Priority in institutions is given to socio-pedagogical and socio-psychological methods of working with juvenile offenders, much attention is paid to the role of religion in the re-socialization of a minor, as well as to creative, creative education in conditions of total isolation of the individual from society.

For social work in Swiss penitentiaries, a differentiated approach is characteristic of juvenile convicts:

- 1) adaptation cells (separate sections - quarantine) in prisons for new juvenile prisoners;
- 2) separate cells for convicts under more serious articles of the Swiss Criminal Code (1977, edition April 2002) - murder, rape, hostage-taking, terrorism, etc.

In turn, for minor convicts suffering from various addictions, for example, from psychotropic and narcotic substances, special correctional programs are designed for up to 1 year. Further, the minor convicted person will be transferred to the regular regime of stay in the penitentiary institution of the penal correctional system of Switzerland [11, p.30].

In most European countries, the principle of “employment” is laid as the basis for organizing the educational process in penitentiaries for juvenile convicts, which is based on the idea of engaging a teenager with some useful business on an ongoing basis. At the same time, a complex combination of various forms of work with juvenile convicts is used to organize the socio-pedagogical process.

These are the measures applied to juvenile offenders in educational centers:

- 1) general and vocational training;
- 2) sports activities (football, volleyball, basketball, athletics and weightlifting, swimming in the pool, chess);

3) socially useful work (cleaning the territory of the colony, cleaning of residential and non-residential premises of the educational center);

4) the socio-psychological support of the teenager throughout the entire period of stay in the penitentiary institution (colony);

5) the maintenance and development of the remedial education of juvenile convicts;

6) leisure classes in circles and sections on interests - photo-video, computer science, mathematics, robotics, visual arts and much more [12, p.176–177].

In **Sweden**, there are private and municipal rehabilitation centers for juvenile prisoners released from prison. In these institutions, for a small fee or free of charge maladaptation<sup>1</sup>, adolescents receive housing and meals until the issues of their employment and household arrangements are resolved.

In addition, municipal local authorities in their subordinate territory maintain at their own budget “lodging houses” (social hotels) to provide immediate assistance to adolescents who find themselves in difficult situations, the so-called “Street Children”. The adolescent’s placement in rehabilitation centers and “lodging houses” depends on the will of the convicts themselves.

It can also be noted that the probation officers of Sweden actually begin to work with their future supervised persons even in the penitentiary institution - at the final stage of serving a criminal sentence [4, p.118].

A probationary social worker sends a minor convict to a rehabilitation center and provides all the information about a teenager. These are all life circumstances, problems in the family of the offender, the socio-psychological and physical condition of the minor, as well as the personal characteristics of the convicted person.

According to the Law on Probation Service, as part of juvenile probation in Sweden, a juvenile offender initially receives qualified assistance and support from a social worker from the moment he is involved in criminal proceedings [11, p.32–33].

Undoubtedly, the experience of the **Swiss** penitentiary institutions is also interesting, which, at the final stage of serving a juvenile convict with a criminal sentence of imprisonment, practice the use of electronic bracelets for those released from the educational colony. This experience is aimed at convicts preparing to be released from prison in 6-8 months. In the penal system of Switzerland, this practice is also actively used for the conditional release of minors, as well as for prisoners sentenced to probation from 6 months to three years.

A student in a correctional colony has the opportunity to move freely around the penitentiary institution and even visit municipal organizations and services that implement issues related to the social adaptation of a minor convict in the post-prison period, as well as visit the library and other cultural and educational organizations of the municipality (prefecture).

This area of activity of the administration of the penitentiary institution is combined with an individual program for the social adaptation of the convict and his successful reintegration into modern Swiss society [4, p.118].

In the **Republic of Kazakhstan**, the Probation Institute is considered as the *best alternative* to imprisonment. It contributes to the most painless rehabilitation of a minor convict, without exposing it to the destructive influence of the institution of the penal system of the Republic of Kazakhstan, while maintaining the real prospect of correcting a certain category of offenders with a predisposition to replenish the prison population [8, p.94].

For the first time in national legislation, the concept of “probation” was included in the Law of the Republic of Kazakhstan dated February 15, 2012 “On Amending and Adding to Some Legislative Acts of the Republic of Kazakhstan on the Issues of Probation Service”, and in law enforcement practice it began to be implemented in the form of probation control established by in relation to conditionally convicted citizens of the Republic of Kazakhstan. The implementation of probation control is entrusted to the probation service of the Republic of Kazakhstan, created in the structure of criminal executive inspections [8, p.94].

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<sup>1</sup>Social maladaptation is the complete or partial loss by the subject of his ability to adapt to the conditions of society. That is, this is a violation of the relationship of a person with the environment, which is characterized by the impracticability of his positive social role in certain social conditions, corresponding to his potential. Social maladaptation is characterized by several levels that reflect its depth: latent manifestation of maladaptation phenomena, maladaptive “perturbations”, destruction of previously formed adaptive mechanisms and connections, entrenched maladaptation. See: Stoimenov Y.A., Stoimenova M.Y., Koeva P.Y. (2003) Psychiatric Encyclopedic Dictionary. - K.: "IAPM", 2003. - P.969. - 1200 p. ISBN: 966-608-306-X.

Penitentiary probation is carried out in respect of juvenile convicts serving a criminal sentence of imprisonment in institutions of the penal system of the Republic of Kazakhstan, and is expressed in the development and implementation of a set of socio-educational and socio-psychological measures aimed at their re-socialization and preparation of the convicted person for release [8, p.96].

In its turn, “Post-Penitentiary Probation in the Republic of Kazakhstan” is an activity to develop and implement a set of measures in relation to persons released from places of deprivation of liberty, with the aim of their successful reintegration into modern society of the Republic of Kazakhstan. Depending on the grounds for the release of a person from serving a criminal sentence of imprisonment and the personal characteristics of those released, post-prison probation is carried out in respect of them in various forms [3].

Thus, at the state level, in order to create a national system for the comprehensive re-socialization of persons released from places of deprivation of liberty and registered with the probation service of the Republic of Kazakhstan. Today, all the necessary conditions are created for its effective implementation, which contributes to a significant reduction in the level of recidivism in adolescents throughout the sovereign state of the Republic of Kazakhstan.

So, by Decree of the President of the Republic of Kazakhstan dated December 8, 2016 No. 387, the “Comprehensive strategy for the social rehabilitation of citizens released from places of deprivation of liberty and registered by the probation service in the Republic of Kazakhstan for 2017 - 2019 was adopted” [1]. This Comprehensive Strategy is aimed at eliminating the prerequisites for social maladaptation while the probation service is registered [8, p.96-97].

In the countries of the Asian continent, for example, in **Japan**, a specialized system of closed correctional institutions has been created for minors and young convicts of different ages (“primary” - for 14–16 years old, “middle” - for 16–20 years old and “senior” - for 20 - 23 years old). The head of the institution’s psychological service is liaising with relatives and friends who would be able to provide assistance and support to a relative in prison at all stages of the execution of the criminal sentence [11, p.35-36].

Lawyers, scientists and other specialists explain this phenomenon by the fundamental factors restraining the growth of crime - the effectiveness of legislation and the activities of Japanese law enforcement agencies. In the implementation of total and public control over crime, an important role is played by measures aimed at the successful social adaptation of people released from prison in Japan. The purpose of these measures is to prevent the formation of a complex of "social outcast", "criminal personality" among juvenile convicts [4, p.118–119].

Also in Japan, the issues of preparing juvenile convicts for release from penitentiary institutions are regulated by the following laws: “On probation of Japan”, “On post-prison guardianship of Japan”, “On post-prison custody of released prisoners in Japan” [4, p.119–220].

A significant role in assisting and supporting juvenile offenders in the post-prison period is played by Japanese society and its state and non-governmental organizations (Charitable Organizations).

One of the largest organizations is the Japan Convict Rehabilitation Assistance Association. Its branches are available in almost every prefecture in 47 administrative units of Japan. On her initiative, special dormitories (social hotels) are created separately for adult and minor convicts released from places of deprivation of liberty (half-open type houses with all amenities for living and housekeeping).

Such assistance in social rehabilitation is carried out only if a minor convict applies for it. This help consists in organizing free accommodation in a hostel, three meals a day, as well as with all necessary treatment (restoration of physiological and psychological health) of the convicted person. Assistance also consists in organizing leisure time, in placing teenagers at work or studying at a vocational school, if possible, and in providing material and socio-psychological assistance to him and his dysfunctional family [4, p.220].

All necessary social and rehabilitation assistance is provided to a minor convict in a rehabilitation center for six months from the date of release from the penal institution of the penal correctional system in Japan. If necessary, this period may be extended by 8 to 10 months at the discretion of the administration of the Center. When making this decision, all life circumstances, the state of the teenager's family, as well as his readiness for an independent life, are taken into account.

All juvenile convicts at the Rehabilitation Center work in nearby, usually small, production facilities, and also attend classes at school or in vocational schools. Some of the convicts are engaged in cleaning up the territory, gardening, repairing clothes and shoes, and other economic affairs of the Center. Their work

is also paid monthly. Employees of the Centers of Japan seek immediately upon arrival of a teenager in the Center to find him a job taking into account mental and physical capabilities, as well as create a different social environment for the convicted person, provide social, psychological, medical and qualified legal assistance [4, p.221–222].

**Conclusions.** In the above-mentioned foreign countries, “probation services” were created primarily to ensure public safety, to work with persons serving criminal sentences in places of deprivation of liberty, as well as to provide assistance and support to prisoners and released from places of deprivation of liberty. The main goal of “probation services” is to promote the successful social adaptation of persons of juvenile convicts released from prison. This assistance consists in rendering assistance to a juvenile convicted person in restoring socially useful ties, social welfare, employment, providing psychosocial, qualified legal and medical assistance, as well as preventing their recidivism [8, 10].

In the course of the study, we revealed that at the present time, from the point of view of achieving the goals of punishment, the issue of ensuring the post-prison adaptation of juvenile convicts and preventing recidivism in adolescence is of significant importance. This is especially important due to the fact that there is no proper system for individual prevention of relapse in teenagers, as well as a special pre-trial study of the identity of the juvenile offender to make recommendations to the court, in particular, to select a preventive measure or type of punishment in order to prevent excessive repressive measures.

In addition, at the present time, the relevant state bodies of the Russian Federation do not exercise proper control and supervision over the behavior of probationers and persons released on parole. Today in Russia there is no mechanism for providing social and rehabilitation assistance and support to persons released from places of deprivation of liberty. The result of the lack of activities for the social rehabilitation of juvenile convicts released from PKU “Educational Colony” of the Federal Penitentiary Service of Russia, as well as the problematic post-prison adaptation of all persons released from prison. The result is their socio-psychological degradation - and, as a result, the spread of recurrent juvenile delinquency in modern Russian society [5, p.3].

It can also be noted that the social adaptation of juvenile convicts in the post-prison period has a preventive, rehabilitation and restorative character. Implementing the basic components in the penitentiary institution of the Federal Penitentiary Service of Russia and beyond, it can be confidently asserted that all the work done by the staff and the administration of the “Educational Colony” of the Federal Penitentiary Service of Russia can be aimed at the socio-economic, cultural, moral, psychological and legal well-being of the convicted.

All this will directly increase the “chances” of successful social adaptation of the convicted person in the post-prison period, and then the successful reintegration of the individual into modern competitive Russian society. We are convinced that the process of introducing minors sentenced from prison to social environment should be not only voluntary, but also compulsory (control, supervision, etc.) [9, p.403-424].

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### **КӘМЕЛЕТКЕ ТОЛМАҒАН СОТТАЛҒАНДАРДЫҢ ИНСТИТУЦИОНАЛДЫҚ ПРОБАЦИЯСЫ: ХАЛЫҚАРАЛЫҚ ТӘЖІРИБЕ**

**Аннотация.** Мақалада Халықаралық оң тәжірибе пробация қызметі кәмелетке толмаған сотталғандарды постпенитенциарный кезеңінде, ориентирующий сотталған адамның әлеуметтік бейімделу үдерісінде өз бетінше дамуы. Өз отбасына және жақын туыстарына қамқорлық жасайтын, мемлекет пен қоғамға пайда әкелетін жеке адамның, заңға мойынсұнушы азаматтың құқықтық, қазіргі заманғы қоғам мен егеменді мемлекеттің барлық талаптары мен жалпыға бірдей қабылданған қағидаттарына жауап беретін жеке адамның құқықтары мен заңды мүдделерін қорғау болып табылады.

Түрмеден кейінгі кезеңде кәмелетке толмаған сотталғандардың әлеуметтік бейімделуі профилактикалық және оңалту сипатына ие. Ресей Федерациясының пенитенциарлық қызметінің пенитенциарлық мекемесіндегі негізгі компоненттерді іске асыра отырып, Ресей Федералды Қылмыстық атқару қызметі колониясының

қызметкерлері мен әкімшілігі жасаған барлық жұмыстар әлеуметтік-экономикалық, мәдени, адамгершілікке бағытталған болуы мүмкін деп сеніммен айтуға болады.

Мұның бәрі түрмеден кейінгі кезеңде сотталушының сәтті әлеуметтік бейімделуінің, содан кейін жеке тұлғаның қазіргі заманғы бәсекеге қабілетті ресейлік қоғамға сәтті интеграциялануының «мүмкіндіктерін» арттырады, ал сотталған кәмелетке толмағандарды әлеуметтік ортаға енгізу процесі тек ерікті ғана емес, сонымен бірге міндетті де болуы керек. (бақылау, қадағалау және т.б.).

"Пробация қызметінің" негізгі мақсаты бас бостандығынан айыру орындарынан босатылған кәмелетке толмаған сотталған адамдардың табысты әлеуметтік бейімделуіне жәрдемдесу болып табылады. Ең алдымен, бұл көмек кәмелетке толмаған сотталғанға әлеуметтік-пайдалы байланыстарды қалпына келтіру, әлеуметтік-тұрмыстық, еңбекке орналастыру, әлеуметтік-психологиялық, білікті заңгерлік және медициналық көмек көрсету, сондай-ақ олардың рецидивті қылмыс жасауының алдын алу болып табылады.

Қазақстан Республикасы, Финляндия, Франция, ГФР, Швеция, Швейцария және Жапония сияқты әлемнің егеменді мемлекеттерінің пробация қызметінің оң тәжірибесі келтіріледі.

Жоғарыда аталған шет мемлекеттерде «пробация қызметі» ең алдымен қоғамдық қауіпсіздікті қамтамасыз ету, бас бостандығынан айыру орындарында қылмыстық жазасын өтеп жатқан адамдармен жұмыс жасау, сондай-ақ бас бостандығынан айыру орындарынан босатылған сотталушыларға көмек пен қолдау көрсету үшін құрылды. «Пробация қызметінің» басты мақсаты - кәмелетке толмағандарды босатуға сотталған адамдардың сәтті әлеуметтік бейімделуіне ықпал ету. Бұл көмек кәмелетке толмаған сотталушыға әлеуметтік пайдалы қатынастарды қалпына келтіруге, әлеуметтік қамсыздандыруға, жұмысқа орналастыруға, психоәлеуметтік, білікті заңгерлік және медициналық көмек көрсетуге, сондай-ақ олардың рецидивті болдырмауға көмек көрсетуден тұрады.

**Түйін сөздер:** Пробация, Қазақстан Республикасында постпенитенциарлық пробация, Швейцарияның пенитенциарлық мекемелеріндегі әлеуметтік жұмыс, Финляндия ҚАЖ, Финляндияның пробация қызметі, кәмелетке толмаған сотталғандарды оқудан кейінгі бейімдеу, Пробация қызметі Жапония, Жапония ҚАЖ, халықаралық тәжірибе, Ресей ҚАЖ-ды дамытудың Федералдық мақсатты бағдарламасының тұжырымдамасы (2017-2025).

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### **ИНСТИТУЦИОНАЛЬНАЯ ПРОБАЦИЯ НЕСОВЕРШЕННОЛЕТНИХ ОСУЖДЁННЫХ: МЕЖДУНАРОДНЫЙ ОПЫТ**

**Аннотация.** В статье представлен международный положительный опыт службы пробации несовершеннолетних осуждённых в постпенитенциарный период, ориентирующий осуждённого в процессе социальной адаптации на самостоятельное развитие. Индивида, заботящегося о своей семье и близких родственниках, приносящего пользу государству и обществу трудовой деятельностью, законопослушного гражданина, отвечающего всем требованиям и общепринятым принципам правового, современного общества и суверенного государства.

Социальная адаптация несовершеннолетних осуждённых в постпенитенциарный период имеет профилактический, реабилитационный и восстановительный характер. Внедряя базовые компоненты в пенитенциарном учреждении Федеральной службы исполнения наказаний России и за ее пределами, можно с уверенностью утверждать, что вся работа, выполняемая сотрудниками и администрацией «Образовательной колонии» Федеральной службы исполнения наказаний России, может быть направлена на социально-экономическое, культурное, моральное, психологическое и правовое благополучие осуждённых.

Все это напрямую увеличит «шансы» на успешную социальную адаптацию осуждённого в послевоенный период, а затем на успешную реинтеграцию личности в современное конкурентное российское общество, при этом процесс введения несовершеннолетних, осуждённых из тюрьмы, в социальную среду должен быть не только добровольным, но и обязательным (контроль, надзор и т. д.).

Автором статьи формулируются основные выводы, в которых определяется то, что основной целью «служб пробации» является содействие успешной социальной адаптации лиц несовершеннолетних осуждённых, освободившихся из мест лишения свободы. Прежде всего, данное содействие заключается в оказании несовершеннолетнему осуждённому помощи в восстановлении социально-полезных связей, социально-бытовом, трудовом обустройстве, оказании социально-психологической, квалифицированной юридической и медицинской помощи, а также предупреждение совершения ими рецидивных преступлений.

Приводится положительная практика Службы пробации таких суверенных государств мира, как, Республика Казахстан, Финляндия, Франция, ФРГ, Швеция, Швейцария и Япония.

В вышеупомянутых зарубежных странах «службы пробации» были созданы в первую очередь для обеспечения общественной безопасности, работы с лицами, отбывающими уголовные наказания в местах лишения свободы, а также для оказания помощи и поддержки заключенным и освобожденным из мест лишения свободы. Основная цель «службы пробации» заключается в содействии успешной социальной адаптации лиц, осужденных за освобождение несовершеннолетних. Эта помощь заключается в оказании помощи несовершеннолетнему осужденному в восстановлении общественно-полезных связей, социальном обеспечении, трудоустройстве, оказании психосоциальной, квалифицированной юридической и медицинской помощи, а также в предотвращении их рецидивизма.

**Ключевые слова:** пробация, постпенитенциарная пробация в РК, социальная работа в пенитенциарных учреждениях Швейцарии, УИС Финляндии, Служба пробации Финляндии, постпенитенциарная адаптация несовершеннолетних осужденных, Служба пробации Японии, УИС Японии, международный опыт, Концепция Федеральной целевой программы Развития УИС России (2017–2025).

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## **PROBLEMS OF CONTEXT AND CONCEPTUAL MANAGEMENT IN EDUCATION: PSYCHOLOGICAL, SOCIAL AND ECONOMICAL ASPECTS**

**Abstract.** The purpose of the article is a brief description of the experience of analyzing the conceptual foundations of governance in education and other spheres in post-Soviet Russia in comparison with developed democracies; a description of typical approaches to the implementation (imitation) of strategic planning in management, as well as the consequences and specific traits of contextual, a-strategic management. Conceptual management in education and in the context of others is oppose to contextual management. Modern management concepts are externally presented in Russian education and in other areas of management discourse and practice. The system of professional standards developed in the country is designed to solve a number of managerial tasks. However, the non-conceptual use of professional standards leads to an imbalance in subject-object interaction and in organization in whole. This article lists two categories of workers. Non-compliance with the professional requirements is typical to the first category of workers. Failure to comply with professional standards also take part to the professional, partners and personal deformations. These deformations are illustrated by the text of management strategies. Having strategies is an incentive for development. However, the lack of an algorithm for the compilation and evaluation of such documents, the analysis of the importance of this aspect in the process of evaluating the activities of authorities leads to the fact that this strategic management remains unclaimed in the territorial and organizational management system. The authors consider two leading aspects of the problem of territorial strategization: (1) substantiation of the reasons for poor-quality strategic developments; (2) the search for errors in the conceptual management methodology. The roots of the first problem should be found in the imbalances in the formation and development of the subject of management, starting with the problem of improper selection and de-professionalization of managerial personnel. To solve the second problem, the authors propose SEO analysis tools as a methodology for evaluating strategy texts. This tool solves the problem of audit of regional strategies in the context of administrative, socio-psychological and linguistic aspects of public servants in the field of education. The data obtained can also be disseminated to non-governmental educational institutions: in particular, in additional or global education it is extremely important to know its subject, object, purpose and objectives, etc. Otherwise, as in the case of state educational institutions, imitations will arise that are more likely to harm education and society than support it.

**Keywords:** education, human capital, human capital development, management, competence, professional standard, strategy.

**Introduction.** The bureaucratization of the scientific and educational environment of the university is a process of sociocultural changes associated with the transformation of the subculture of officials into the cultural mainstream of Russian society. Bureaucratization is anti-intellectual and anti-creative; it creates



serious barriers to intellectual and creative activity in the educational system (Babintsev & Rimsky, 2014). The practice of “effective managers” and imitation of innovation destroys education at all levels.

A characteristic feature of the development of many modern foreign and Russian universities, manifesting regardless of their status, is, unfortunately, the bureaucratization of the management of scientific, educational and cultural-educational space. This is manifested in the form of a set of managerial practices affecting all aspects of the functioning of higher education institutions. In modern conditions, these practices significantly devalue the creative and intellectual component of the educational process.

In the works of B. Reedings, the “university in ruins” is described: the university of the “Humbolt type” (or the “German model” defined by classical German idealism) is essentially destroyed. “Humbolt University” has the goal of developing horizontal connections “professor - student”, “scientific research - teaching”, “production (critical and creative) of new knowledge - the transmission of new knowledge to students as subjects of civil society,” and thereby to a culture of mature Art Nouveau, where it plays the role of a “big narrative”, an ideology that legitimizes a nation-state and forms a national culture. He was replaced by the “University of Excellence.” the emphasis is not on “new knowledge”, but on its perfection, formal technologization and reproduction. In the place of the rector-scientist, as “the first among equal professors”, became the rector-administrator. The administrator stood at the top of the hierarchy of academic authority. The horizontal of a classical university has turned into a vertical. In it, students and professors took the foot of the pyramid, and “academic management” is busy reproducing epistemological and technological effectiveness, assessed in PR indicators and marketing ratings that allow the university to enter the global market for innovative educational services. The university has become a transnational business corporation; it is not interested in national culture and the state. A “perfection” itself means only a component of technology’s self-reflection. Such a university is a parasitic growth on resources similar to exchanges or insurance companies. The university essentially speculates on the difference in information. The bulk of the teachers remained and remain outside the economic and moral incentives for scientific innovation and quality work. Even famous scientists and important studies are ostracized.

There is the Soviet (pre-capitalist) “paradox M.K. Petrova” (a scientist who was not in demand neither in last Soviet time, nor now, who made a significant contribution to the development of science, including the study of the system of scientific innovations and communications). There is also the post-Soviet (capitalist) “paradox of V. Perelman”, which was expelled from work for not meeting the bureaucratic requirements of imitations because of the desire to do real science. This is due to deformations in the management of education and a management culture in capitalist Russia and the capitalist world as a whole.

There are such concepts, the use of which does not cause the requisite piety and does not give a priori effect in them. On the author's question addressed to the students of senior courses, which means the phrase “conceptual approach”, the answer, as a rule, does not follow. This happens, despite the fact that each discipline studied by students begins with the definition of its conceptual framework. Concept, conceptual approach, denotes a theoretical basis, the conceptual and methodological apparatus of research. The evolution of the term “concept” in Russian is seen in isolation from the philosophical tradition, beginning in the 1920s. This is understandable. The conceptual approach allows forming the ideology of relations and discoursing in a certain sphere. Initially and until the mid-1970's. The term “concept” was used as a synonym for the term “concept”. “Concept is a mental unit, an element of consciousness. Human consciousness is a mediator between the real world and language” (Dem'yankov, 2001: 38). By the end of the XX century there is a distinction between the terms “concept” and “conception”: the first term unifies the understanding by different subjects of the terminology used, the second goes into the category of simulacra. The fashion for the term “conception” in the scientific and fiction literature of the late twentieth and early twenty-first centuries “indicates an interest in the reconstruction of those essences in human life that we encounter in everyday life without thinking about their” true “(a priori) meaning” (Stepanov, 1996: 48).

### **Literature Review.**

*Theoretical background.* In Russian educational management the “conceptual approach” is one of the most sensitive issues that almost every day reflects in all the mass media in both within the country and abroad (Arpentieva, 2016; Panichkina, Burova, and Masych, 2016; Panichkina, and Masych, 2016; Panichkina, and Masych, 2017). A great number of research papers of such national scientists as V.A. Vittih, T.Yu. Bazarov, O. Anisimov, O.S. Vikhanskiy, M.R. Arpentieva, I.V. Gorelova, I.N. Gerchikova, R.A. Dubovitskiy, E.O. Kondratiev, E.A. Utkin, R.A. Fatahutdinov, E.A. Erokhina, D.S. Zhukov, S.K. Lyamin,

J. Varajão and many others (Arpentieva, and Gorelova, 2017; Arpentieva and Moiseeva, 2017; Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014; Gorelova, 2016; Gorelova, 2017a; Gorelova, 2017b; Demyanenko, 2016; Erokhina, 1999; Zhukov, and Lyamin, 2007; Il'ina, Plisetskii, Kopychenko, Rybina, and Klimova, 2015; Katkalo, 2007; Vittikh, 2015). Many other world scientists are concerned with the causes of such problems, such scientists as R.L. Ackoff, J. Baudrillard, A. Toynbee, B. Garrett, R. Farson, D. Welch, P. Weil, G. Rzevski, M. Wodcock, D. Francis, R. Jay, R. Templar, P.F. Drucker, D. Owen, U. Rice-Johnston, J. Toner, D. Norman, R. Dilts, etc. (Dilts, 2016; Norman, 2006; Toner, 2015; Rzevski, and Skobelev, 2014; Varajão, 2016). Contextual management suggests a new understanding of the strategic advantages. It is intended to provide answers to what are the factors, goals and objectives of modern governance. This approach can be found in the works of Armstrong M., Mintzberg G., Drucker P., March, G., Ogle M., Barney J., Wernefelt B., Grant, R., Pisano G., Prahalad C., Efremov V., Gurkov I., Katkalo V., Kleiner G., Milner, B., Popov E., Montgomery S., Naka A., Peteraf M., Ramella R., Takeuchi, D. Tisza, Hamel G., Shuen E. (Guetat, and Dakhli, (2016; Montequin, Cousillas, Alvarez, and Villanueva, 2016; Varajão, Trigo, and Soto-Acosta, 2016; Varajão, 2016; Vittikh, 2015; Wang, and Lo, J. (2016; Zoroja, and Pejić Bach, 2016). Concepts in education and in educational management are one is the most impotent factors and lines of the technical, social and cultural stable development, one of the main principles of the effective and productive educational innovations and other reforms (Arpentieva, Kassymova, Lavrinenko, Tyumaseva, Valeeva, Kenzhaliyev, Triyono, Duvalina, Kosov, 2019; Kenzhaliyev, B. K., Gladyshev, S. V., Abdulvaliyev, R. A., Kuldeev, E. I., Beisembekova, K. O., Omarova, S. A., Manapova A. I. (2018); Kenzhaliyev, B. K., Kul'deev, E. I., Luganov, V. A., Bondarenko, I. V., Motovilov, I. Y., & Temirova, S. S. (2019); Zhabbasbayev, U., Ramazanov, G., Kenzhaliyev, B., Sattinova, Z., & Shakhov, S. (2016); Arpentieva, 2015; Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014; Kassymova, Stepanova, Stepanova, Menshikov, Arpentieva, Merezhnikov, Kunakovskaya, 2018; Kassymova, Tokar, Tashcheva, Slepukhina, Gridneva, Bazhenova, Shpakovskaya, Arpentieva, 2019; Kassymova, Tyumaseva, Valeeva, Lavrinenko, Arpentieva, Kenzhaliyev, Kosherbayeva, Kosov, Duvalina, 2019; Kassymova, Kosherbayeva, Sangilbayev, Schachl, Cox, 2018; Kassymova, Valeeva, Stepanova, Goroshchenova, Gasanova, Kulakova, Menshikov, Arpentieva, Garbuzova, 2019).

**The purpose of the investigation.** The purpose of the investigation is a brief description of the experience of analyzing the conceptual foundations of governance in post-Soviet Russia in comparison with developed democracies; a description of typical approaches to the implementation (imitation) of strategic planning in management, as well as the consequences and specific traits of contextual, a strategic management.

**The statement of basic materials.** In the Russian system of management and management systems of several other countries of the former USSR, in the management of life as a whole, the question of following the chosen concept paradoxically is not relevant. Practically in any sphere one can find the plurality and parallelism of meanings, practices, concepts. The winner in this case is far from the strongest. More often, we encounter situations where the very idea of development is completely leveled, the concept is distorted. Such is the "precession of simulacra." (Baudrillard, 2013: 17). Hence the difficulty in determining the fulcrum in any kind and level of conflict. The management system is dominated by the replacement of formal, unadapted concepts. We emphasize that the context does not change, it "juggles" the concept (s), justifies them and gives them sound, proceeding from the "pole" given to the concepts. Concepts are now not "things in themselves", they have a second bottom, depending on the embeddedness in the context. The proof of this theory is the windows of J. Overton.

Conceptual management is such a method of managing organizational and social systems, as well as individuals, in which the control object, feeling free, acting on its own and for its own benefit, nevertheless, is within the framework of the set of strategies allowed in this system. This is achieved through the use by the subject of management of special methods of influence on the object of management, which results in bringing the reference model of the world (and the rules of interaction with the world) adopted by the object into compliance with a certain regulatory model defined by the subject of management. Conceptual management involves only one method of influence. This is informational method (Konotopov, 2006). Conceptual management also refers the subject of management to a palette of strategies of a dialogic, inter-subjective type, that is, interaction strategies. The amount of information in the system of such management

grows, information flows freely, management is fast, flexible, relevant, which allows to realize the ideal of "sustainable development".

This approach is opposed to the direct - prescriptive - method of management, which implies the subordination of the will and goals of the object of management to the controlling subject. The principal difference of directive management is that the subject of management in relation to the object can be allowed and other than informational impact (whether encouraging, punishing is not significant). A monologic, prescriptive approach implies significant deformations of information flows and management reflection both at the level of implementation of managerial acts and at the level of their theoretical and practical reflection. For this control, typical are the problems of "blockades" and asymmetries of information flows, problems of information leakage and collusion, problems of errors and general reduction of information as control, and, therefore, the rudiment of control itself to control and suppression. Management all the time "lags behind" the realities of life, destroys both the object of management and the environment, leads to systemic collapse of the controlled systems and the surrounding world.

Mankind constantly balances between these two poles (between conceptual and directive management), and has never managed to implement the conceptual management regime in a bright, pure form: neither on the basis of idealistic (religious) world outlook and the concept of "state-church", nor on the basis of materialistic worldview and model of the "people's state". In past centuries, the self-governing communities of the indigenous people of America, as well as some communities in Europe and Africa, approached this model. In the modern world, countries of the North of Europe are approaching such communities, with a post-capitalist system of government.

However, at the same time, the ideal (global, shared by people goal, understandable and represented in concrete patterns - behavioral models, social structure models, decision-making models and management in everyday situations) of development is the leading tool for conceptual management! Nothing else has the same efficacy as a global, personally and socially significant goal.

Formulated by socialism, capitalism, some religious-oriented states of the past and the present system of concepts, taken as the basis for building a reference model of a socially oriented capitalist, communist or spiritually oriented religious community, have come into conflict with reality. No attempts to modify them fundamentally contributed to the resolution of this conflict - developmental imbalances are aggravated, the gap in the quality of life of people and groups is growing both within individual states and at the interstate level. The understandable result of this contradiction became the phenomena of international terrorism, refugee and migration, separatist and protest movements of various forms, types and orientations. We live in an era of crisis management methodology that broke out on a global scale: none of the management systems implemented in the modern world is able to offer meaningful and valid alternatives for the development of society, but there are many alternatives to collapse and crisis (Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014; Konotopov, 2006). There are different trends: from "secret world government" and Malthusian models of directed genocide in the interests of the "golden billion" to dystopia of the electronic and other concentration camps of a single state, from constant terrorist wars to more or less local size before the Third World War, capable of destroying life on Earth. Everything shows the crisis - the collapse of the socialist system, the growing imbalances and the collapse of the capitalist system, which is being transformed into a slave system, and the intensification and intensification of conflicts on religious, ethical, and economic grounds. In general, over the course of the 20th century, conceptologists in the field of management worked only to destroy existing conceptual worlds: the postmodern destroyed the common understanding of the board without giving anything in return. Post-postmodern is trying to fix these errors. One of the main mistakes was related to the planning and design of changes: the mistake of the conceptologists of the socialist and capitalist orientations was the focus of work on people who did not take into account psychological and other features of the person, intervals and forms of achieving the goal. The capitalist system oversimplified the understanding of the prospects and the time to achieve them, and the socialist system overly complicated, including trying to build communism in a huge range of countries that are significantly different in their characteristics. As a result, (not without the help of capitalism, which lost its power on a "spurt"), the socialist development "collapsed", which resulted in the destruction and devaluation of socially significant goals, gave rise to the transition to the achievement of short-term personal goals and a general violation of environmental, technological, and cultural balance. The very methodology

of conceptual management is in its initial development stage and seeks to ignore reality, avoiding admitting to management as the “elite” activity of the “human crowd” (Konotopov, 2006).

However, the experience of conceptual management of humanity is very rich: all the ancient civilizations left the relevant works and ideas that were not in demand until the twentieth century. However, even when they were comprehended, many pseudoscientific frauds were committed, due to an insufficiently critical view of the scientific heritage and the specifics of the conceptologists of the past who are supersaturated with metaphors of language. Now negative trends are reinforced by a technological approach that levels the significance of the methodology. This neglect of the methodology, including the conceptualization of social management, the refusal to develop a system of concepts and conceptual models, that is, on the basis of which effective technologies of social management are formed, gave birth to a crisis of management and other management areas (Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014; Konotopov, 2006).

In the modern space in which the content of the concept “management” is realized, over the past decade has undergone significant transformations. In Russia, these transformations are connected with new economic relations and the emergence of new business entities, as well as new concepts that have been introduced into the communicative space of business. The management discourse included such language elements as “corporatism” and “corporate culture”, “logistics”, “top management”, “manager”, “sales representative”, “public relations”, “marketing”, “business” plan”, “holding”, “concern”, “cartel”, “company”, etc., which have not previously had a place in the conceptual sphere of the Russian economy, and in the Russian linguistic culture. Recently, the same has also been observed in the phenomenon and theory of import of concepts.

The conceptual nature of management implies, among other things, a clear structuring of functions, a formed list of competencies, conditions, factors, and management results. In a general sense, it can be said that conceptual management is close to the competence management. In the face of fierce competition, organizations set themselves large, strategic, difficult, complex, and forms ambitious goals and develop new strategies and forms of activity in order to survive and thrive in the market. The implementation of business strategies of organizations is impossible without qualified, motivated and involved employees. Unique competences, professional and personal potential of employees are a key factor in improving the efficiency of an organization in a dynamic and diverse environment. In recent years, the competence approach has become an integral part of the organization’s personnel management system. Today, organizations believe that personnel as a strategic asset should possess, first, competence - the knowledge, skills and behavioral models necessary for the effective performance of work in this organization. The main feature of the competence-based approach in personnel management is the transition from operational problems of personnel specifics to tasks of a higher strategic level. Now it is not enough just to train employees, create rules of conduct and develop some kind of regulation, the result of all managerial actions should be to increase work efficiency, staff involvement, motivation, and therefore increase the overall performance of the organization. Therefore, the goals in the competence-based approach are formulated to show that these processes can improve the organization’s activities by achieving higher performance, changing employee behavior, increasing the productivity and efficiency of the organization (Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014; Zotkin, Nateykina, 2015).

Modern organizations are increasingly translating the ideology of the competence-based approach to all areas of personnel management, while the competency model is a central element of the personnel management system, around which specific functional areas of personnel management are concentrated. R. White, D. McClelland, R. Boyatzis, S. Spencer and D. Ulrich remarkably developed the concept of competencies for the organization’s survival and sustained competitive advantage (Chouhan, & Srivastava, 2014). The development of a competence-based approach in science is primarily associated with the name of D. McClelland, who proposed the concept of “variable competences” to describe the qualities of an employee’s personality. They formed a list of tests that allowed to predict how effective this or that work will be done. R. Boyatzis defined competencies as “a set of characteristics that separate effective work from unsatisfactory or inefficient”. In a competence-based approach to personnel management in an organization, the competence model is the center around which the management system is built. Modern models of competencies set the coordinate system, which allows you to identify employees who can be as effective as possible within a specific organizational culture. When developing models, they are guided by the choice

of the most important competences, which, as a rule, are grouped into clusters or functional blocks. The competency model allows you to unify employee requirements and create uniform standards of behavior, a basis for evaluating and promoting employees (Zotkin, Nateykina, 2015).

Researchers identify different organizational skills as the competence of an individual leader and organization as a whole, for example (Prahalad, Hamel, 1990): 1. Absorption abilities that are always present in one form or another. There are hidden abilities when individual employees themselves acquire knowledge and skills, but they are not included in the competence development system to achieve a new ability. 2. Multifunctional abilities (strategic vision and planning). The ability to analyze the market, assess the position of competitors and conduct management surveys lead to the development of a strategy that covers all aspects and aspects of the enterprise. Therefore, such abilities were called multifunctional. The ability to develop a strategy does not guarantee a real competitive advantage. Plans may not be realized. 3. Transformational abilities, which include workers with certain competencies in the overall activity. If the system of new activity is thought out and there are employees of all the necessary competencies, then the consistent inclusion of these workers with their new "repertoire" into the system of business processes will transform the organization. These transformations start the process of manufacturing new products and other new processes, which together will create sales growth, profit growth and an increase in market share. The development of an organization's abilities is not only about educating employees, increasing their level of competence. Collective experience in joint innovation activities is extremely necessary. A. Carroll and J. McCrackin (Carroll and McCrackin, 1997) organized competencies into three main categories. 1) Core competencies (Hamel and Prahalad, 1994 forms the basis for strategic direction; it is something a company does well relative to other competitors. Core competencies refer to the elements of behavior that are important for all employees to possess as, for example, a core competency in "result/ quality orientation". 2) Leadership / managerial competencies are related to leading an organization and people. Some examples include "visionary leadership", "strategic thinking", and "developing people". 3) Functional competencies are job-specific skills required to perform a particular job role or profession. Sometimes consider the concept of conceptual management. It is a concept of management of the situation. This is one of the four main competency groups used in management, along with technical, political and interpersonal. Unlike the other competencies (knowledge and skills), conceptual management is extremely difficult to learn from another person; it is generally considered more of a personal trait than a learned skill. The aim of this skill set is creating plans that will allow teams to work efficiently, before a project is even started. The main component of conceptual management is looking at a situation and figuring out a way to break it down into manageable pieces. When a project is in its infancy, it is easy to become overwhelmed by the upcoming choices and work. The conceptual manager's job is to look over that aggregate of tasks and information and structure it out in a clear and organized manner. Like many management and business concepts, the most important part of conceptual management is information. The more information the individual or the collective (intersubjective) manager has, the easier it is to make correct decisions. Unlike other forms of management, a conceptual manager is always accounting for information that is impossible to know. Since the majority of this skill takes place in the future, the manager needs to account for the unforeseen. When using the existing information, we can predict what some of the unexpected things may be and plan accordingly.

An inquiry into management, legal and other systems regarding the management object in the system of labor relations does not give an unambiguous answer. Words that a priori cannot co-exist in the framework of one concept, which are, in fact, mutually exclusive, paradoxically used in Russian legislation and the laws of a number of other "civilized" countries as synonyms. If throughout the world the word combinations "personnel management", "human capital management", "human resources management" imply the evolution of approaches to the labor person, then in Russia and some other countries of the former USSR these concepts turned into simulacra. If you judge by the papers circulating in the personnel departments, the first of the listed concepts prevails in labor relations. Judging by the job advertisements, the second concept is in priority. In scientific rhetoric, the concept of human resource management is popular. In the West, in the context of the implementation of the latter approach to employment, a labor contract is concluded for the acquisition, for a fee, of the competencies necessary for the organization to achieve its goals, but not all of its carrier-worker. Hence the development in the West of the provisions of compensation management. In the opinion of the Russian leaders, the person (people) is recognized as the object of control, in a system of any scale and purpose (Bykasova, Arpentieva, Gorelova, Bogomolova,

2019; Galich, 2014; Gorelova, 2007; Demyanenko, 2016; Dem'yankov, 2001). Managers who do not competence, skills, abilities that can be assessed. At the enterprise level, such an understanding of the management object is manifested in the inability to competently build labor relations, assess the professionalism of the employee. But with the indicated understanding of the control object, this is of no use: "Everything that is done by people who do not have hope for the best is done very badly. It is not surprising that we do not get those profits from the farms in which slaves work, which could be obtained if people were treated like free citizens... the slave does not have the incentive to work well' (Stepanov, 1996, Toner, 2015: 31). He or she has no interest in the work, its results, the employees, the employer, and, as a result, to himself.

The concept of human resource management evolved in parallel with the development of the theory and practice of strategic management. By the beginning of the XXI century, there emerged an awareness of the "heterogeneity of the unit of analysis" in strategic management, when scientists proposed a two-level interpretation of the object of management (Katkalo, 2007: 10). The triad "knowledge-skills-competences" lies at the heart of the labor standards that are being introduced into practice. However, in the absence of a clear understanding of the purpose of such a management tool, the effect of its implementation is negative. In the absence of attention to detail in the process of developing these documents, the effectiveness of the introduction of professional standards has an "anti-effect" at the output. An example is standardization in manager knowledge, skills and competences.

A-strategic "lawmaking" and "competencies making" in the sphere of managerial strategy increases the anti-effect in times. The main functional task in the process of developing a strategy is the formulation of a goal, tasks. The absence of changes in the texts of strategic planning in documents of Russian managers reflects their irrelevance in time, the lack of demand for these documents and the lack of strategic planning. In the Russian managerial plans, all goals are a priori unattainable. That is why there are no sanctions in the management system for failure to achieve strategic goals and non-fulfillment of tasks, and there are no sanctions for posing fictitious goals. The implementation of the strategy is not included in the list of criteria for assessing the activities of the heads of regions. Accordingly, there is no incentive neither to formulate competent goals for the development of regions and firms, to strive to realize them.

Analysis of the texts of strategies for social and economic development of the regions is often found in scientific and journalistic literature. However, as a rule, it is not going further than the statistical delights of those who have access to relevant databases, accompanying strategic planning and management. In addition, sometimes it happens: people write and look for guilty outsiders (Belanovskiy, Dmitrieva, Komarov, Komin, Kotsyubynskiy, and Nikolskaya, 2016; Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014). Other experts try to analyze the development goals, group them (Il'ina, Plisetskii, Kopychenko, Rybina, and Klimova, 2015). The most paradoxical thing is that strategies are still fussing, are still being discussed, although they do not affect anything and nobody needs. Unfortunately, trying to understand what is read, few people pay attention to the fact that the word combinations "government bodies" and "authorities" in the Russian mentality are synonymous, practically inseparable, which has certain consequences (Arpentieva, Gorelova, 2017; Bykasova, Arpentieva, Gorelova, Bogomolova, 2019; Galich, 2014). However, this clearly indicates that in Russia, there is no readiness and ability of managers to apply conceptual management, but, on the contrary, policy methods and technologies of control and repression are applied.

The use of the SEO-analysis of texts (Search Engine Optimization) technique allows you to assess the quality of the site on a number of parameters, helps to further its advancement. SEO-analysis in the world of modern information technologies is the basis for the audit of texts, since it solves the main task: evaluates the uniqueness of the text. Here we discuss the main idea of management. If the designer, when making a decision, focuses on the mental model of the user (the control object), most likely the solution will be more effective. A bad design translated into the language of a modern manager is "erroneous mental models (orientation to the designer's model / concept) and insufficient feedback." The emphasis on power authority, interpreted as rights that are not backed by duties, allows managers (designers) to level the mental user model (subordinate) in the decisions made. The subordinate and his model of the world is an extra link in the national management model. Two aspects of the problem of educational management strategization are considered: (1) justification of the reasons - poor-quality development strategies; (2) methodology search. The roots of the first problem should be found in the imbalances in the formation and development of the subject of management, starting with the problem of improper selection and de-professionalization of managerial personnel. To solve the second problem, the authors propose SEO analysis tools as a methodology

for evaluating strategy texts. This tool solves the problem of audit of regional strategies in the context of administrative, socio-psychological and linguistic aspects of managers in the field of education. The data obtained can also be disseminated to non-governmental educational institutions: in particular, in additional or global education it is extremely important to know its subject, object, purpose and objectives, etc. Otherwise, as in the case of state educational institutions, imitations will arise that are more likely to harm education and society than support it.

Conceptual management is forced to understand both the meaning of oneself and the meaning of what is happening around oneself, the meaning of one's goals and values, relationships and resources, etc. Contextual management, in theory, could also be very successful, rely on an understanding of what the manager is and what he does. However, in modern Russia there are big problems with training and, most importantly, the possibility of work for qualified managers. On the contrary, unskilled and unprepared advance to leading positions in education, culture. Most often, we can say that the person managing the school, university, etc. should not be in the place that he occupies under any circumstances. However, the state not only encourages valuable and professionally inferior leaders, but also creates obstacles to the work of leaders who have at least an initial idea of dignity, respect, etc. Leaders who could really establish the educational process are excluded from the very possibility that to change something. In addition, managers who do not even have basic education in the chosen field and do not have any personal, partner and professional traits required for effective and productive leadership, on the contrary, are actively promoted. This model serves, on the one hand, the destruction of education, pseudo-leadership and pseudo-education, and on the other hand, the formation of a "service man": illiterate and highly specialized, incapable of understanding what is happening outside and inside him, an active consumer and an obedient and slave. All human activity is exhausted by pseudo-goals that are not set by himself and lead to its destruction. The very ability to understand and change something in the current situation of the total destruction of education, culture, humanity is suppressed. Obviously, in these conditions, everyone makes their choice. Moreover, unfortunately, many make destructive choices for them and others. However, the "death of the university," no matter how it is promoted, will not happen. The centers of "parallel" or even "catacomb" civilization on the planet are also increasing, as is the number of organized ones, successful, willing and able to prepare and support the training of real professionals, partners and personalities, managers. We see some achievements on the example of the countries of Scandinavia (post-capitalist), in which, at the beginning of the 21st century, the cornerstone of education and other areas is the respect of students and teachers in the process of preparing a happy person. Some of the achievements are related to the updating of ideas about the traditions of high school education in Russia of the 19th century and, in the 20th century, of Soviet education since the time of the great enlightener I.V. Stalin (Dzhughashvili). He wrote: "There is no reason to doubt that the working class of the USSR also cannot do without its own production and technical intelligence. The Soviet government took this circumstance into account and opened the doors of higher educational institutions in all sectors of the national economy for people of the working class and working peasantry ... If earlier, under capitalism, higher education institutions were the monopoly of the barchuk, now, under the Soviet system, the working-peasant youth is the dominant force there" (Stalin, 2000, 13: 67). He is revived, along with many famous teachers and pedagogues of the country (S.T. Shatskiy, P.P. Blonskiy, A.S. Makarenko, M.N. Pokrovskiy, N.K. Krupskaya and others), the culture of the peoples of the USSR. I.S. Stalin insisted on universal higher (and free) education for all citizens of the USSR, paying attention to the broad preparation of a person for life, the education of a person as an individual, a partner of a professional, and not just as a "qualified consumer" (in the expression of a person with opposite orientations, A. A. Fursenko). Saying the latter, we can summarize the purposeful and destructive attitude of modern management in education towards its participants: "... the drawback of the Soviet educational system was the attempt to shape a human creator, and now the challenge is to nurture a qualified consumer who can skillfully use the results of other people's creativity" (Mazurova, 2007: 1; Panfilova 2010:69). Another ex-Minister of the Russian Federation G. Gref is close to this opinion: "You know, dear sirs - you say terrible things, actually ... You are proposing to transfer power, power in the hands of the population ... as soon as all people understand the basis of their self, they identify themselves - it will be extremely difficult to manage, that is, to manipulate them... How to live, how to manage a society where everyone has equal access to information, everyone has the opportunity to receive unprepared information?" (Gref, 2012: 1). Obviously, talking about management strategies, about strategic plans, is redundant here: there is only directed and direct destruction of education.

Bureaucracy is now acting as a mechanism of (destructive) management of the modern system of higher education. As noted by M. Weber, management usually contains two opposing elements (Weber, 1976): bureaucratic and professional. Management based on discipline and management based on competency do not always coincide and come into conflict with each other. Because of the bureaucratization of universities and schools, the teacher and student were integrated into a rigid system of hierarchical relations. The competence of the teacher began to be determined not by real scientific and pedagogical achievements, but by position in the system of scientific and pedagogical hierarchy. Similarly, the achievements of the student and the student also turned out not to be achievements in terms of development as an individual, partner and professional, but as a “qualified consumer” and a “robot-resistant, robot-proof specialist” who successfully or unsuccessfully sells himself in the labor and life markets. The consequences of the bureaucratization of higher education are its massization and commercialization; a low level of activity and respect among teachers and teachers, a decline in the spiritual and moral support and “spirit” of teachers, increased apathy and estrangement among teachers and students, a decrease in the competence and motivation of education in students impoverishing curricula; due pseudopractical orientation, the removal of theoretical knowledge and the rejection of the most primitive and pseudoscientific knowledge (Lukashchuk & Zotov, 2017 and other).

**Conclusions.** Thus, management in Russia continues to be a-strategic, does not take into account the opinions of those who are guided, considers them as a homogeneous mass of slaves in need of strict control ("power"). This is the "secret" of the economic, political and social unsuccessfulness of modern Russia, which is on the verge of total collapse of all its systems. Contextual approach to management assumes identification of external and internal factors of management. These factors should be significant from the point of view of the subject of the strategy, as well as its "object" (managed competencies, people, processes, organizations). Accounting for significant factors predetermines the ability of the management system to achieve the expected result. Accounting for significant factors creates a strategic understanding of the results of management. When a contextual approach is implemented in Russia, its subjects and "objects" as actors can achieve even the most "unattainable" goals. At least, both the manager, and the organization (state, region), and workers will know what they are working for and will strive to work qualitatively and effectively. Management, its strategy, should not be formal, fictitious, separated from life. It must be meaningful, concrete, and realistic.

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#### **БІЛІМНІҢ МӘТІНДІК ЖӘНЕ КОНЦЕПТУАЛДЫҚ БАСҚАРУ МӘСЕЛЕЛЕРІ: ПСИХОЛОГИЯЛЫҚ, ӘЛЕУМЕТТІК ЖӘНЕ ЭКОНОМИКАЛЫҚ ӘСЕРЛЕР**

**Аннотация.** Мақаланың мақсаты – дамыған демократиямен салыстырғанда білім беру саласындағы және посткеңестік Ресейдегі басқа да салалардағы басқарудың тұжырымдамалық негіздерін талдау тәжірибесінің қысқаша сипаттамасы; басқарудағы стратегиялық жоспарлауды іске асырудың (имитацияның) типтік тәсілдерінің сипаттамасы, сондай-ақ контекстік, стратегиялық басқарудың салдары мен ерекшеліктері. Білім беру саласындағы концептуалды басқару контекстік басқаруға қарсы. Менеджменттің заманауи тұжырымдамалары орыс білімінде және басқару дискурсы мен практикасының басқа салаларында ұсынылған. Елімізде әзірленген кәсіби стандарттар жүйесі бірқатар басқару міндеттерін шешуге арналған. Алайда, кәсіби стандарттарды тұжырымдамалық емес қолдану пән-объектінің және тұтастай ұйымның өзара әрекеттесуіндегі



теңгерімсіздікке әкеледі. Бұл мақалада жұмысшылардың екі санаты берілген. Кәсіби талаптардың сақталмауы жұмысшылардың бірінші санатына тән. Кәсіби стандарттарды сақтамау кәсіби, серіктес және жеке деформацияларға да қатысты. Бұл деформациялар басқару стратегиясының мәтінімен суреттелген. Стратегиялардың болуы дамудың ынталандырушысы болып табылады. Алайда, мұндай құжаттарды құру және бағалау алгоритмінің жоқтығы, билік органдарының қызметін бағалау процесінде осы аспектінің маңыздылығын талдау осы стратегиялық менеджменттің аумақтық және ұйымдық басқару жүйесінде талап етілмейтіндігіне әкеледі. Авторлар аумақтық стратегияландыру проблемасының екі жетекші аспектісін қарастырады: (1) сапасыз стратегиялық әзірлемелердің себептерін негіздеу; (2) басқарудың тұжырымдамалық әдістемесіндегі қателерді іздеу. Бірінші мәселенің тамыры менеджмент персоналын дұрыс іріктеуден және кәсіпқойсыздандырудан басталатын басқару пәнінің қалыптасуы мен дамуындағы теңгерімсіздіктерден табылуы керек. Екінші мәселені шешу үшін авторлар SEO талдау құралдарын стратегия мәтіндерін бағалау әдісі ретінде ұсынады. Бұл құрал білім беру саласындағы мемлекеттік қызметшілердің әкімшілік, әлеуметтік-психологиялық және лингвистикалық аспектілері тұрғысынан аймақтық стратегиялардың аудитін жүргізу мәселесін шешеді. Алынған мәліметтер үкіметтік емес оқу орындарына да таратылуы мүмкін: атап айтқанда, қосымша немесе ғаламдық білім беру кезінде оның пәнін, объектісін, мақсаты мен міндеттерін және т.б. білу өте маңызды. Олай болмаған жағдайда, мемлекеттік оқу орындарындағыдай, еліктейтіндер білім мен қоғамға қолдау көрсетуден гөрі көбірек зиян тигізуі мүмкін.

**Түйін сөздер:** білім, адами капитал, адами капиталды дамыту, менеджмент, күзiреттiлiк, кәсiби стандарт, стратегия, мақсат, нәтижелер құрылымы, SEO талдау.

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## **ПРОБЛЕМЫ КОНТЕКСТУАЛЬНОГО И КОНЦЕПТУАЛЬНОГО УПРАВЛЕНИЯ В ОБРАЗОВАНИИ: ПСИХОЛОГИЧЕСКИЕ, СОЦИАЛЬНЫЕ И ЭКОНОМИЧЕСКИЕ АСПЕКТЫ**

**Аннотация.** Дано краткое описание опыта анализа концептуальных основ управления в образовании и других сферах в постсоветской России по сравнению с развитыми демократиями; описание типичных подходов к внедрению (имитации) стратегического планирования в управлении, а также последствий и специфических черт контекстного, стратегического управления. Концептуальное управление в образовании и в контексте других противостоит контекстному управлению. Современные концепции управления внешне представлены в российском образовании и в других областях управленческого дискурса и практики. Система профессиональных стандартов, разработанная в стране, предназначена для решения ряда управленческих задач. Однако неконцептуальное использование профессиональных стандартов приводит к дисбалансу во взаимодействии субъект-объект и в организации в целом. Перечислены две категории работников. Несоблюдение профессиональных требований характерно для первой категории работников. Несоблюдение профессиональных стандартов также принимает участие в профессиональных, партнерских и личных деформациях. Эти деформации иллюстрируются текстом стратегии управления. Наличие стратегий является стимулом для развития. Однако отсутствие алгоритма составления и оценки таких документов, анализ значимости этого аспекта в процессе оценки деятельности органов власти приводит к тому, что это стратегическое управление остается невостребованным в системе территориального и организационного управления. Авторы рассматривают два ведущих аспекта проблемы территориальной стратегизации: (1) обоснование причин некачественных стратегических разработок; (2) поиск ошибок методологии концептуального управления. Корни

первой проблемы должны быть найдены в дисбалансах становления и развития субъекта управления, начиная с проблемы неправильного подбора и депрофессионализации управляющих кадров. Для решения второй проблемы авторы предлагают инструменты SEO-анализа в качестве методологии оценки текстов стратегий. Этот инструмент решает проблему аудита региональных стратегий в контексте административных, социально-психологических и лингвистических аспектов образовательных организаций и деятельности служащих государственных и негосударственных работников в сфере образования. Полученные данные также могут быть распространены и на негосударственные образовательные учреждения: в частности, в дополнительном или глобальном образовании крайне важно знать его предмет, объект, цель и задачи и т.д. Иначе, как и в случае государственных образовательных учреждений, возникнут имитации, скорее, вредящие образованию и социуму, чем поддерживающие его.

**Ключевые слова:** образование, человеческий капитал, развитие человеческого капитала, управление, компетенция, профессиональный стандарт, стратегия.

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E-mail: [ssavina@fa.ru](mailto:ssavina@fa.ru)**ARTIFICIAL INTELLIGENCE IN ANALYZING THE CAPITAL  
STRUCTURE EFFECT ON FINANCIAL STABILITY**

**Abstract.** Financial stability is an important measure used by stakeholders to assess the financial situation of an entity concerned. Economic worries caused by internal business issues, global processes, and international economic (regional) integration may increase the entity's exposure to external factors. Financial stability considers the entity's dependence on creditors and investors, i.e. the debt-to-equity ratio. Significant liabilities that are not fully covered by the entity's own liquid funds create preconditions for bankruptcy should any large creditor demand settlement of any debts owed to it. However, borrowed funds can significantly increase the return on equity. Therefore, in analyzing financial stability, it is very important to use a system of indicators that indicate the entity's future risks and profitability.

Financial stability is the principal objective of financial analysis. The nature and scope of such economic analysis are aimed to determine the entity's internal capacities, means, and methods for improving the entity's financial stability. Thus, financial stability is understood as the entity's guaranteed solvency and creditworthiness resulting from the effective formation, distribution, and application of financial resources in the entity's business operations. Financial stability is assessed based on the working capital to inventory ratio and debt to equity ratio.

Business entities are independent in establishing business relationships with their contract partners; therefore, they are fully responsible for the decisions they make. The increasing importance of financial analysis for the entity's own financial situation and for its business partners is explained by the increasing demand for additional sources of business financing and the requirement to increase the productiveness of capital resources.

Entity's financial stability analysis should not focus on the current financial activities only. It should also determine what measures should be taken on a continuous basis to maintain and improve the entity's financial situation. Both current and future stability, i.e. the entity's sustainability, must be ensured to provide conditions for state-of-the-art competitive production.

An entity is a complex system consisting of many subsystems; therefore, a complex method must be applied to analyze its stability, i.e. using a system of financial stability indicators. Present-day diversity of financial stability indicators, including both absolute and relative indicators, makes the analysis difficult and overcomplicated, creating difficulties in combining the findings of the analysis to make conclusions about the entity's financial stability. Absolute indicators, namely equity, borrowed capital, assets, cash, accounts receivable and accounts payable, profit, play an important role in the analysis of an entity's financial stability. Equally important are absolute indicators calculated in the analysis of financial statements: net assets, working capital, working capital to inventory ratio, stable liabilities. These indicators are critical as they are used to establish the criteria used in the financial analysis.

An entity should have a flexible structure of financial resources and, if necessary, be able to borrow funds. Therefore, another manifestation of an entity's potential financial stability is its creditworthiness, i.e., the ability to settle its payment obligations when due. Thus, an entity is considered creditworthy if it meets a certain requirement for granting a loan and is able to repay the loan when due subject to any interest accrued. This concept is closely related to the concept of financial stability and shows whether the company is able to raise funds from different sources to repay its debts. Credit analysis may predict solvency and is closely related to the analysis of solvency, financial stability and return on equity. Entity's stable operation, high profitability and working capital turnover also guarantee loan repayment to a certain degree.

**Keywords:** automation, financial stability, liquidity, solvency, economic analysis.

**Introduction.** In the context of the developing market economy, analytical support has become increasingly important for decision makers, as financial stability is the basis for sustainable growth and financial solvency of a business entity in market conditions [4,5].

**Methods.** A. GENERAL DESCRIPTION.

Financial stability analysis allows external parties (primarily, contract partners) to assess the entity's long-term financial capacity as a function of the entity's capital structure, degree of creditors' and investors' participation, conditions for raising and servicing loans. Thus, many decision makers, including those in the public sector, prefer to use a minimum of equity to finance their business operations and choose to borrow funds to finance the activities. However, if the debt component in the debt-to-equity ratio significantly exceeds the equity component, the entity may go bankrupt if several creditors unexpectedly demand their money back. Short-term financial stability analysis is equally important to determine the entity's liquidity, current assets, and solvency [11,13,16].

Solvency and financial stability are the most important characteristics of the entity's business activities in a market economy. "Financial stability" is far more complex and broader than "solvency" and "creditworthiness" since it includes a number of aspects of the entity's business activities.

Financial stability is a certain state of an entity's accounts, guaranteeing its continuous solvency. Indeed, a business transaction can either improve or worsen the entity's financial situation or have no effect at all. Daily business transactions affect financial stability and cause its transition from one state to another. By knowing the margins of the sources of funds to cover capital investments in fixed assets or production costs, decision makers may generate such flows of business transactions that may improve the entity's financial situation and increase its stability. In financial stability analysis, a separate concept is distinguished - "solvency", which should not be confused with "financial stability". Solvency is an integral component of financial stability. Financial stability depends on the results of the entity's production, commercial, financial and investment activities, and, in turn, has a positive effect on the activities themselves. Entity's financial stability determines the shares of the inventory financed by own funds and borrowed funds and the value of the inventory itself. Working capital to inventory ratio and debt to equity ratio are essential characteristics of financial stability, while solvency is their external manifestation. Meanwhile, the working capital to inventory ratio determines the level of solvency as of a specific date. Therefore, solvency can be understood as a manifestation of financial stability [10,12].

Financial stability is the economic and financial condition of an entity in the process of allocation and use of resources, ensuring its continued development in order to gain profits and capital while maintaining solvency [6,9].

A stable financial condition is established through the entity's operations. However, partners and shareholders are not interested in the process, but in the results, i.e. indicators of financial stability. Every stakeholder analyzes financial activities and related sustainability from its own perspective: external partners are interested in financial stability as a result, while internal parties are interested in financial stability both as a result and a process.

B. ALGORITHM.

Financial stability analysis is based on an integrated system method of assessing the financial condition of a business entity by identifying and measuring the conflicting effects of individual factors. System analysis reviews an entity as a system of interconnected elements (components) and assesses their influence on the entity's situation and performance. An important feature of the system analysis is its complex nature, meaning that the entity's performance is analyzed as a product of all of the entity's operations and the totality of factors that influence them. Economic analysis uses a system of indicators to provide a comprehensive review of the entity's operations, analyzes the relationships between such indicators, identifies and analyzes the causes of changes in such indicators in order to determine the capacities for improving the entity's operational efficiency [1,2,14]. Since financial stability analysis is the most important area of economic analysis, it is characterized by all the features inherent to economic analysis.

In the process of such analysis, a general review of the entity's financial stability is made, then the individual factors affecting the financial stability are identified and their influence on the financial stability is measured, and, finally, the findings are summarized into conclusions and recommendations. In such case, all available information on the entity's performance must be used after proper processing [17,20].

The summary of the findings (the final stage of the analysis) includes conclusions containing an assessment of the entity's stability, a list of identified capacities and recommendations for their use. The summary identifies the relationship between operating results of individual divisions, determines their influence on the entity's overall performance, describes the possible ways to strengthen the effects of positive factors and eliminate or at least weaken the effects of negative ones.

Financial stability is measured based on the findings of financial analysis, i.e. to assess an entity's financial stability, its financial situation should be analyzed using various methods and approaches in accordance with the objectives, tasks, available time, information and human resources, technical support. Continuous business awareness is required to make managerial decisions affecting the entity's financial stability. Such business awareness arises from the proper selection, analysis, evaluation of information, as well as careful examination of the source data in accordance with the objectives of the analysis and management [3,7,8].

There are numerous and diverse factors that can influence an entity's financial stability or a specific factor of it. The major causes of changes in the financial stability indicators must be established. Since such indicators are connected logically, they cannot be reviewed on a standalone basis. However, they can be isolated for the purpose of economic calculations, if necessary.

Throughout the history of financial analysis, scholars and experts have developed the main methods for analyzing financial stability: horizontal, vertical, trend, ratio and factor analysis. In Russia, the following main methods of financial stability analysis are used:

- *Horizontal (dynamic) analysis* is used to compare historical data and determine absolute and relative deviations, variations, and rates of change over a number of years in order to make predictions for the future periods;

- *Vertical (structural) analysis* is used to analyze the structure of overall financial indicators and assess their variations. It can be used to conduct a comparative analysis with due account of the industry specifics. It also smooths out the negative impact of inflationary developments. In practice, analysts should combine horizontal and vertical analysis;

- *Trend analysis* is used to analyze the time series of data and define the trends to make predictions for the future periods; therefore, development trends are analyzed, i.e., a forward-looking analysis is performed. Trend forecasting includes two elements: point prediction when only one value is predicted, and interval prediction based on the confidence interval in which the actual value of the predicted indicator is likely to appear;

- *Ratio analysis* is used to calculate various financial ratios on the basis of reported data and conduct their factor analysis subject to parallel identification of the relationship and interdependence between various indicators that can be compared from a logical point of view;

- *Comparative (spatial) analysis* is intra- and inter-company analysis of the entity's indicators as compared with those of its competitors and the industry average. The advantage of comparative industry analysis is that it provides a deeper understanding of the business and allows to assess the entity's financial stability and solvency;

- *Factor analysis* is a comprehensive system analysis and assessment of the impact of individual factors on the performance, using deterministic or stochastic analysis models. It can be either direct or reverse. The factor indicator characterizes the entity, i.e. its performance.

The mathematical economic model is used to identify, analyze and forecast how various factors affect performance indicators. One of the ways to systematize factors is to develop deterministic factor models, i.e., represent the item (performance) analyzed as follows:

- 1) product for multiplicative relationships:  $y = x_1 * x_2 * \dots * x_n$ ,
- 2) quotient for multiple relationships:  $y = x_1 / x_2$ ,
- 3) sum for additive relationships:  $y = x_1 + x_2 + \dots + x_n$ , various combinations for complex relationships:  $y = x_1 / (x_2 + x_3)$ .

In modeling, various methods are used: increasing, decomposition, contraction, expansion. A classic example of the expansion method is the well-known DuPont model (return on assets ratio), which can be represented as a multiplicative relationship by multiplying the numerator and denominator by the same indicator, i.e. sales revenue, and determining the influence of two factors, i.e. return on sales and asset turnover:

Return on Assets = Profit / Assets = Profit / Sales Revenue \* Sales Revenue / Assets = Return on Sales \* Asset Turnover.

Relative indicators smooth out the negative impact that any inflationary developments may have on the reported values, therefore, they are extremely important for the financial stability analysis in the present-day environment. They are more popular than absolute indicators because they allow comparing items that are incomparable in absolute values. They are more stable over time; therefore, they characterize homogeneous variation series and improve the statistical properties of indicators. Proper choice of indicators for the financial stability analysis can help find a solution to the problem, evaluate its financial stability on the basis of financial statements. Unfortunately, there are no universally recognized unambiguous criteria for assessing financial stability [15,17,18,19].

Following the rationality and adequacy review of different methods of analysis and assessment of the financial stability of business entities, the following system of main indicators for assessing an entity's financial stability was chosen (table 1).

Table 1 – System of Financial Stability Indicators

Item No.	Indicator	Formula	Explanation
<i>Group 1. Solvency Ratios</i>			
1	2	3	4
1	Cash Ratio	Cash + Securities Current Liabilities	Measures the company's ability to pay off its short-term liabilities when they become due using its liquid assets only
2	Quick Ratio	Current Assets - Inventory Current Liabilities	Measures the company's ability to pay off its short-term liabilities when they become due using its quick assets only
3	Current Ratio	Current Assets Current Liabilities	Measures the company's ability to pay off its short-term liabilities when they become due using its current assets only
4	Working Capital	Current Assets - Current Liabilities	Measures the company's current assets financed from the company's equity
<i>Group 2. Capital Structure Ratios</i>			
5	Equity-to-Assets Ratio	Equity Total Assets	Measures the share of equity in the total assets
6	Stable Liabilities Ratio	Equity + Long-Term Liabilities Total Assets	Measures the share of assets financed by stable liabilities
7	Debt to Equity Ratio	Total Liabilities Equity	Measures the ratio of borrowed funds to equity
8	Long Term Debt to Equity Ratio	Long-Term Liabilities Equity + Long-Term Liabilities	Measures the share of long-term debts in all long-term sources of financing
9	Net Assets	Eligible Assets – Eligible Liabilities	Measures the availability and adequacy of equity
10	Surplus (shortage) of inventory coverage by specific sources of funds	Sources of Funds - Inventory	Measures the inventory coverage by specific sources of financing
<i>Group 3. Fixed and Current Assets Ratios</i>			
11	Working Capital to Current Assets Ratio	Working Capital Current Assets	Measures the share of current assets financed by equity
12	Working Capital to Inventory ratio	Working Capital Inventory	Measures the share of inventory financed by working capital
13	Working Capital to Equity Ratio	Working Capital Equity	Measures the share of working capital in the equity



<i>Table continuation</i>			
1	2	3	4
14	Current Assets to Non-Current Assets Ratio	Current Assets	Measures the share of current assets per 1 RUB of non-current assets
		Non-Current Assets	
15	Asset Real Value Ratio	Fixed Assets + Inventory + Work in Progress	Measures the share of factors of production in the assets value, productive capacity
		Assets	
<i>Group 4. Turnover and Return Ratios</i>			
16	Current Assets Turnover Ratio	Sales Revenue	Measures the efficiency of use of current assets
		Current Assets	
17	Inventory Turnover Ratio	Manufacturing Costs	Measures the efficiency of use of Inventory
		Inventory	
18	Accounts Receivable Turnover Ratio	Sales Revenue	Measures the rate of payment of debtors' invoices
		Accounts Receivable	
19	Accounts Payable Turnover Ratio	Manufacturing Costs	Measures the rate of turnover of creditor's invoices
		Accounts Payable	
20	Equity Turnover Ratio	Sales Revenue	Measures the rate of equity turnover
		Equity	
21	Return on Assets Ratio	Sales Revenue	Measures the portion of revenue per monetary unit of fixed capital
		Fixed Capital	
22	Return on Assets	Profit	Measures the portion of profit per monetary unit invested in assets
		Assets	
23	Return on Equity	Profit	Measures the portion of profit per monetary unit invested in assets by shareholders
		Equity	
24	Return on Sales	Profit	Measures the portion of profit per monetary unit of revenue
		Sales Revenue	
25	Return on Net Assets	Profit	Measures the portion of profit per monetary unit of net assets
		Net Assets	

For the purpose of comprehensive assessment, the following financial stability indicators were selected: Current Ratio, Equity-to-Assets Ratio, Financial Stability Ratio, Working Capital to Current Assets Ratio, Asset Real Value Ratio, Current Assets Turnover Ratio, and Return on Assets.

The proposed financial stability indicators allow to:

- perform financial analysis of the entity's operations;
- develop a sound balance structure;
- find the main factors affecting financial results;
- develop measures to increase the profit and its growth rate.

The deep analysis identifies any unutilized resources and capacities to improve the entity's financial stability.

**Results.** Entity's financial stability determines the portions of the inventory financed by equity and borrowed funds and the value of the inventory itself. Working capital to inventory ratio and debt to equity ratio are the essential characteristics of financial stability. For the purpose of analyzing an entity's financial condition, the entity's accounts must be provided in such form so as to ensure that any estimations concerning the entity's ability to maintain its economic viability in the near future, i.e., continue its business activities and meet its liabilities, as well as a significant curtailment of its business activities or required liquidation are based on the reported data [7].

To analyze the dynamics and structure of the entity's financial standing, comparative analytical tables should be drawn based on the entity's financial statements. For the purpose of financial analysis, a variety of comparison methods, groupings, and summaries are applied to summarize information into such analytical tables.

Horizontal (dynamic), vertical (structural), ratio, and factor analysis methods are used to analyze the condition, structure, and dynamics of indicators, as well as to identify the trends and patterns of their changes.

To analyze assets, liabilities, and capital, a comparative analytical balance sheet is drawn for the entity concerned (table 2).

Table 2 – Company “A” 2018 Analytical Balance Sheet

Indicator	Absolute value, thousand RUB		Structure, %		Change (+,-)			
	As of 31/12/2017	As of 31/12/2018	As of 31/12/2017	As of 31/12/2018	thousand RUB	n points	As of the beginning of the year, %	To the balance Δ, %
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6=3-2</i>	<i>7=5-4</i>	<i>8=6/2</i>	<i>9=6/Σ6</i>
<b>ASSETS</b>								
1. Non-current assets	173	799	0.78	.97	626	1.19	361.85	3.41
Fixed assets	173	799	0.78	.97	626	1.19	361.85	3.41
2. Current assets	22,102	39,831	99.22	98.03	17,729	-1.19	80.21	96.59
Inventory	4,114	10,047	18.47	24.73	5,933	6.26	144.21	32.32
Accounts receivable	17,780	22,007	79.82	54.16	4,227	-25.66	23.77	23.03
Short-term financial investment	0	3,500	0.00	8.61	3,500	8.61	0.00	19.07
Cash	208	4,277	0.93	10.53	4,069	9.59	1,956.25	22.17
Total Assets	2,2275	40,630	100.00	100.00	18,355	0.00	82.40	100.00
<b>LIABILITIES</b>								
3. Equity	1,309	11,646	5.88	28.66	10,337	22.79	789.69	56.32
4. Long-term liabilities	0	0	00	0.00	0	0.00	0.00	0.00
5. Current liabilities, including	20,966	28,984	94.12	71.34	8,018	-22.79	38.24	43.68
Accounts payable	20,775	26,974	93.27	66.39	6,199	-26.88	29.84	33.77
Total Liabilities	22,275	40,630	100.00	100.00	18,355	0.00	82.40	100.00

According to table 2, over the year, Assets have grown by 18,355 thousand Russian Rubles (82.40%) owing to the growth of Non-Current Assets by 626 thousand Russian Rubles (3.41%) and Current Assets by 17,729 thousand Russian Rubles (96.59%). As of the end of the year, the majority of Assets was represented by Current Assets (98.03%), with Non-Current Assets constituting only 1.97% of the entity's Total Assets, which is explained by the specifics of the company's business of selling and maintaining boiler equipment. As for the Assets structure, the largest percentage is that of Accounts Receivable (54.16%). However, the share of Accounts Receivable does not exceed the share of Accounts Payable, which is a positive point since it doesn't threaten the company's financial stability. Inventory in the total structure of Assets at the end of the year amounted to 24.73%, i.e., its share grew by 6.26% or 5,933 thousand Russian Rubles, compared to the beginning of the year. It should be noted that the majority of Inventory is represented by goods for resale.

The company's Equity as of the end of the year is 28.66%, Current Liabilities – 71.34%, i.e. stable (long-term, recurrent) liabilities do not prevail in the structure of liabilities, which is a negative point. However, an increase in Equity by 10,337 thousand Russian Rubles is a positive trend in terms of financial stability.

As for the company's production facilities in 2018 (see table 3), a rather low Asset Real Value Ratio should be noted. But an increase in its volume (from 0.06 to 0.29) is a positive moment for the company's

financial stability. The Current Assets to Non-Current Assets Ratio indicates a decrease in the share of Current Assets from 127.76% to 49.85%, i.e., the share of Current Assets per 1 RUB of Non-Current Assets is smaller at the end of the year. A change in the Current Assets to Non-Current Assets Ratio in the review period indicates a growing share of Current Assets in the company's Total Assets, but with an obvious increase in Non-Current Assets. A smaller share of Non-Current Assets is explained by the specifics of the company's business of selling and maintaining boiler equipment. Moreover, it should be borne in mind that the Current Assets to Non-Current Assets Ratio limits the Debt to Equity Ratio, provided that the minimum financial stability is achieved, i.e. the company's liabilities are fully covered by its Current Assets. Financial stability is guaranteed if the following condition is met:

Table 3 – Dynamics of Company “A” Relative Financial Stability Indicators in 2018

Item No.	Indicator	As of 31/12/2017	As of 31/12/2018
Group 1. Solvency Ratios			
1	Cash ratio	0.01	0.27
2	Quick ratio	0.86	1.03
3	Current ratio	1.05	1.37
Group 2. Capital Structure Ratios			
4	Equity to Assets Ratio	0.06	0.29
5	Financial Stability Ratio	0.06	0.29
6	Debt to Equity Ratio	16.02	0.25
7	Long-Term Debt to Equity Ratio	0	0
Group 3. Fixed and Current Asset Ratios			
8	Working Capital to Inventory Ratio	0.05	0.27
9	Working Capital to Equity Ratio	0.87	0.93
10	Current Assets to Non-Current Assets Ratio	127.76	49.85
11	Asset Real Value Ratio	0.19	0.27
Group 4. Turnover and Return Ratios			
12	Assets Turnover Ratio	1.88	1.8
13	Current Assets Turnover Ratio	1.9	1.84
14	Inventory Turnover Ratio	8.27	3.79
15	Accounts Receivable Turnover Ratio	2.36	3.33
16	Accounts Payable Turnover Ratio	1.64	1.41
17	Equity Turnover Ratio	32.02	6.28

Current Assets to Non-Current Assets Ratio > Debt to Equity Ratio,

According to Table 3, this condition is met in the review period:

- as of 31/12/2017:  $127.76 > 16.02$ ,

- as of 31/12/2018:  $49.85 > 0.25$ .

Due to financial correlations between assets and liabilities, the financing arrangements should be as follows: short-term borrowings are intended for the replenishment of Current Assets, while long-term borrowings are intended for the acquisition of real estate and capital investments. In financial analysis, special attention should be paid to the capital structure and its improvement. The main criterion in such analysis is the minimization of financial risks, which is associated with the differential selection of sources of financing for various components of the entity's Assets. For this purpose, all assets are divided into 3 groups:

- Non-Current Assets;

- Permanent Current Assets, an invariable part of an entity's Current Assets that do not depend on seasonal and other fluctuations in the company's business and is considered the minimum Current Assets required by an entity to continue its current activities;

- Variable Current Assets, a variable part of an entity's Current Assets that depend on seasonal and other fluctuations in the company's business, with the average and maximum Current Assets requirements falling within the variable part of an entity's Current Assets.

There are three fundamental approaches to asset financing:

1) The conservative approach assumes that Non-Current Assets, Permanent Current Assets and half of Variable Current Assets should be financed by equity and long-term borrowed capital, while the other half of Variable Current Assets should be financed by short-term borrowed capital. This model of asset financing provides a high level of the entity's financial stability in the process of its growth;

2) The moderate (compromise) approach assumes that Non-Current Assets, Permanent Current Assets should be financed by equity and long-term borrowed capital, while Variable Current Assets should be financed by short-term borrowed capital. This model of asset financing provides an acceptable level of the entity's financial stability;

3) The aggressive approach assumes that only Non-Current Assets should be financed by equity and long-term borrowed capital, while all Current Assets should be financed by short-term borrowed capital (according to the following principle: Current Assets should correspond to short-term liabilities). This model creates serious obstacles for ensuring solvency and financial stability of the entity, although it allows to carry out current activities with minimum equity involvement [10].

Table 4 – Company "A" Assets Financing in 2018

As of December 31, 2017		As of December 31, 2018	
Assets	Asset Financing Approach	Assets	Asset Financing Approach
	Aggressive		Aggressive
Variable Current Assets	Current liabilities 94.12	Variable Current Assets	Current liabilities 71.34
19.4		35.26	
Permanent Current Assets	Equity and Long-Term Liabilities 5.88	Permanent Current Assets	Equity and Long-Term Liabilities 28.66
79.82		62.77	
Non-Current Assets		Non-Current Assets	
0.78		1.97	
Financial Stability Level	Disturbing	Financial Stability Level	Disturbing

In 2018, the company took an aggressive approach to finance its assets by using equity capital to finance Non-Current Assets and a small number of Permanent Current Assets, while short-term borrowed capital was used to finance almost all Permanent Current Assets and all Variable Current Assets. However, by the end of the year there was a change in the relation between the sources of financing and various assets. There is also a trend of increasing share of permanent sources (equity) used to finance most of Current Assets. Nevertheless, this model of asset financing can only ensure disturbing level of financial stability and can create serious obstacles for ensuring the company's solvency and financial stability, although it allows to carry out current activities with minimum equity involvement. Insufficient equity financing leads to an increase in Variable Current Assets and a decrease in Permanent Current Assets, suggesting higher financial dependence and instability of the company.

**Discussions.** This paper reviews theoretical methods of financial stability analysis: it defines the concept of financial stability and examines the factors affecting an entity's financial stability. Financial stability is the principal objective of financial analysis. The nature and scope of such economic analysis are aimed to determine the entity's internal capacities, means, and methods for improving its financial stability. Thus, financial stability is understood as the entity's guaranteed solvency and creditworthiness resulting from the effective formation, distribution, and application of financial resources in the entity's business operations. Financial stability is assessed based on the working capital to inventory ratio and debt to equity ratio.

It is proved that an entity's financial activities depend on numerous interrelated external and internal factors. It is noted that the effectiveness of financial analysis as an element of the management system and the level of financial stability largely depend on the quality of the database established and used, and the methods of evaluating its analytical capacity.

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### ҚАРЖЫ ТҰРАҚТЫЛЫҒЫ ҮШІН КАПИТАЛДЫҚ ҚҰРЫЛЫМ ТӘУЕКЕЛДІГІН ТАЛДАУДАҒЫ ӨНЕРЛІКТІЛІК

**Аннотация.** Қаржылық тұрақтылық – мүдделі тараптар тиісті кәсіпорынның қаржылық жағдайын бағалау үшін қолданатын маңызды шара. Ішкі бизнес мәселелерінен, жаһандық процестерден және халықаралық экономикалық (аймақтық) интеграциядан туындаған экономикалық алаңдаушылық субъектінің сыртқы факторларға әсерін арттыруы мүмкін. Қаржылық тұрақтылық субъектінің несие берушілер мен инвесторларға тәуелділігін, яғни қарыздан-капиталға қатынасын қарастырады. Кәсіпорынның меншікті өтімді қаражаттарымен толық қамтылмаған маңызды міндеттемелер кез-келген ірі несие беруші өзінің кез келген қарызын өтеуді талап еткен жағдайда банкроттық үшін алғышарттар жасайды. Алайда, қарыз қаражаттары меншікті капиталдың кірістілігін едәуір арттыруы мүмкін. Сондықтан қаржылық тұрақтылықты талдау кезінде ұйымның болашақ тәуекелі мен кірістілігін көрсететін көрсеткіштер жүйесін пайдалану өте маңызды.

Қаржылық тұрақтылық – қаржылық талдаудың негізгі мақсаты. Мұндай экономикалық талдаудың сипаты мен көлемі ұйымның ішкі тұрақтылығын, оның қаржылық тұрақтылығын жақсарту тәсілдері мен әдістерін анықтауға бағытталған. Осылайша, қаржылық тұрақтылық дегеніміз – субъектінің іскери операцияларында қаржы ресурстарын тиімді қалыптастыру, бөлу және қолдану нәтижесінде пайда болатын ұйымның кепілдік берілген төлем қабілеттілігі мен несие қабілеттілігі. Қаржылық тұрақтылық айналым қаражаттары мен қорлардың қатынасы мен қарыздардың меншікті капиталға қатынасы негізінде бағаланады.

Шаруашылық жүргізуші субъектілер келісімшарт бойынша серіктестермен іскерлік қатынастар орнатуда тәуелсіз; сондықтан олар қабылдаған шешімдері үшін толықтай жауап береді. Қаржылық талдаудың субъектінің жеке қаржылық жағдайы мен оның серіктестері үшін өсіп келе жатқан маңыздылығы бизнесті қаржыландырудың қосымша көздеріне деген сұраныстың артуымен және капитал ресурстарының өнімділігін жоғарылату талабымен түсіндіріледі.

Кәсіпорынның қаржылық тұрақтылығын талдау тек ағымдағы қаржылық қызметке бағытталмауы керек. Сондай-ақ, ұйымның қаржылық жағдайын сақтау және жақсарту үшін тұрақты негізде қандай шараларды қабылдау керектігін анықтауы керек. Қазіргі және болашақтағы тұрақтылық, яғни кәсіпорынның тұрақтылығы қазіргі заманғы бәсекеге қабілетті өндіріс үшін жағдай жасау үшін қамтамасыз етілуі керек.

Кәсіп - бұл көптеген ішкі жүйелерден тұратын күрделі жүйе; сондықтан оның тұрақтылығын, яғни қаржылық тұрақтылық көрсеткіштері жүйесін қолдана отырып талдаудың кешенді әдісін қолдану қажет. Абсолютті де, салыстырмалы көрсеткіштерді қоса алғанда, қаржылық тұрақтылық көрсеткіштерінің қазіргі заманғы әртүрлілігі талдауды қиын және асқындырады, бұл кәсіпорынның қаржылық тұрақтылығы туралы қорытынды жасау үшін талдау нәтижелерін біріктіруде қиындықтар туғызады. Абсолютті көрсеткіштер, атап айтқанда меншікті капитал, қарыз капиталы, активтер, ақша қаражаттары, дебиторлық және кредиторлық берешек, пайда кәсіпорынның қаржылық тұрақтылығын талдауда маңызды рөл атқарады. Қаржылық есептілікті талдау кезінде есептелген абсолютті индикаторлар: таза активтер, айналым қаражаттары, айналым қаражаттарының тауарлы-материалдық қорларға қатынасы, тұрақты міндеттемелер. Бұл көрсеткіштер критерий болып табылады, өйткені олар қаржылық талдау кезінде қолданылатын өлшемдерді белгілеу үшін қолданылады.

Кәсіпорын қаржы ресурстарының икемді құрылымына ие болуы керек және қажет болған жағдайда қаражаттарды қарызға ала алады. Осылайша, ұйымның қаржылық тұрақтылығының тағы бір көрінісі оның несие қабілеттілігі, яғни төлем міндеттемелерін уақытында өтеу мүмкіндігі болып табылады. Осылайша, егер ол несие беруге қатысты белгілі бір талапты қанағаттандырса және кез келген есептелген пайыздар ескерілсе, несиені қайтара алатын болса, несие қабілетті деп саналады. Бұл тұжырымдама қаржылық тұрақтылық тұжырымдамасымен тығыз байланысты және компания өзінің қарыздарын өтеу үшін әртүрлі көздерден қаражат жинай алатындығын көрсетеді. Несиелік талдау төлем қабілеттілігін болжауы мүмкін және төлем қабілеттілігін, қаржылық тұрақтылықты және меншікті капиталдың тиімділігін талдаумен тығыз байланысты. Субъектінің тұрақты жұмысы, жоғары рентабельділігі және айналым қаражаттары айналымы белгілі бір дәрежеде несиені қайтаруға кепілдік береді.

**Түйін сөздер:** автоматика, қаржылық тұрақтылық, өтімділік, төлем қабілеттілік, экономикалық талдау

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## **ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В АНАЛИЗЕ ВЛИЯНИЯ СТРУКТУРЫ КАПИТАЛА НА ФИНАНСОВУЮ УСТОЙЧИВОСТЬ**

**Аннотация.** Финансовая стабильность является важной мерой, используемой заинтересованными сторонами для оценки финансового положения соответствующего предприятия. Экономические проблемы, вызванные внутренними проблемами бизнеса, глобальными процессами и международной экономической (региональной) интеграцией, могут увеличить подверженность предприятия внешним факторам. Финансовая стабильность учитывает зависимость предприятия от кредиторов и инвесторов, то есть отношение долга к собственному капиталу. Значительные обязательства, которые не полностью покрываются за счет собственных ликвидных средств предприятия создают предпосылки для банкротства, если какой-либо крупный кредитор потребует урегулирования любых долгов перед ним. Однако заемные средства могут значительно увеличить рентабельность собственного капитала. Поэтому при анализе финансовой устойчивости очень важно использовать систему показателей, которые указывают на будущие риски и доходность предприятия.

Финансовая стабильность является основной целью финансового анализа. Характер и сфера охвата такого экономического анализа направлены на определение внутренних возможностей, средств и методов организации для повышения ее финансовой устойчивости. Таким образом, финансовая стабильность понимается как гарантированная платежеспособность и кредитоспособность предприятия в результате эффективного формирования, распределения и применения финансовых ресурсов в деловых операциях предприятия. Финансовая устойчивость оценивается на основе соотношения оборотного капитала и запасов и отношения долга к собственному капиталу.

Хозяйствующие субъекты независимы в установлении деловых отношений со своими контрагентами; поэтому они несут полную ответственность за принимаемые ими решения. Возрастающая важность финансового анализа для финансового положения предприятия и его деловых партнеров объясняется растущей потребностью в дополнительных источниках финансирования бизнеса и необходимостью повышения продуктивности капитальных ресурсов.

Анализ финансовой устойчивости предприятия не должен фокусироваться только на текущей финансовой деятельности. Следует также определить, какие меры следует принимать на постоянной основе для поддержания и улучшения финансового положения предприятия. Должна быть обеспечена как текущая, так и будущая стабильность, то есть устойчивость предприятия, чтобы обеспечить условия для современного конкурентоспособного производства.

Сущность - это сложная система, состоящая из множества подсистем; поэтому для анализа его устойчивости необходимо применять сложный метод, т.е. использовать систему показателей финансовой устойчивости. Современное разнообразие показателей финансовой устойчивости, включая как абсолютные, так и относительные показатели, делает анализ сложным и чрезмерно сложным, создавая трудности при объединении результатов анализа, чтобы сделать выводы о финансовой устойчивости предприятия. Абсолютные показатели, а именно собственный капитал, заемный капитал, активы, денежные средства, дебиторская и кредиторская задолженность, прибыль, играют важную роль в анализе финансовой устойчивости предприятия. Не менее важными являются абсолютные показатели, рассчитанные при анализе финансовой отчетности: чистые активы, оборотные средства, соотношение оборотных средств и запасов, стабильные обязательства. Эти показатели являются критериальными, так как они используются для установления критериев, используемых в финансовом анализе.

Предприятие должно иметь гибкую структуру финансовых ресурсов и, при необходимости, иметь возможность занимать средства. Следовательно, еще одним проявлением потенциальной финансовой устойчивости организации является ее кредитоспособность, то есть способность своевременно погашать свои платежные обязательства. Таким образом, предприятие считается кредитоспособным, если оно удовлетворяет определенным требованиям по предоставлению кредита и способно погасить кредит в установленный срок с учетом начисленных процентов. Эта концепция тесно связана с концепцией финансовой устойчивости и показывает, способна ли компания привлекать средства из разных источников для погашения своих долгов. Кредитный анализ может прогнозировать платежеспособность и тесно связан с анализом платежеспособности, финансовой устойчивости и рентабельности капитала. Стабильная деятельность предприятия, высокая прибыльность и оборотный капитал также в определенной степени гарантируют погашение кредита.

**Ключевые слова:** автоматизация, финансовая устойчивость, ликвидность, платежеспособность, экономический анализ.

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## **EXPLORING EFL STUDENT TEACHERS READINESS AND GENDER DIFFERENCES OF LEARNER AUTONOMY**

**Abstract.** Despite its importance for successful English as a Foreign Language (EFL) language learning and the abundance of scientific works of learner autonomy, this construct has not received decent attention in the Indonesian context. Further, gender differences in learner autonomy as an essential variable that has not been well-researched were also included in this study. The authors conducted a mix-method study to explore the fourth-year student teachers' conceptualization, attitudes, and readiness for learning autonomy by employing a 43 items questionnaire survey adapted from Karabiyik (2008) to a total of 120 participants (156 male and 164 female) and interview questions to 6 volunteers. The qualitative data implied that the participants had an insufficient understanding of learner autonomy even though they exhibited a positive attitude towards this construct. The overall results of quantitative data suggested that the student teachers were not ready for learner autonomy indicated by the tendency to teacher-centered teaching which might be accounted for by low proficiency in English reflected by low engagement virtually in the majority of the autonomous learning activities. Furthermore, in terms of gender differences in learner autonomy, the t-test results demonstrated that no significant differences between male and female student teachers in terms of the responsibilities of autonomous learning, decision-making abilities, and engagement of autonomous learning outside the class. However, a significant difference was found between genders and engagement in autonomous activities in class which favored male students than their female counterparts suggesting that the male students performed more than male students in asking questions to teachers and taking opportunities to practice their English with their peers. The authors concluded that the student teachers were not ready for autonomous learning even though they had a positive attitude. Thus, the authors recommended the teachers to implement teaching methods, for instance, Project-Based Learning which might help to promote learner autonomy in the Indonesian context.

**Key words:** learner autonomy, student teachers, readiness, autonomous learning, gender.

**Introduction.** The notion of learner autonomy has attracted considerable attention in language learning and research on foreign language learners over the last four decades (e.g., Holec, 1981, 1988; Dam, 1995; Benson & Voller, 1997; Benson, 2001; Chan et al. 2002; Lamb, 2004; Borg & Al-Busaidi, 2012; Borg & Alshumaimeri, 2017; Juan & Yajie, 2018; Cirocki et al. 2019; Kartal & Balcikanli, 2019). Not only learner autonomy is considered as an essential construct in language learning and research, but learner autonomy is also regarded as a desirable goal both in second and foreign language learning and teaching (Al-Busaidi & Al-Maamari, 2014; Benson & Huang, 2008; Borg & Alshumaimeri, 2007; Chan et al. 2002).

Many scholars have attempted to define learner autonomy; nevertheless, no consensus on the definition has arrived until today. However, Holec's (1981) definition is the most cited in the literature. He defines learner autonomy as 'the ability to take charge of one's own learning' translated as to have and hold the responsibilities for deciding on all learning aspects. Similarly, Benson (2011) views learner autonomy as the capacity to take control of one's learning. Meanwhile, other scholars see learner autonomy as ability and willingness to take responsibility for learning (Littlewood, 1996) or an ability for objectivity, critical reflection, decision making, and independent actions (Little, 1991; Atayeva, Basikin, Kassymova, Sydyk, Triyono, Arpentieva, Dossayeva, Klepach, & Kivlenok, 2019).

The importance of learner autonomy is attached on its close relationship with various supportive aspect of language learning such as motivation in learning language (Alkan & Arslan, 2019; Chan et al., 2002),



language proficiency (Myartawan et al. 2013; Jafari et al. 2017), and high engagement of autonomous language learning activities both inside and outside the classroom (Lamb, 2004), and high use of language learning strategies (Oxford, 2015). More importantly, a highly autonomous learner is claimed to be able to set their own goals, identify and develop learning strategies, to select relevant learning sources and appropriately assess his/her learning performance (Chan, 2001).

Numerous studies in different contexts have been conducted on the learner to teachers or students or both of them. Some themes emerged from the studies were student readiness for autonomy (Chan et al. 2002; Chikwa, 2018; Cirocki et al. 2019; Kartal & Balcikanli, 2019; Liu, 2011), gender differences in learner autonomy (Bekleyen & Selimoglu, 2016; Orawiwatnakul & Wichadee, 2017; Raziyeah & Amir, 2013; Yan & Ruimei, 2019;), students' perception of learner autonomy (Yildirim, 2012; Fazarani, 2014; Khalil & Ali, 2018; Tayjasant & Suraratdecha, 2016; Balcikanli, 2010), and the practice of learner autonomy or autonomous language learning (Lamb, 2004; Lin & Reinders, 2019; Neissi & Hussin, 2017). These continuous scientific works have developed the body of literature which strongly suggest that learner autonomy is an essential construct for successful learning and teaching in education.

Regardless, despite the abundance of scientific works and the popularity of learner autonomy, in the Indonesian context, learner autonomy has not received decent attention from scholars. In other words, empirical findings on LA in the Indonesian context are still limited. Some studies of learner autonomy have been conducted to teacher or teachers and students to find out their belief and practice on learner autonomy (Lengkanawati, 2017; Darsih, 2018), to explore teacher understanding of LA (Agustina, 2017), and to reveal learner autonomy practice in Indonesian 2013 curriculum (Ramadhiyanti & Lengkanawati, 2019), teachers and students' perception of autonomous language learning (Khotimah et al. 2019).

Meanwhile, the studies of learner autonomy involving students or learners focused on students' practices of autonomous language learning outside and inside the class (Lamb, 2004), the use of self-access learning center and autonomous language learning (Furaidah & Suharmanto, 2008), correlation between learner autonomy and English proficiency (Myartawan et al. 2013), and learner readiness of learner autonomy (Cirocki et al. 2019).

Prior to limited number of studies of learner autonomy researched on students in the Indonesian context, the authors were motivated to conduct this study. The difference between this study and the previous studies was this study involved student teachers who have not been considered to explore pertaining to their readiness for learner autonomy. Another difference between this study and previous studies on student teachers and learner autonomy, this study explored student teachers' conceptualization and attitude of learner autonomy and gender differences on the readiness of autonomy, which are still left unnoticed and demand more empirical findings.

**Method.** The participants of this study were 120 fourth-year student teachers consisted of 156 male and 164 female students of a private student-teacher teaching institute in Pontianak, West Kalimantan. All of the student teachers in this study had completed their teaching practice as one of the pre-requisites to pass the semester in which each individual was assigned to a particular area nearby the city or to their hometown to teach English in secondary schools for six months. The reason why the authors only included the student teachers of the fourth year was due to the reason that these students had experienced teaching students in classroom from their teaching practices which could provide more insights based on their practical experience and theoretical knowledge from their actual teaching practice and study during the previous semesters.

This study followed a mix-method design that combined both quantitative and qualitative data. The authors collected quantitative data by administering a questionnaire to the participants and qualitative data through a structured interview. Besides, quantitative data comprised of student teachers' readiness of autonomy covered students' perceptions of their own and their teachers' responsibilities in autonomous learning, their abilities in decision-making related, activities of autonomous learning in and out of the class. Whereas qualitative data covered students' conceptualization of learner autonomy and their attitudes towards learner autonomy.

The authors deployed two instruments in this study. The first instrument was a questionnaire, Learner Autonomy Readiness Questionnaire, adapted from Karabiyik (2008) which was initially developed by Chan, Spratt and Humphreys (2002) to investigate tertiary EFL student readiness of learner autonomy in Hong Kong. The questionnaire was then adapted in different contexts and translated into different languages. In Karabiyik's (2008) version, no significant changes were made. The questionnaire comprised of 43 items

divided into three sections. The first section comprised 13 items assessing students' perceptions of their responsibilities and their teachers' responsibilities in the language learning process. In the second section, there were 10 items asking students to assess their abilities in making a decision to act autonomously, and the last section consisted of 20 items revolving around students' actual practices of autonomous language learning activities outside the class and in the class.

As for the qualitative data, the authors borrowed two first questions constructed by Chan, Spratt, and Humphreys (2002). The questions were: 1) what is your definition of learner autonomy?; 2) do you consider learner autonomy important? Why? Why not?. Both of the questions were aiming at exploring students' understanding of learner autonomy and attitudes towards learner autonomy.

In collecting the data, the authors conducted two main procedures. In the first step, the authors came to the classroom for two different days. On the first day, the authors distributed the questionnaire to the two classes in the morning time from class A morning to class B morning. The next day, the authors came again to the last two classes of afternoon time, A afternoon class, and B afternoon class. In each class, before administering the questionnaire, the authors briefly explained the purpose of the questionnaire and provided times for the participants to read and ask questions related to the statements in the questionnaire. At the end of each administration, the authors requested some students who would like to volunteer for the interview to provide their phone number.

On the fourth day, the authors invited the volunteers to meet on the campus for the interview. Seven volunteers attended the authors's invitation. However, for acquiring even numbers of male and female students, one student was not involved in the interview session. The interview lasted for 30 minutes for two sessions in which each volunteer was interviewed one by one. The interview was recorded and videotaped for the sake of transcribing and a better understanding of volunteers' answers to the questions.

The data of this study comprised of quantitative (questionnaire) and qualitative (interview) data. Qualitative data gathered through the interview was transcribed and grouped based on two themes, namely students' understanding of learner autonomy and attitudes towards learner autonomy. Meanwhile, quantitative data in the form of questionnaire results were analyzed according to Oxford's (1990) mean classification method. Mean scores that are between 1.0 and 2.4 were categorized as low. Mean scores that ranged from 2.5 and 3.4 were considered as 'medium.' Mean scores that are between 3.5 and 4.0 were considered as 'high.' Moreover, in order to test if significant differences exist between gender and the variables in the questionnaire, the authors performed an independent sample t-test at 0.05 level of confidence ( $P = 0.05$ ). Also, percentages mean scores and standard deviation were also calculated after the raw data had been computed into SPSS.

**Result and discussion.** The results of this study are presented in three folds: a) the student teachers' perception of learner autonomy (conceptualization and attitude towards learner autonomy), b) student teachers' readiness of learner autonomy (their perception on their own and their teachers' responsibilities, decision-making abilities, and the practice of autonomous activities in and out the classroom), c) differences in terms of student teachers' readiness of learner autonomy and gender. The overall findings suggested that the student teachers are not ready for learner autonomy supported by their limited conception of learner autonomy, low practices of autonomous language learning activities outside the class and in-class in which the majority of the items were at a low level. This low level of readiness might be accounted by the cultural barriers (Sinclair et al. 2000) to learner autonomy in Indonesian context as learner autonomy initially comes from European countries or appears firstly in western context (Pennycook, 1997) which might be still difficult to be adopted (Dardjowidjojo, 2006).

**Students' perception of learner autonomy.** The following were the results of the interview focusing on two questions to discover student teachers' understanding, familiarity and attitude towards learner autonomy.

**a) How do student teachers define learner autonomy?**

S1: I think it (learner autonomy) is to learner rights to get what he deserves in learning by the help or guidance by the teacher.

S2: In my opinion, learner autonomy is when students realize that he/she is the one who should be active in learning.

S3: I think it is about learner ability to set out what he needs to learn

S4: learner autonomy is learner rights to be heard by the teacher about his/her needs in learning

S5: learner autonomy, in my opinion, is the dependence of learners on him/herself in achieving their learning goals.

S6: it (learner autonomy) is about students' active involvement in fulfilling his goals in learning and improving his language skills.

**b) Do student teachers think learner autonomy is important in language learning? Why? Why not?**

S1: yes, it (learner autonomy) is important because it makes learners become active knowledge seekers and will also develop their sense of responsibility for their own study.

S2: I think learner autonomy can be a help teacher to teach what the students need.

S3: I think it (learner autonomy) is quite crucial to reduce students' dependency on teachers which allow the learners to expose him/herself more to the target language by using any resources available both online (internet) or offline (English storybooks or English newspaper)

S4: I think learner autonomy is crucial because not only it helps the learner to be active in learning in the classroom but also outside the class

S5: yes, it (learner autonomy) will enable students to be a warrior for his own improvement by using any means available, and it also will keep them motivated to better their learning.

S6: I consider learner autonomy important because it helps learners to be brave in deciding on what he/she wants to find out in learning language based on his or her needs.

In terms of student-teacher conceptualization of learner autonomy, it seems that most of the student teachers defined learner autonomy as students' active involvement, learning needs, and responsibility of their learning with little guidance from the teachers. This keywords shows that student teachers have a reasonably good understanding of learner autonomy.

Moreover, when asked about their attitude towards learner autonomy, the participants showed a positive attitude towards learner autonomy. They considered learner autonomy beneficial to student progress in learning, which at the same time increase student motivation and sense of learning responsibility. This finding is similar to Chan et al. (2002) and Balcikanli (2010), who found out that the students had a fair understanding and positive views on the prospect of learner autonomy. However, contrary to the findings of Cirocki et al. (2019) which demonstrated that the majority of senior high school students in East Java were not familiar with the concept of learner autonomy. This gap of knowledge might be caused by the level of education and exposure to English language learning between secondary students and student teachers in tertiary education.

***Students' perception of their own and teacher responsibility in the classroom.*** The questionnaire of student readiness of learner autonomy was employed to explore the participants' readiness of autonomy, as mentioned in the outset. The first result, as showcased in table 1, deals with student teachers' perceptions of their own and their teachers' responsibilities in the teaching and learning activities during their study.

Table 1 demonstrates that *making sure the students progress in learning outside class, raising interest in learning the English language, making them more determined and persistent in learning, and deciding what to learn outside class* are mostly students' responsibilities, as mentioned by the participants. On the contrary, *determining learning goals in English courses, deciding what the students should learn next, choosing types of activities in English lessons, choosing the right materials in learning English, setting the time for learning in the classroom, evaluation learning and course* are regarded as teachers' responsibility. Meanwhile, *making sure the students making progress during English lessons and identifying students' weaknesses in learning* are viewed as shared responsibilities between students and teachers.

Regarding the student teachers' perception of their responsibilities of learner autonomy, the participants regarded virtually all responsibilities in classroom belong to the teachers, whereas a few responsibilities outside the class such as making sure to make progress outside the classroom, increasing their interest in language learning, and determining what to learn outside class as the students' responsibilities. These results indicated that in reality, the practice of learner autonomy is not well-fostered in this context which implies teacher domination in the teaching and learning process. This result is similar to those by (Bekleyen and Selimoglu, 2016; Yildirim, 2012; Chan, Spratt and Humphreys, 2002) in which the students regarded their teachers to be responsible for aspects related to methodology or students progress in the classroom. Meanwhile, as for the aspects related to learning outside the classroom, for instance, deciding what to learn and how to assess their learning, the students had a medium degree of beliefs that those aspects were their responsibilities.

Table 1 – Students’ Perceptions of their own and their teachers’ responsibilities

In English lessons, whose responsibility should it be to,	Completely the teacher’s		Mostly the teacher’s partly mine		Half mine, half the teacher’s		Mostly mine, partly the teacher’s		Completely mine		M	SD
	f	%	f	%	f	%	f	%	f	%		
1. make sure you progress during lessons	1	.8	23	19.2	71	59.2	21	17.5	4	3.3	3.03	.733
2. make sure your make progress outside class.	5	4.2	7	5.8	28	23.3	51	42.5	29	24.2	3.77	1.019
3. stimulate your interest in learning English	1	.8	10	8.3	40	33.3	51	42.5	18	15	3.63	.870
4. identify your weaknesses in English	5	4.2	10	8.3	43	35.8	42	35	20	16.7	3.83	1.042
5. make you work harder	1	.8	4	3.3	22	18.3	57	47.5	36	30	4.03	.835
6. decide the objectives of the English course	37	30.8	65	54.2	15	12.5	2	1.7	1	.8	1.88	.751
7. decide what you should learn next	39	32.5	58	48.3	13	10.8	7	5.8	3	2.5	1.98	.948
8. choose what activities to use in your English lessons	39	32.5	59	49.2	15	12.5	5	4.2	2	1.7	1.93	.877
9. decide how long to spend on each activity	33	27.5	56	46.7	19	15.8	7	5.8	5	4.2	2.13	1.017
10. choose what materials to use in your English lessons	28	23.3	62	51.7	17	14.2	7	5.8	6	5	2.18	1.018
11. evaluate your learning	20	16.7	54	45	35	29.2	7	5.8	4	3.3	2.34	.939
12. evaluate your course	37	30.8	46	38.3	25	20.8	6	5	6	5	2.15	1.074
13. decide what you learn outside the class	0	0	3	2.5	17	14.2	52	43.3	48	40	4.21	.777

**Students’ perception of their ability in decision-making in the classroom.** In terms of student teachers’ abilities in making the decision in the classroom, by looking at the mean scores, the participants rated themselves as ‘very good’ in *choosing learning activities and objectives outside the classroom, evaluating their own learning and course and identifying their own weaknesses in learning English*. The authors presented the result in more detail in table 2.

Table 2 – Students’ Decision-Making Abilities

How do you think you would be at:	Very Poor		Poor		OK		Good		Very Good		M	SD
	f	%	f	%	f	%	f	%	f	%		
14. choosing learning activities in class?	0	0	12	10	53	44.2	47	39.2	8	6.7	3.43	.763
15. choosing learning activities outside class?	0	0	2	1.7	27	22.5	58	48.3	33	27.5	4.02	.756
16. choosing learning objectives in the class?	20	16.7	64	53.3	25	20.8	7	5.8	4	3.3	2.26	.921
17. choosing learning objectives outside the class	1	.8	3	2.5	31	25.8	55	45.8	30	25.0	3.92	.826
18. choosing learning materials in the class?	23	19.2	72	60	19	15.8	5	4.2	1	.8	2.08	7.69
19. choosing learning materials outside the class?	0	0	3	2.5	64	53.3	43	35.8	10	8.3	3.50	.686
20. evaluating your learning	1	.8	0	0	33	27.5	68	56.7	18	15	3.85	.694
21. evaluating your course	0	0	0	0	35	29.2	67	55.8	18	15	3.86	.652
22. identifying your weaknesses in learning English	0	0	0	0	37	30.8	68	56.7	15	12.5	3.82	.635
23. deciding what you should learn next in your English lessons	0	0	16	13.3	39	32.5	63	52.5	2	1.7	3.43	.741

The result above suggested that the student teachers perceived themselves to be very good at choosing learning activities and objectives outside classrooms, in evaluating their own learning and course, and at identifying their weaknesses. The confidence of the abilities to make decisions related to learner autonomy in class seems to be hindered by the actual situation where the students still regard their teachers as most responsible for all classroom-related autonomous learning activities. In other words, the student teachers were sure of their abilities to make decision-related to learner autonomy, but they put the teachers as more capable and had higher authorities in making decision-related to learner autonomy practices in the classroom. Another factors which contributed to this situation might arise from the lack of experience and knowledge of learner autonomy by the students (Faharani, 2014 & Atayeva, Putro, Kassymova, & Kosbay, 2019) and students low engagement of autonomous activities indicating medium or even low English language proficiency. Thus, the teachers might prefer to make all the decisions than sharing chances to students whose English proficiency were not sufficient enough to help deciding what needs to be done in the classroom.

**Students autonomous language learning activities outside and inside the classroom.** The next part of the questionnaire is related to the autonomous language learning activities performed by the students outside the classroom. According to the mean scores in table 3 indicates that most of the activities were practiced rarely, for instance, *sending letters to pen-friends* ( $M=1.22$ ) *speaking with native English speakers* ( $M=1.3$ ), *attending a self-study center* (2.13), except for *listening to music and watching English movies* which were attended or engaged by students quite frequently.

Table 3 – Students' Engagement in Autonomous Activities outside the Class

In your last academic term, outside of class, without having been assigned to do so, how often did you:	Never		Rarely		Sometimes		Often		M	SD
	f	%	f	%	f	%	f	%		
24. read grammar books on your own?	37	30.8	50	41.7	22	18.3	11	9.2	2.06	.929
25. note down new words and their meanings?	10	8.3	56	46.7	39	32.5	15	12.5	2.49	.820
26. send letters to your pen-friends?	94	78.3	26	21.7	0	0	0	0	1.22	.414
27. read newspapers in English?	38	31.7	61	50.8	20	16.7	1	.8	1.87	.709
28. send e-mails in English	38	31.7	67	55.8	13	10.8	2	1.7	1.83	.682
29. read books or magazines in English?	1	.8	71	59.2	40	33.3	8	6.7	2.46	.634
30. watch English TV programs	12	10	73	60.8	29	24.2	6	5	2.24	.698
31. listen to English radio?	12	10	70	58.3	33	27.5	5	4.2	2.26	.692
32. listen to English songs?	0	0	0	0	48	35.6	72	60	3.69	.492
33. speak English with native speakers?	82	68.3	38	31.7	0	0	0	0	1.32	.467
34. practice using English with friends?	0	0	75	62.5	40	33.3	5	4.2	2.42	.574
35. watch English movies?	0	0	0	0	29	24.2	91	75.8	3.76	.430
36. write a diary in English?	11	9.2	73	60.8	30	25	6	5	2.26	.692
37. use the internet in English?	0	0	7	5.8	83	69.2	30	25	3.19	.523
38. review your written work on your own?	4	3.3	60	50	46	38.3	10	8.3	2.52	.698
39. attend a self-study centre?	12	10	81	67.5	27	22.5	0	0	2.13	.559
40. talk about your teacher about your work?	20	16.7	75	62.5	22	18.3	3	2.5	2.07	.670

Table 4 – Students' engagement in autonomous activities in the class

In your last academic term, in class, how often did you:	Never		Rarely		Sometimes		Often		M	SD
	f	%	f	%	f	%	f	%		
41. ask the teacher questions when you do not understand?	1	.8	85	70.8	22	18.3	12	10	2.83	6.74
42. make suggestions to the teachers?	34	28.3	78	65	8	6.7	0	0	1.78	55.3
43. take opportunities to speak English?	0	0	48	40	60	50	12	10	2.70	.643

Table 4 presents the student teachers’ engagement in autonomous activities in their classes in the last academic term. The findings reveal that *asking questions to the teacher when confusing arises* and *taking a chance to speak English in the class* are neither highly or poorly engaged but only sometimes performed by the students, meanwhile, *making suggestions to the teacher* is rarely done by the students.

A myriad of autonomous language learning activities inside and outside the class are aiming at developing learner autonomy and their proficiency in the English language. Regarding the activities outside the classroom, the student teachers only frequently engaged in two activities, which were listening to English songs and watching English movies. Meanwhile, the rest of the activities seems to be less attractive or considered useful or might not be feasible to be conducted by the students. Their practices of autonomous language learning outside the class might imply their low level of English proficiency. This result was similar to those work of Kartal & Balcikanli (2019) , Faharani (2014), and Atayeva, Ciptaningrum, Hidayah, Kassymova, Dossayeva, and Akmal, (2019) who also discovered that only watching English movies and listening to English songs as the most frequently engaged by the learners.

Regarding in-class activities of learner autonomy, all of the three activities were not well-engaged by the participants. The lowest level among the three activities was to make suggestions to the teacher, which virtually had never been done by the students. This could be accounted for the low practice of autonomous activities in almost all items or perhaps the cultural situation, which views this activity to be less polite for students to do so since the teachers were perceived as having more authority and knowledge than the students.

**Autonomous Learning Responsibilities and Gender.** According to the results presented in table 5 below, the discrepancies of perceptions on the responsibilities related to autonomous learning among female and male student teachers were nearly absent except a few, which was salient in items 6, 10 and 12. Even though both sex opposites agreed that deciding the learning objectives, making the decision on materials to use for learning, and evaluating the course were teachers’ responsibility, male students ultimately gave up them to teachers and female students, though small, still viewed that they had a small portion of responsibilities to participate.

Table 5 – Responsibilities Related to Autonomous Learning of English and Gender

In English lessons, whose responsibility should it be to	Gender	Responsibility		
		Yours	Your Teacher	Both
1. make sure you make progress during lessons	Males	14,1%	25%	45.1%
	Females	23,5%	15,7%	60.9%
2. make sure your make progress outside class.	Males	75%	5,4%	19.6%
	Females	59,4%	14,1%	26.6%
3. stimulate your interest in learning English	Males	59,4%	1,8%	28.6%
	Females	73,5%	6,3%	20.3%
4. identify your weaknesses in English	Males	69,6%	3,6%	26.8%
	Females	51,6%	12,5%	35.9%
5. make you work harder	Males	92,8%	0%	7.1%
	Females	64,1%	7,9%	28.1%
6. decide the objectives of the English course	Males	0%	89,3%	10.7%
	Females	4,7%	81,2%	14.1%
7. decide what you should learn next	Males	7,2%	82,9%	8.9%
	Females	9,4%	88,2%	12.5%
8. choose what activities to use in your English lessons	Males	5,4%	94,2%	10.7%
	Females	6,3%	76,8%	14.1%
9. decide how long to spend on each activity	Males	10,7%	70,3%	16.1%
	Females	9,4%	72,6%	15.6%
10. choose what materials to use in your English lessons	Males	0%	85,1%	5.4%
	Females	21,8 %	65,4%	21.9%
11. evaluate your learning	Males	10,7%	64,9%	26.8%
	Females	7,8%	78,4%	31.3%
12. evaluate your course	Males	1,8%	85,2%	12.5%
	Females	17,2%	61,7%	28.1%
13. decide what you learn outside the class	Males	92,9%	46,9%	5.6%

As for the rest of the items, both view most of the responsibilities as the teachers' and only *making sure to make progress in the class* was seen as a shared responsibility between the students and the teachers. In other words, the results displayed in table 6 suggests that both genders perceived themselves as having more or less similar responsibilities in autonomous learning of English.

**Decision-making abilities and gender.** Based on the results demonstrated in table 6 ( $\alpha = 0.997 \geq 0.05$ ), there was no statistically significant differences found in the student teachers' abilities to decide in the classrooms in terms of gender. In other words, both opposite-sex regards themselves as having similar abilities to make decision-related to autonomous learning in the classroom.

Table 6 – Decision-Making Abilities and Gender

		N	Mean	Standard Deviation	Standard Error Mean	Significance
Decision-Making Abilities	Male	56	3.45	0.23	0.0310	0.997
	Female	64	3.38	0.24	0.0311	

**Engagement in autonomous activities outside the class and gender.** According to the table below, the results of the t-test showed that both male and female student teachers engage similarly in various activities of autonomous learning outside the class ( $\alpha = 0.939 \geq 0.05$ ). This result means that no statistically significant difference existed between the opposite gender's practices of autonomous activities outside their classrooms.

Table 7 – Engagement in Autonomous Activities outside the Class

		N	Mean	Standard Deviation	Standard Error Mean	Significance
Autonomous activities outside the class	Male	56	2.29	0.16	0.0214	0.939
	Female	64	2.38	0.18	0.0226	

**Engagement in autonomous activities in class and gender.** Looking at the results of the t-test in table 8 above, statistically, significant differences were exhibited by male and female student teachers ( $\text{sig} = 0.02 \leq 0.05$ ) in terms of their practices or engagements in autonomous practices in the class. In other words, male students seemed to be more frequently in asking teachers when they were confused, making suggestions to teachers, and taking more chances than female students to speak in the target language compared to female students.

Table 8 – Engagement in Autonomous Activities in Class

		N	Mean	Standard Deviation	Standard Error Mean	Significance
Autonomous activities in class	Male	56	2.31	0.32	0.042	0.02
	Female	64	2.26	0.39	0.049	

In terms of gender differences of learner autonomy readiness, a significant difference only exists in class autonomous activities, whereas in terms of responsibilities and abilities to make decision-related to learner autonomy, both opposite sex regarded themselves to be quite similar. Further, even though asking a question to the teacher, making a suggestion, and taking a chance were rarely performed by student teachers, male students seem to dominate these activities. This result might be due to the level of confidence or bravery of the students in which generally, in this context, male students to be more active than female students in the classroom. similar finding was also yielded by the study conducted by Yan & Ruimei (2019) where their male participants had more active participation in making suggestion to their teachers compared to female students.

Additionally, pertaining to gender and learner autonomy readiness of LA, except for autonomous learning inside the class, several previous studies supported that no significant difference in terms of gender and autonomous learning (Cirocki et al. 2019; Razeq, 2014; Razieyeh and Amir, 2013). They discovered

that no significant differences between male and female students in terms of their practices of autonomous language learning activities outside the class. However, contrary the result above, other studies which were carried out to highly proficient and motivated learners showed that female students tended to performed better in autonomous learning compared to their male counterparts (Jafari, Ketabi, and Tavakoli, 2017; Alkan and Arslan, 2019). The reason why no difference existed to between genders and learner readiness of autonomy in this context might be due to their low engagement of autonomous learning or low English proficiency or perhaps cultural barriers where students still viewed their teachers as having higher authorities or more responsibilities for the learning.

**Conclusion.** This study explored the fourth-year student teachers at a private teaching institute in Pontianak, West Kalimantan of their conceptualization and attitude of learner autonomy, the readiness of learner autonomy, and gender differences related to LA readiness. Even though the participants had a fair understanding and attitude of learner autonomy; however, they were not ready for learner autonomy indicated by the perception, which still supports teacher domination in the classroom. Moreover, the low engagement in autonomous language learning activities both in class and outside the class might be due to their low proficiency in English.

This situation should be taken into account by the institution to re-examine the teaching practice to support student teachers' development of learner autonomy by encouraging students to practice more autonomous activities outside the classroom to enhance their language proficiency. Moreover, the teachers or lecturers should be able to come up with strategies that support more involvement from the students, for instance, providing students chances to involve in the decision-making process and be more responsible for their progress by using project-based learning.

As for the future study, investigating the readiness of learner autonomy might provide better insights on how poor and good students engage in a myriad of autonomous language learning activities. Besides, a further qualitative study is in need to shed light on the factors causing a low level of readiness for learner autonomy in the Indonesian context.

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#### **EFL БОЛАШАҚ ОҚЫТУШЫЛАРЫН ЖӘНЕ АВТОНОМДЫ ТҮРҒЫДА ОҚИТЫН СТУДЕНТТЕРДІҢ ГЕНДЕРДІК АЙЫРМАШЫЛЫҒЫ ЗЕРТТЕУ**

**Аннотация.** Шет тілі (EFL) ретінде ағылшын тілін ойдағыдай меңгерудің маңыздылығына және оқушылардың автономиясының ғылыми еңбектерінің көптігіне қарамастан, бұл зерттеу Индонезия контекстінде лайықты назар аударған жоқ. Сонымен қатар, оқушылардың автономиясындағы гендерлік айырмашылықтар маңызды зерттелмеген айнымалы болып табылады. Зерттеуде үш негізгі бөліктің айналасында үш мақсат қойылды: 1) оқушы автономиясының тұжырымдамасы мен қатынасы, 2) оқушы автономиясының дайындығы және 3) оқушы автономиясының гендерлік айырмашылықтары. Нақтырақ айтсақ, авторлар жоғарыдағы мақсаттарды көрсететін келесі сұрақтарды тұжырымдады:

1. Оқушылардың оқушы дербестігі туралы түсінігі нені білдіреді:

а) олардың оқушы дербестігі туралы тұжырымдамасы

б) оқушылардың дербестігі маңыздылығы туралы олардың пікірі

2. Оқушылардың автономдылыққа дайындығы дегеніміз не?

а) олардың жауапкершілікті түсінуі және мұғалімдердің оқушылардың дербестігі алдындағы жауапкершілігі?

б) олардың сыныпта шешім қабылдау қабілетін олардың қабылдауы.

в) Сабақтан тыс уақытта автономды тілдік оқу іс-әрекеттері.

г) сыныптағы автономды тілдік оқу іс-әрекеті.



3. Студенттер оқытушыларының оқушылардың дербестігі мен жынысы арасында айтарлықтай айырмашылықтар бар ма?

Авторлар төртінші курс студенттерінің мұғалімдерінің концептуализациясын, көзқарастарын және автономияны үйренуге дайындығын зерттеу үшін «Карабийік» (2008) 43 қатысушыдан (156 ер адам және 164 әйел адам) бейімделген 43 сұрақтан тұратын анкеталық сауалнаманы қолдана отырып, 6 еріктіге сұхбат сұрақтарын беру әдісі арқылы зерттеу жүргізілді. Сапалық мәліметтер қатысушылардың бұл құрылысқа оң көзқарасын білдірсе де, оқушылардың дербестігі туралы жеткіліксіз түсініктерін көрсетті. Сандық мәліметтердің жалпы нәтижелері студенттердің оқытушылары автономды оқу іс-әрекетінің көпшілігінде ағылшын тілінің төмен деңгейімен түсіндірілетін, мұғалімге негізделген оқытуға бейімділігімен оқушылардың автономиясына дайын емес екендігін көрсетті. Сонымен қатар, оқушылардың автономиясындағы гендерлік айырмашылықтар тұрғысынан, t-тестілеу нәтижелері ерлер мен әйел мұғалімдері арасында автономды оқытудың, шешім қабылдау қабілетінің және сабақтан тыс уақыттағы автономды оқытудың міндеттеріне қатысты айтарлықтай айырмашылықтар жоқ екенін көрсетті. Алайда, гендерлер мен сыныптағы автономды жұмыстарға қатысу арасында айтарлықтай айырмашылық анықталды, бұл ер балаларға қарағанда, мұғалімдерге сұрақ қою және құрдастарымен бірге ағылшын тілін үйренуге мүмкіндік беру кезінде ер студенттер әйел студенттерге қарағанда көбірек болды. Авторларда студенттік мұғалімдерге деген жағымды көзқараста болса да, дербес оқуға дайын емес деген қорытындыға келді. Осылайша, авторлар мұғалімдерге оқыту әдістерін, мысалы, Индонезия контекстінде оқушылардың автономиясын ілгерілетуге көмектесетін жобалық-негізделген оқытуды қолдануға кеңес берді.

**Түйін сөздер:** оқушы дербестігі, студенттер оқытушылары, дайындық, дербес оқыту, жыныс.

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### **ИЗУЧЕНИЕ УЧИТЕЛЯ СТУДЕНТОВ EFL ГОТОВНОСТИ И ГЕНДЕРНЫХ РАЗЛИЧИЙ АВТОНОМНОСТИ УЧАЩЕГОСЯ**

**Аннотация.** Несмотря на свою важность для успешного изучения английского языка как иностранного (EFL) и обилие научных работ в автономии учащихся, исследуемая тема не получила достойного внимания в индонезийском контексте. Кроме того, гендерные различия в автономии учащегося как важной переменной, которая не была хорошо изучена, также были включены в данное исследование. В этом исследовании были три цели, вращающиеся вокруг трех основных частей: 1) концептуализация и отношение автономии учащегося, 2) готовность автономии учащегося и 3) гендерные различия автономии учащегося. В частности, авторы сформулировали следующие вопросы, отражающие цели, следующим образом:

1. Как студенты воспринимают самостоятельность учащихся с точки зрения:

- а) их концептуализации автономии учащихся;
- б) их мнения о важности автономии учащихся.

2. Какова готовность учащихся к автономии учащихся с точки зрения:

- а) их восприятия личной ответственности и ответственности учителей за автономию учащихся;
- б) их восприятия способности принимать решения в классе;
- в) самостоятельного изучения языка вне класса;
- г) самостоятельного изучения языка в классе.

3. Существуют ли существенные различия между готовностью учителей к самостоятельности учащихся и их полом?

Для изучения концептуализации авторы провели исследование смешанного метода, которое заключается в отношении и готовности учителей четвертого курса к самостоятельности в обучении, используя анкетный опрос из 43 предметов, адаптированный из Карабийика (2008 г.) для 120 участников (156 мужчин и 164 женщин) и вопросы интервью для 6 добровольцев. Качественные данные подразумевали, что участники не имели достаточного понимания к самостоятельности в обучении, хотя они демонстрировали позитивное отношение к этой конструкции. Общие результаты количественных данных свидетельствуют о том, что учащиеся-преподаватели не были готовы к автономии учащихся, о чем свидетельствует склонность к преподавательскому обучению, которое может объясняться низким уровнем владения английским языком, что отражается на низком уровне участия практически в большинстве самостоятельных учебных мероприятий. Кроме того, с точки зрения гендерных различий в автономии учащихся, результаты t-теста продемонстрировали отсутствие

значительных различий между учителями-учениками мужского и женского пола с точки зрения ответственности за автономное обучение, способности принимать решения и вовлечение автономного обучения вне класса. Тем не менее, была обнаружена значительная разница между полами и вовлечением в самостоятельную деятельность в классе, которая отдает предпочтение ученикам мужского пола, а не их коллегам-женщинам, что говорит о том, что ученики мужского пола показали больше результатов, чем ученики женского пола, задавая вопросы учителям и используя возможности попрактиковаться в английском со своими сверстниками. Авторы пришли к выводу, что учащиеся-преподаватели не были готовы к самостоятельному обучению, хотя у них был позитивный настрой. Таким образом, авторы рекомендовали учителям применять методы обучения, например, проектное обучение, которое могло бы способствовать продвижению автономии учащихся в индонезийском контексте.

**Ключевые слова:** автономия учащегося, учитель студентов, готовность, автономное обучение, пол.

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## Поздравления

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### **Наш земляк – академик Российской академии наук (РАН)!**



В конце ноября 2019 года в Москве прошло годовое собрание Российской академии наук (РАН), где состоялись выборы в действительные члены – академики из числа выдающихся ученых – членов-корреспондентов РАН.

По результатам тайного голосования член-корреспондент РАН, декан факультета зоотехнии и биологии Российского государственного аграрного университета – МСХА им. К. А. Тимирязева Юлдашбаев Юсупжан Артыкович был избран академиком отделения аграрных наук по секции «зоотехния и биология».

Юсупжан Артыкович является уроженцем Жамбылской области, родился в 1958 г. в г. Чу. В 1981 г. после окончания с отличием зооинженерного факультета Московской сельскохозяйственной академии им. К. А. Тимирязева по специальности «зоотехния», по направлению он приехал на Родину. В начале трудовой деятельности Ю. А. Юлдашбаев работал зоотехником-технологом, младшим и старшим научным сотрудником отдела генетики и разведения каракульских овец Джамбулского филиала Казахского НИИ каракулеводства, с 1983 г. – старшим научным сотрудником лаборатории качества и стандартизации шерсти Джамбулского филиала Московского ЦНИИ шерсти.

В 1989 г. – с.н.с. кафедры овцеводства МСХА имени К. А. Тимирязева, а с 2000 г. – профессор кафедры овцеводства, с 2003 по 2010 гг. – заместитель проректора по научной работе. С июля 2010 г. по настоящее время – декан факультета зоотехнии и биологии.

Юлдашбаев Ю. А. – известный ученый в области зоотехнии, внесший большой вклад в развитие овцеводства и козоводства, создание новых селекционных достижений, разработку инновационных технологий производства и первичной переработке продукции овцеводства и козоводства, подготовку кадров для АПК.

Ю. А. Юлдашбаев является заместителем председателя экспертного совета ВАК Минобрнауки РФ по зоотехническим и ветеринарным специальностям, председателем секции овцеводства Отделения сельскохозяйственных наук РАН, членом НТС совета по селекционным достижениям в овцеводстве и козоводстве МСХ РФ. Член редакционной коллегии научно-производственных

журналов, рекомендуемых ВАК РФ: «Известия Тимирязевской сельскохозяйственной академии», «Овцы, козы, шерстяное дело», «Аграрная наука», «Главный зоотехник», «Вестник науки НАН Республики Казахстан», «Известия НАН РК: серия аграрная».

Научная школа профессора Юлдашбаева Ю. А. получила признание среди ученых и производителей в странах ЕАЭС и дальнего зарубежья. Под его руководством защищено 17 кандидатских и 5 докторские диссертации, в том числе для Казахстана 3 доктора наук, 2 кандидата наук, один доктор PhD и еще 3 докторанта проходят обучение в докторантуре. За подготовку высококвалифицированных специалистов для АПК Республики Казахстан удостоен звания «Почётный работник образования Республики Казахстан» и награжден Почетной грамотой НАН РК (2018 г.).

Ю. А. Юлдашбаев – автор 646 работ, в том числе 31 монографий, 18 учебников и 36 учебных пособий, 20 учебно-методических пособий, 23 методических рекомендаций и указаний, 15 программ и рекомендаций. Им получено 12 патентов, 5 авторских свидетельства и 19 свидетельств на базу данных.

Мы желаем нашему земляку крепкого здоровья, творческого долголетия и семейного счастья!

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