ISSN 2518-1483 (Online),
ISSN 2224-5227 (Print)

2018 • 2

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

БАЯНДАМАЛАРЫ

ДОКЛАДЫ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

REPORTS

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

ЖУРНАЛ 1944 ЖЫЛДАН ШЫҒА БАСТАҒАН
ЖУРНАЛ ИЗДАЕТСЯ С 1944 г.
PUBLISHED SINCE 1944

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
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«Қазақстан Республикасы Ұлттық ғылым академиясының баяндамалары»
ISSN 2518-1483 (Online),
ISSN 2224-5227 (Print)

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» Республикалық қоғамдық бірлестігі (Алматы қ.)
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 01.06.2006 ж. берілген **№5540-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік

Мерзімділігі: жылына 6 рет.
Тиражы: 500 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18,
http://nauka-nanrk.kz. reports-science.kz

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

ДОКЛАДЫ **2018• 2**
НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

Доклады Национальной академии наук Республики Казахстан»
ISSN 2518-1483 (Online),
ISSN 2224-5227 (Print)

Собственник: Республиканское общественное объединение «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№5540-Ж**, выданное 01.06.2006 г.

Периодичность: 6 раз в год.
Тираж: 500 экземпляров

Адрес редакции: 050010, г.Алматы, ул.Шевченко, 28, ком.218-220, тел. 272-13-19, 272-13-18
http://nauka-nanrk.kz. reports-science.kz

Адрес типографии: ИП «Аруна», г.Алматы, ул.Муратбаева, 75

REPORTS **2018 • 2**
OF NATIONAL ACADEMY OF SCIENCES OF THE
REPUBLIC OF KAZAKHSTAN

Reports of the National Academy of Sciences of the Republic of Kazakhstan.
ISSN 2224-5227
ISSN 2518-1483 (Online),
ISSN 2224-5227 (Print)

Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 5540-Ж, issued 01.06.2006

Periodicity: 6 times a year
Circulation: 500 copies

Editorial address: 28, Shevchenko str., of.219-220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz / reports-science.kz

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 5 – 8

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DEVELOPMENT OF NOZZLE-FREE CAPILLARY POROUS DUST-AND-GAS COLLECTORS WITH FOAM GENERATING AND DEFOAMING STRUCTURES

Abstract. The nozzle-free foam generators of air mechanical foam were designed along with its case, inlet and outlet nozzles, a set of grids and sprayer. They help to conduct foam generation processes with high effectiveness under low hydro-and-gas dynamic resistance. For further enhancement of the combined processes of gas mechanical foam and collecting micro-and-ultramicroscopic dust, a dust collector along with its case, inlet and outlet nozzles, a set of grids and sprayer was proposed, which is equipped with defoaming grid porous structure, whereas foam generating and defoaming structures are installed into in case consequently as per the dusty gas movement and sludge collector. Besides, each subsequent grid of foam generating porous structure is made with the increased size of cells following the cleanable gas; e.g. made of metal cells for clearance 0,08*0,14*1, and defoaming made of grids with decreasing size of cells following the cleanable gas, e.g made of metal cells for clearance 0,4*0,14*0,08.

Keywords: dust-and-gas collector, capillary porous structures, porous foam generator, foam generation, heat-mass exchange, vapor bubble.

Research of heat-mass exchange processes by boiling of pure liquids in capillary porous structures revealed a behavior of the internal (thermal hydraulic) characteristics, generation of vapor phase, the density of generation centers, discharge of drops from the structure, bubble departure diameter and frequency of bubble departure, the speed of bubble growth [1-5]. The different porous systems were developed applicable to heat and power units [6] and the relevant calculations were performed to verify trial data with accuracy ±20% in a form of criterion equation for bubbling, injection, suction, pseudo fluidization, foam generating [7] and focused on highly effective nozzle-free capillary porous dust-and-gas collectors with foam generating and defoaming structures [8-13].

Let's review a new class of nozzle-free dust-and-gas collectors. Invention called "Dust Collector" [article No.1456608, MKI E21F 5/04, 1989] refer to the different industries of national economy for highly effective gas (air) cleanup from micro-and ultramicroscopic dust (size of fractions less than $5*10^{-6}$ m and $0,25*10^{-6}$ m accordingly), for example, in fuel combustion, processing and transportation of dusty materials, removal of vent emissions.

There is a known device for collecting gases and aerosols [article No.309717, kl.V. OId 47/04, 1971], which contains inlet and gas removal nozzles, case, fiber attachment located in case, gasket and baffle, mist separator.

The disadvantage of this device is its low effectiveness for collecting micro-and ultramicroscopic dust, defined by the size of nozzle pores, that leads to a high material consumption, high hydraulic resistance as per the liquid movements and gas dynamic resistance whilst flushing gas (air).

A short duration of operations between generations due to pore plugging of fiber attachment causes a significant problem. Foam is generated outside of porous body and attacks its surface. That reduces the effectiveness of dust collection and enhancement of the mass transfer process, which increases material consumption, dimensions and weight of the device.

Gas flow penetrating a fiber attachment overcomes a high gas dynamic resistance. It is due to the excess energy and its boosting. Duration of operations between generations of such device will be low because pores in fibers tend to be blocked by dust particles. This leads to the complicated operations of the device, and minimizes its reliability.

In the suggested capillary porous structures of nozzle-free dust-and-gas collector [8-13] a high effectiveness for collecting micro-and ultramicroscopic dust could be explained by diffusion mechanism of dust settling in the foam flow and at the structure surface, when dust particles are under continuous influence of gas molecules, which are in the Brownian movement, whereas mobility of particles will be increased with the help of thermophoresis due to difference of temperature between skeleton of porous structure, foam flow and dust particles on the one hand, and due to diffusiophoresis caused by the gradient of concentrated components of foam flow, enforced with vapor process of foam forming solution within a porous structure and partial steam condensate of foam flow on the other hand.

High resistance and stability of liquid film in cells of grid structures is ensured with an equal injection of the sprayer liquid and allows to reduce a consumption of foam forming solution 1.5 to 2 times retaining the foam stability, dispersion and multiplicity of foam formed in foam generating structure [8-13.]

As shown in trials [8,13] hydraulic resistance of the grid porous structures in comparison with the fiber attachment is reduced a few times, as well as a gas dynamic resistance. Since the suggested porous structures have large cell sizes in comparison with pores of the fiber attachment that tend to increase a duration of grid regeneration, and thus it simplifies operations and enhances the reliability of dust collector and its service life.

It is impossible to organize a stable process in multiphase layer with the help of fiber and filter materials similar to them (metal ceramic, sintered powders) as foam bubbles block nozzle pores and stop access of fresh portions of foam generating liquid to bubble generating pores at loads 2 to 2.5 times less than for the grid structures.

Dust collector operates in the following way as below.

Flow contaminated by dust is injected through the nozzle of dusty gas 1 into dust collector case 2 (fig.1). Gas cleanup from microscopic dust is performed in foam generating porous structure 3 of type 0.08*0.14*1. Gas mechanical foam 10 is blown by gas flow from the structure cells, supplied by foam forming solution 9, for example, 110-12, supplied by sprayer 4.

Porous structure in comparison with isotropic structure helps significantly enhance mass exchange processes flown in their volume and on the surface because of simplified growth of bubbles 8 from top of the cone to its base, that increases coagulative feature of foam. Therefore, enhancement of processes leads to higher effectiveness of catching microscopic dust due to raising rate of catching dust by foam in volume of structure and on its surface.

Gas mechanical foam 10 will be destroyed from the surface and in the volume of defoaming porous structure 5 of type 0.4*0.14*0.08. Foam bubbles 11 start intensively burst in structure due to the growth of resistance from the cone base to its top. Microscopic dust contained in destructive gas mechanical foam under influence of gravity and pressure leaking from sprayer along the porous surface moves towards sludge collector 7.

Gas will be additionally cleaned up from microscopic dust in a defoaming structure where the destructive process of gas mechanical foam is significantly enhanced because grids are collected with minimized cell sizes.

This result in increasing effectiveness of collecting microscopic dust on its surface and in volume due to raising rate of catching dust and increases coagulative feature of the destructive foam flow.

Gas cleaned up from the microscopic dust is removed from the device through the outlet nozzle of clean gas 6.

Test demonstrated [8,11] that in comparison with the filtering materials such as metal ceramic and sintered powders, consumption of form forming solution is reduced 1.5 to 2 times retaining the foam stability, dispersion and multiplicity of foam, hydraulic resistance for transportation of foam forming

liquid is reduced 10 to 20 times, gas dynamic resistance 1.8 times that minimizes pump and fan (smoke exhauster) capacity, material consumption and dimensions 2 to 2.5 times, weight of device 3 to 4 times.

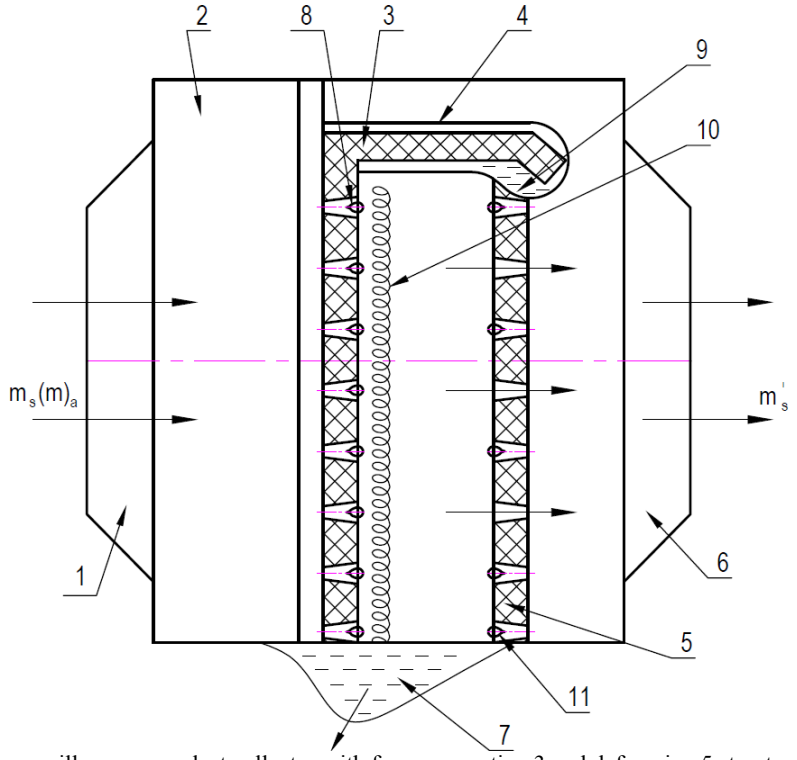

Figure 1 - Nozzle-free capillary porous dust collector with foam generating 3 and defoaming 5 structures: 1 – inlet nozzle; 2 – dust collector case; 3 – foam generating porous structure; 4 – sprayer; 5 – defoaming porous structure; 6 – outlet nozzle; 7 – sludge collector; 8 – bubble; 9 – defoaming porous structure; 10 – gas mechanical foam; 11 – foam bubbles; mf, ma, m^I_s, – consumption of foam, air (steam)

Time between regeneration is significantly increases, as well as effectiveness of catching microscopic dust, which could reach values up to 99.6-99.8%, thus it simplifies operations and enhances the reliability of dust collector and its service life, which is proved by relevant acts of Trust Alma-AtaInzhstroi and Almaty Heat & Power Plant-2.

Cost from implementing the suggested dust collector will be saved because of reduced consumption of foam forming solution 1.5 to 2 times, minimized hydraulic resistance for transportation of foam forming liquid up to 10 to 20 times, gas dynamic resistance for pumping of dusty flow up to 1.8 times, material consumption and dimensions up to 2 to 2.5 times, weight of device 3 to 4 times. Also, the device operations are getting simplified, the duration between regenerations increases, and thus it enhances reliability and service life of the device, which saves capital and operational costs.

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КӨБІК ӨНДІРЕТІН ЖӘНЕ КӨБІК СӨНДІРЕТІН ҚҰРЫЛЫМДАРМЕН БҮРКІГІШСІЗ КАПИЛЛЯРЛЫ-КЕУЕКТІ ТОЗАҢ-ГАЗ ТҰТҚЫШТАРДЫ ӘЗІРЛЕУ

Аннотация. Корпус, кіру және шығу келте құбырлары, торшалар топтамасы, тозаңдатқыштан тұратын ауа-механикалық көбікке арналған бүркігішсіз көбік генераторлары әзірленді. Олар аз гидро және газдинамикалық қарсылықтарда жоғары тиімділікпен көбік өндіру процестерін жүргізуге мүмкіндік береді. Газ-механикалық көбікті өндіру мен микро және ультрамикроскопиялық тозаңды тұту бірлескен процестерін әрі қарай сәйкестендіру үшін көбік сөндіретін торкөзді кеуекті құрылыммен және қақ жинағышпен жабдықталған корпус, кіру және шығу келте құбырлары, торшалар топтамасы, тозаңдатқыштан тұратын тозаң тұтқыш ұсынылды, бұл ретте көбік өндіретін және көбік сөндіретін құрылымдар корпусқа тозаңдатылған газ қозғылысының бағытын бойлай орнатылды. Бұдан өзге, көбік өндіретін торкөзді кеуекті құрылымның кейінгі торшасы тазартылатын газдың қозғалыс бағыты бойымен ұяшықтардың ұлғаятын өлшемімен, мысалы, саңылауға ұяшықтарының өлшемі: 0,08*0,14*1 болатын метал торлардан, ал көбік сөндіретін торша - тазартылатын газдың қозғалыс бағыты бойымен ұяшықтардың кішірейетін өлшемімен, мысалы, саңылауға ұяшықтарының өлшемі: 0,4*0,14*0,08 болатын метал торлардан орындалды.

Түйін сөздер: тозаң-газ тұтқыш, капиллярлы-кеуекті құрылымдар, кеуекті көбік генераторы, көбік өндіру, жылу-масса алмасу, бу көпіршігі.

УДК 697 (075,8)

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РАЗРАБОТКА БЕЗФОРСУНОЧНЫХ КАПИЛЛЯРНО-ПОРИСТЫХ ПЫЛЕГАЗОУЛОВИТЕЛЕЙ С ПЕНОГЕНЕРИРУЮЩИМИ И ПЕНОГАСЯЩИМИ СТРУКТУРАМИ

Аннотация. Разработаны безфорсуночные пеногенераторы воздушно-механической пены, содержащий корпус, входной и выходной патрубки, пакет сеток, распылитель. Они позволяют проводить процессы генерации пены с высокой эффективностью при малых гидро- и газодинамических сопротивлениях. Для дальнейшей интенсификации совместных процессов генерации газомеханической пены и улавливания микро- и ультрамикроскопической пыли предложен пылеуловитель, содержащий корпус, входной и выходной патрубки, пакет сеток, распылитель, который снабжен пеногасящей сетчатой пористой структурой, причем пеногенерирующая и пеногасящая структуры установлены в корпусе последовательно по ходу движения запыленного газа, и щламосборником. Кроме того, каждая последующая сетка пеногенерирующей сетчатой пористой структуры выполнена с увеличивающимся размером ячеек по ходу движения очищаемого газа, например, из металлических с размером ячеек на просвет: 0,08*0,14*1, а пеногасящая – из сеток с уменьшающимся размером ячеек по ходу движения очищаемого газа, например, из металлических с размером ячеек на просвет: 0,4*0,14*0,08.

Ключевые слова: пылегазоуловитель, капиллярно-пористые структуры, пористый пеногенератор, пеногенерация, тепломассообмен, паровой пузырь.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 9 – 16

UDC 678.03:546.26; 677.4

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METHODS FOR PRODUCING CARBON NANOFIBERS FROM COAL PITCH

Abstract. The article gives a literature review of nanofiber production technologies from coal tar pitch. The basic methods for obtaining carbon nanofibers are considered: the stretching method, the template method, magnetospinning, electrospinning. It presents the advantages and disadvantages of these methods for the synthesis of carbon nanofibers. A technological scheme for the production of carbon fiber based on coal tar pitch has also been proposed. The prospectivity of these studies lies in the possibility of large-scale production of carbon fibers from coal pitch.

Key words: nanofiber, coal pitch, nanocomposites,methodof drawing, templating method, electrospinning, magnetospinning.

Introduction

The new "era" of science throughout the world was marked by the discovery of nanomaterials. Among a wide class of nanomaterials, carbon fibers (CF) occupy a separate position, due to the uniqueness of their physicochemical properties and the prospects for practical application. Carbon fiber is a material consisting of thin filaments with a diameter of 5 to 15 microns, formed predominantly by carbon atoms. The carbon atoms are combined into microscopic crystals aligned parallel to each other. Aligning the crystals gives the fiber more tensile strength. Carbon fibers are characterized by high tension force, low specific gravity, low coefficient of temperature expansion and chemical inertness. Special fibers from phenolic resins, lignin, coal and petroleum pitches can be used to produce hydrocarbons. In this respect, coal precursors are of particular interest, since they are economically viable, and also present in large quantities in various coal deposits.

Coal pitch is a solid product of coal tar processing (yield 50-60% by weight). Coal pitch is a uniform in appearance, a thermoplastic substance of black color with a brilliant wrinkled fracture. The main components of pitch are aromatic and heterocyclic compounds, as well as their polymerization and polycondensation products. About 500 compounds have been identified in the coal tar pitch, including benzoanthracene, benzopyrenes, perylene, benzo-fluorenes, fluoranthene, naphthacene, chrysene, brazan and alkyl brazans, triphenylene, etc. [1].

Carbon fibers are one of the main types of reinforcing elements used to create high-modulus high-strength composite materials.

Materials based on carbon fibers have already been applied in the most significant, knowledge-intensive industries: engineering, nuclear power, aviation and cosmonautics, military-industrial complex, construction, in addition, carbon fibers have the potential to be used in various new applications such as electrodes, substrates catalysts, adsorbents, composites, etc. because of their large surface area and relatively high electrical conductivity [2]. In view of the low cost of the raw materials, the priority goals remain the reduction of energy inputs and the increase in the yield of the target product.

The first developments in the production of carbon fibers from pitch were carried out by Japanese researchers, who are still holding the first place in the world market for the production of carbon fibers.

The technology for producing pitch-based carbon fiber includes several stages: preparation of the substrate, fiber synthesis by spinning from the melt, stabilization in an oxidizing atmosphere, carbonization in an inert atmosphere, graphitization at an elevated temperature.

The conventional technology for the production of carbon fibers is based on the thermal treatment of various organic fibers: hydrate-cellulose, polyacrylonitrile (PAN), pitch, polyesters, polyamides and other polymers [3]. For technological and economic reasons, the most suitable were viscose, PAN and pitches [4].

The authors of [5, 6] considered that all carbon fibers were divided into several types depending on how and from what they are made (Figure 1). However, now the classification is based on their mechanical properties.

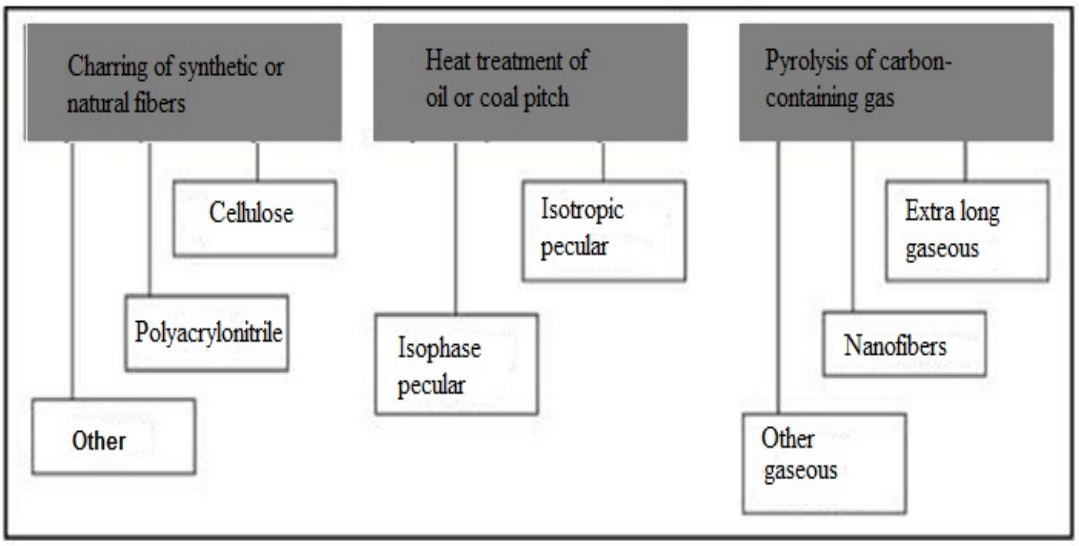

Figure 1 - Types of carbon fibers by origin

The method of drawingis that using a micromanipulator, a thin point is slightly immersed in a drop of the polymer solution near the contact boundary [7] (Figure2). Then the point is extracted from the drop at a speed of ~ 10^{-4} m/s, pulling the nanofibers behind it. The method of drawing produces nanofibres of polymers that withstand large deformations while in a viscous-flowing state. The length of the fibers obtained is determined by the speed of curing of the fiber due to the evaporation of the solvent (when forming the polymer solution) or the glass transition of the melt (when forming the polymer melt) [8].

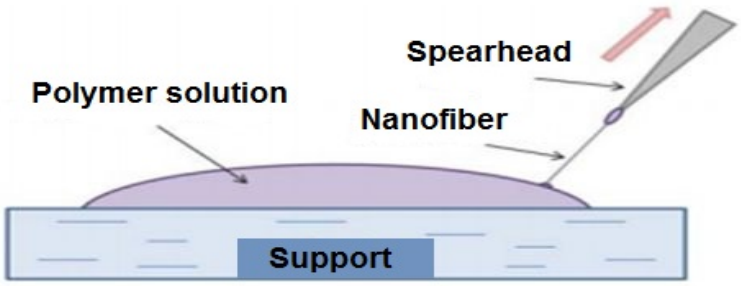

Figure 2 - Schematic representation of the preparation of nanofibers by drawing

The invention [9] relates to a technology for producing carbon fibers from carbon tar. Fibers are drawn by a single gas stream followed by additional drawing when exposed to one additional gas flow creating tension in the fiber, the velocity of at least one additional gas flow exceeding the speed of the fiber. The fiber and the additional gas stream are passed through a Venturi tube and the tensioned fiber is thermoset.

The method [10] for producing nanostructured carbon fibers is that a sprayed catalyst is deposited on the upper surface of a rotating disk through a precipitating chamber of the reactor, heated to a pyrolysis temperature, after which a continuous supply of hydrocarbon gas and the removal of gaseous pyrolysis products are carried out, and upon completion of the process pyrolysis, the finished product together with the catalyst is cooled.

The authors also considered the template method, called the nanofilter method. In this method, a template substrate (a substrate with oriented 1D nanopores) determines the direction of polymer extrusion (Figure3). The polymer solution is pressed through the nanoporous membrane due to the created hydrostatic pressure and the formed nanofibers fall into the curing solution. The diameter of nanopores determines the diameter of nanofibers. As a nanoporous membrane, porous oxides are used, for example anodized aluminum oxide, or metal dies with nanopores formed by laser drilling [11, 12].

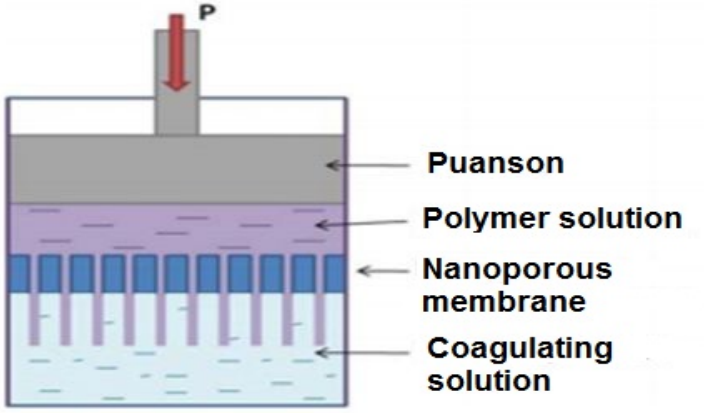

Figure 3 - Diagram of the preparation of nanofibers of polymers by the template method

Electroforming (electrospinning) is the name of a process that leads to the formation of nanofibers as a result of the action of electrostatic forces on an electrically charged jet of polymer solution or a melt [13]. Figure4 shows the scheme of the process of electroforming (EF).

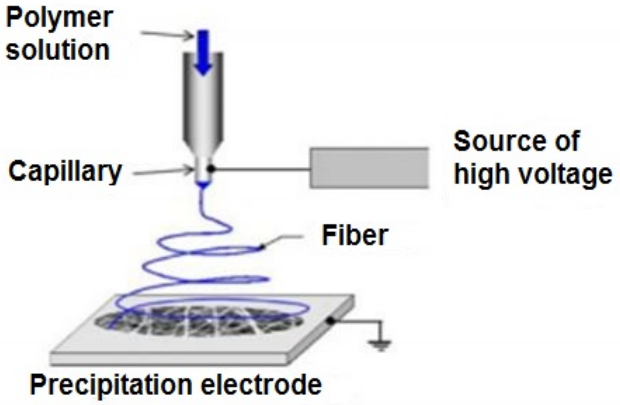

Figure 4 - Scheme of obtaining nanofibers by electroforming process

The essence of the method of electrospinning is that the electrical voltage from one to one hundred kilovolts is applied to a solution (melt), which is fed through a capillary by means of a dispenser [14]. The high voltage induces in the solution the same electric charge, which, as a result of the Coulomb electrostatic interaction, leads to the drawing of the polymer solution into a thin jet [15]. During the electrostatic drawing of a polymer jet, it can undergo a series of successive splittings into thinner jets with a certain ratio of the viscosity values, surface tension and the density of electric charges (or the electrostatic field strength) in the fiber [16]. The resulting jets harden by evaporation of the solvent or as a result of cooling, turning into fibers and under the action of electrostatic forces drift to a grounded

substrate having the opposite value of the electric potential. It should be noted that the polarity with the EF can also be reversed when the capillary is grounded, and a high voltage is applied to the depositing substrate. The precipitation electrode (collector) must have good electrical conductivity [17, 18].

The authors of [19] found that by varying the parameters of the electro spinning process, it is possible to vary the thickness of biopolymer threads in the range from hundreds of nanometers to several microns. Figure 5 shows an installation designed to produce biopolymer matrices by the method of electrospinning.

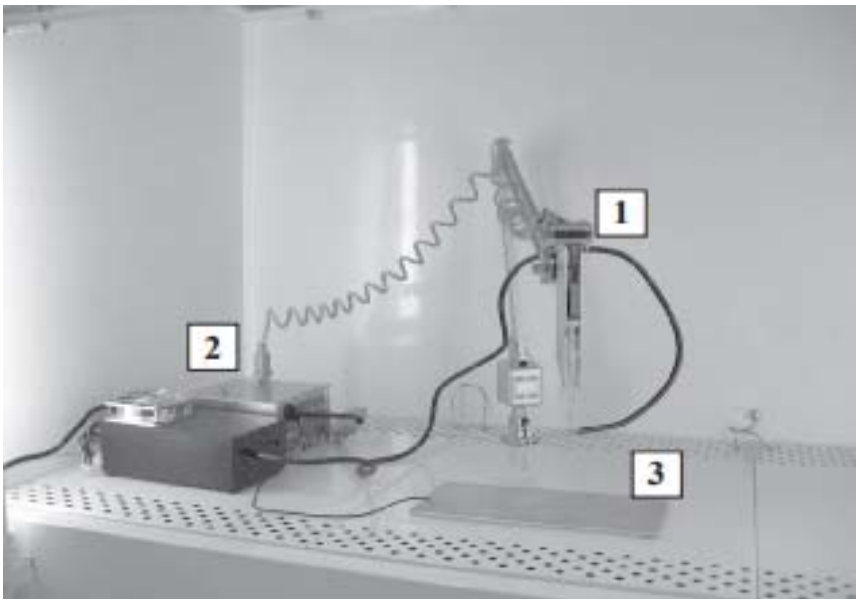

Figure 5-Installation created for manufacturing biopolymer matrices by the method of electrospinning:
1-perfusor (polymer feeding systems); 2- high-voltage power supply; 3- substrate (stationary grounded collector)

The method of electrospinning is good because, unlike usual, mechanical drawing of fibers from a solution, it does not impose high requirements on the chemistry of the process, it does not require high temperatures for solidification of the fiber, and therefore it allows the creation of fibers from long and complex molecules. As a result of the struggle between capillary and electrostatic forces, as well as the processes inside the solution, the charged drop itself lengthens, becomes thinner and dries out in flight. This method has significant drawbacks. It does not allow working with solutions of polymers with a small dielectric constant. In addition, it uses high-voltage equipment, which, firstly, is quite expensive, and secondly, it makes serious demands on safety.

Magnetospinning is a new technique for obtaining nanofibres that lacks these drawbacks. Because it uses magnetic fields to draw the fiber. It looks simpler, and its implementation does not cost as much as an electrospinning. Installation for magnetospinningcan be assembled from a cheap magnet, a simple electric motor and a syringe. This method makes it possible to reduce the cost of production of fibers.

The principle of the magnetospinning method: a permanent magnet is fixed on a rotating disk (Figure6). The point of the syringe is next to the disc. At the end of the syringe hangs a droplet of ferrofluid (polymer solution with magnetic nanoparticles). The speed of rotation of the disk is adjustable in a wide range up to several thousand revolutions per minute. The magnet attracts a droplet, and when it passes in the immediate vicinity of the tip of the needle, the droplet breaks and sticks to the magnet. With a suitable viscosity of the solution between the needle and the magnet, a bridging-constriction occurs. The disc continues to rotate, the distance between the magnet and the needle increases, the constriction stretches out, thins, but does not break. The solvent evaporates at this time, the filament becomes even thinner and solidifies, and as a result, nanofibresare formed. The bobbin, fixed on the opposite side of the disc, ensures continuous winding of the fiber.

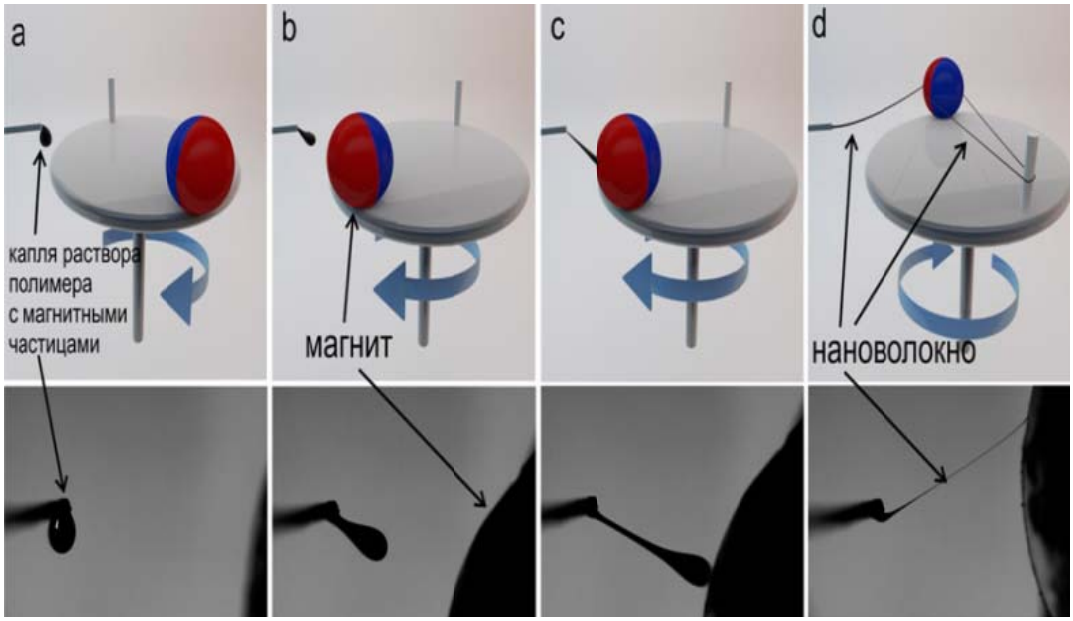

Figure 6 –Scheme of nanofibers synthesis by magnetospinning

Figure 7 represents types of fibers produced by magnetospinning method.

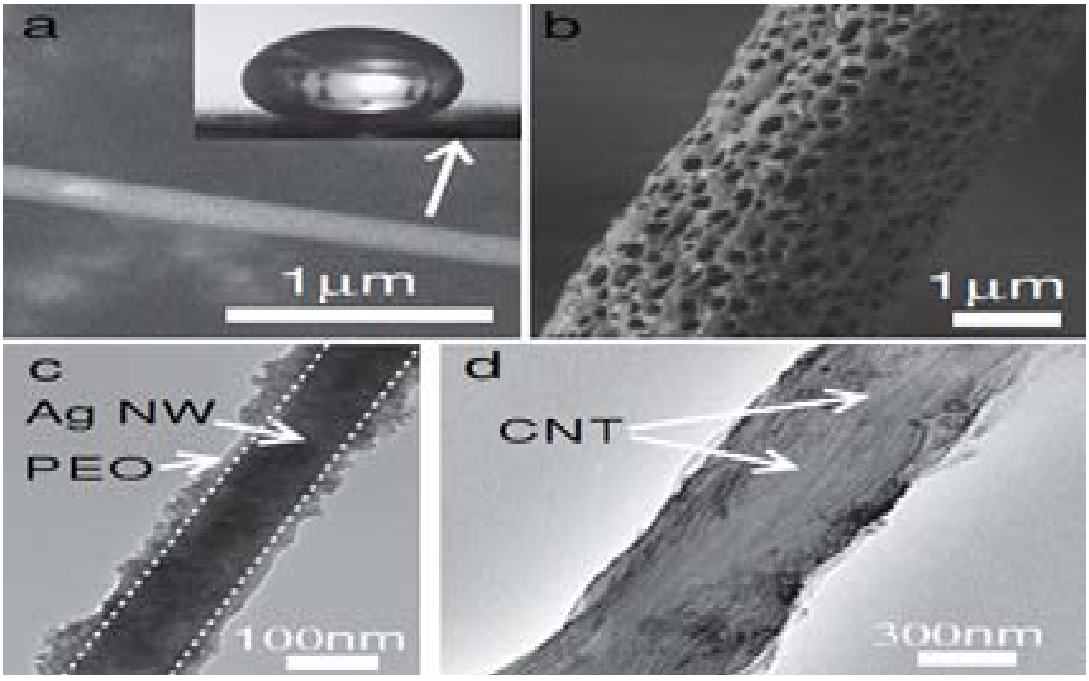

Figure 7 - Fibers produced by magnetospinning method: a- fibers from teflon;
b– porous nanofibres; c- silver wire in polymer shell; d-nanofibers with 10% carbon nanotubes

Technological scheme of carbon fibers production based on coal pitch is presented below(Figure8).

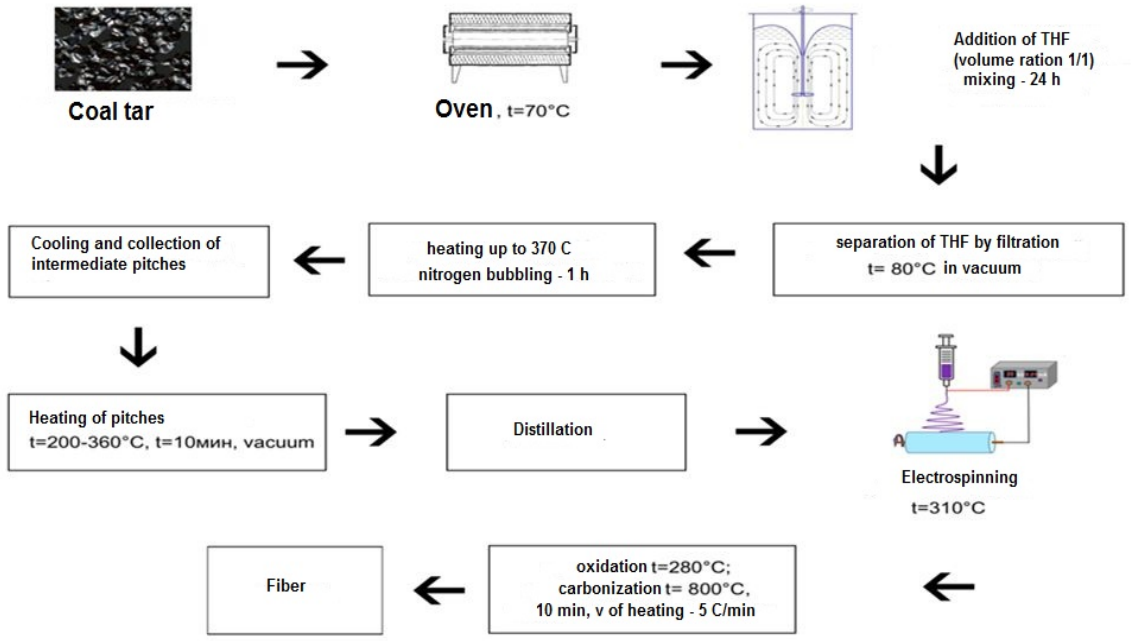

Figure 8 –Technological scheme of carbon fibers production based on coal pitch

The most important stage in the production of carbon fiber based on coal tar pitch is the process of obtaining the initial fiber. Pitches are a complex mixture of aromatic and aliphatic compounds. The molecular weight of the compounds is relatively small, and only a part of them can be attributed to oligomers. Of these systems, only a coarse brittle fiber can be formed from which a good quality carbon fiber cannot be obtained, so low-molecular volatile compounds must be previously removed to impart fiber-forming properties to the pitch. To increase the molecular weight, the pitch must be subjected to heat treatment.

In the first stage, the coal tar is placed in an oven at a temperature of 700°C, then tetrahydrofuran (THF) is added in a volume ratio of 1:1 and stirred for 24 hours. The insoluble part of THF is removed by filtration of the coal mixture and the purified coal tar is collected by separating THF at 800°C in vacuo. Then, 200 g of coal tar is heated to 370°C and is bubbled with nitrogen at a rate of 1 l/min for 1 hour. After this, the reactor is cooled to room temperature and intermediate pitches are collected. Further, the reactor is filled with 10 g of intermediate pitch and heated to (200-360^{0}C) for 10 minutes in a vacuum using an oil pump. Softening points are measured. Pakes are prepared with high softening points to produce carbonaceous fibers from the melt by further distillation, a heating temperature of 330°C. Further, electrospinning from the melt (melt-electrospinning) is carried out at a temperature of 310^{0}C. The molding temperature depends on the carbon content in the pitch and can reach 300-330°C. Plasticizers, fiber-forming polymers and curing agents can be added to the pitch before molding to reduce the molding temperature, improve the spinnability and other technological objectives. The diameter of the winding drum should be 100 mm, and a wide range of winding speeds (250-900 rpm) will be adopted to achieve molding. The formed fiber, as a rule, is characterized by low strength and increased brittleness. Such properties are natural for fibers from oligomers, which are essentially pieces. To increase the strength and impart an imperfection, the formed fibers are oxidized in a gas or liquid medium. Oxygen (air), air with additives of ozone, oxygen or chlorine, a pair of nitroaromatic compounds (nitrobenzene, nitrophenol), sulfur dioxide and trioxide, oxides of ozone serve as oxidants [20]. Since oxidation is carried out at elevated temperatures, it is heated at a low rate to produce a spun fiber. The oxidation temperature in the air stream should be 280°C for 1 hour at a heating rate of 1°C. The oxidized fibers are carbonized at 800°C for 10 minutes at a heating rate of 5°C under a nitrogen atmosphere [21]. However, if the carbon content in the fiber is 95%, the heating rate can be increased to 10°C / min. In this case, the fiber yield

reaches 85-90%.The carbonized fiber is graphically drawn under tension both during electrical heating and when anelectric current is passed through the fiber. Elastic-strength indexes of fibers from pitches can be significantly increased by drawing during heat treatment at temperatures above 2800 °C. Next, the finished fiber is wound on the coils [20, 22].

Conclusions

One of the aspects of the novelty of these studies is the development of technology for the production of carbon fibers without the use of polymer precursors, which will allow to solve the ecological aspect of utilization of this type of waste, to reduce the harmful effect on the environment with obtaining an economically viable product. The prospectivity of these studies lies in the possibility of large-scale production of carbon fibers from coal tar, which will lead to the appearance of materials and composites based on domestic production on the Kazakhstan market.

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УДК 678.03:546.26; 677.4

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МЕТОДЫ ПОЛУЧЕНИЯ УГЛЕРОДНЫХ НАНОВОЛОКОН ИЗ КАМЕННОУГОЛЬНОГО ПЕКА

Аннотация. В статье приведен литературный обзор технологий получения нановолокон из каменноугольного пека. Рассмотрены основные методы получение углеродных нановолокон: метод вытягивания, темплатный метод,магнитоспиннинг, электроспиннинг. И представлены преимуществы и недостатки этих методов для синтеза углеродных нановолокон. Также предложена технологическая схема производства углеродного волокна на основе каменноугольного пека. Перспективность данных исследований заключается в возможности масштабного производства углеродных волокон из каменноугольного пека.

Ключевые слова:нановолокно, каменноугольный пек, нанокомпозиты, метод вытягивания, темплатный иметод, электроспиннинг, магнитоспиннинг.

УДК 678.03:546.26; 677.4

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КӨМІРТЕКТІ НАНОТАЛШЫҚТАРДЫ ТАСКӨМІР ПЕГІНЕН АЛУ ӘДІСТЕРІ

Аннотация. Мақалада таскөмір пегінен наноталшық алу технологиясына әдебиеттік шолу келтірілген. Көміртекті наноталшықты алудың негізгі әдістері берілген: созылу, темплатты әдіс, электроспиннинг, магнитоспиннинг. Көміртекті наноталшықты синтездеуге қолданылатын аталған әдістердің артықшылықтары мен кемшіліктері, сонымен қатар таскөмір негізінде алынған көміртекті талшықтарды өндірудің технологиялық схемасы келтірілген. Бұл зерттеулеркөміртекті наноталшықтарды таскөмір пегінен масштабты өндіруге негіз болады.

Тірек сөздер: наноталшық, таскөмір пегі, нанокомпозиттер, созылу әдісі, темплатты әдіс, электроспиннинг, магнитоспиннинг.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 17 – 22

UDC 004.056.5

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EFFECTIVE SCHEME OF STEGANOGRAPHY INFORMATION PROTECTION AND AUTHENTICATION BASED ON MAXIMUM FLOW ALGORITHMS

Abstract. Developed effective scheme of electronic digital signature based on El-Gamal algorithm, transport network and it's blocking flows (output data) produced by Ford Fulkerson maximum flow algorithm serves as additional data for sides authentication. Scheme with the addition of transport networks and it's blocking flows is considered as effective since there exist various sets of identical blocking flows and various transport networks associated with following flows.

Key words. steganography, Ford Fulkerson algorithm, blocking flow, cryptography, flow, authentication.

ElGamal digital signature. ElGamal scheme was created by Taher Elgamal in 1985 [1]. Following scheme is based on public key cryptography, the complexity of calculation discrete logarithm [2]. Developed scheme of steganography based on information concealing within the framework of master degree project can be also applied at the process of authentication. The adjacency matrix of the graph (transport network), including its weights and selectable blocking flows as well as maximum flow is input criteria on which process of user authentication would occur. In parallel for binding these input data to particular user, it is necessary to use tools of Electronic Digital Signature. The process of signing input parameters data would be done in the following manner.

Process of Electronic Digital Signature formation
Side A
1). Encrypt own message with personal private key
2). Next encrypt received sequence with open keys of side B

Side B
3). Decrypt received sequence at first we are using personal private keys
4). Continuing procedure of decryption with open keys of side A:
5). If the message is readable that it was not underwent modifications

Figure 1 - Process of formation developed scheme of authentication on the basis of Ford Fulkerson algorithm and El-Gamal scheme

In developed authentication scheme, a novelty is presented due to the fact that algorithms of maximum flow were not earlier used in cryptography. Also scheme of authentication were considered cryptographic endurable because those full selection attacks are completely excluded attacker do not have data regarding of size dimension of adjacency matrix (all adjacency matrix are stored in secured memory area of server and known only to client and server) as well edges weights (throughputs) of transport network can be changed during some time intervals (taking place operations of incrementing, decrementing on pre-installed values stipulated between each client). A scheme using not only tools of hashing but also the Electronic Digital Signature for proving that client calculated values of arbitrary blocking flows and maximum flow. Totally there are

$$\big((V * V) * (E * E) * (N * N) * (M * M)\big)/k$$

values for transport network of the adjacency matrix, V – number of vertexes, E- number of edges, N – bit capacity of used numbers in adjacency matrix, M – size of used numbers. k – number of attempts for

presenting authentication data. Considering that attacker does not know closed keys of users and does not know in which order data are applied for forming Electronic Digital Signature cracking the following scheme is not possible.

P=19 – prime number

$$\{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18\}$$

Function of Euler totient. Primitive roots 2,3,10,13,14,15

$$Phi(19) = 18$$
$$Mod\ 19$$

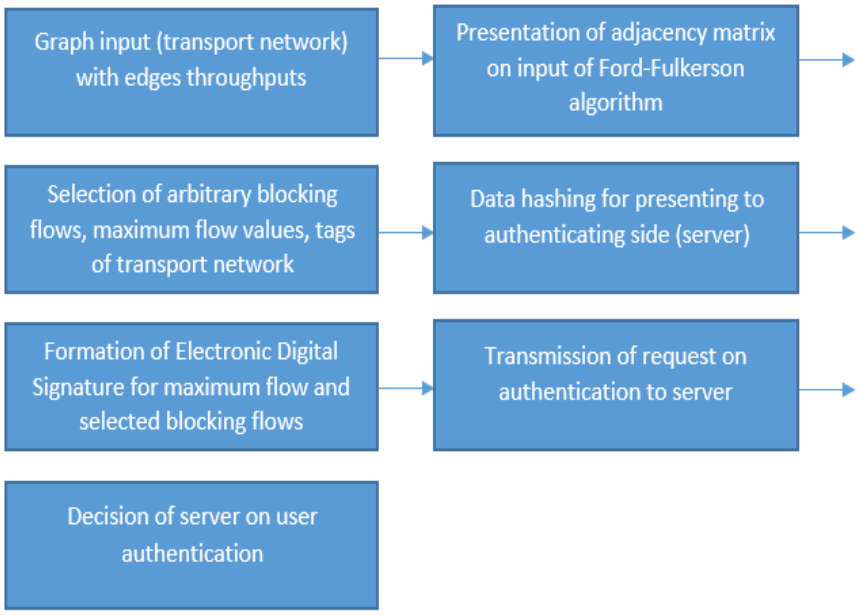


Figure 2 - Scheme of the developed system

Table 1 - Primitive roots

x^i	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	4	8	16	13	7	14	9	18	17	15	11	3	6	12	5	10	1
3	3	9	8	5	15	7	2	6	18	16	10	11	14	4	12	17	13	1
4	4	16	7	9	17	11	6	5	1	4	16	7	9	17	11	6	5	1
5	5	6	11	17	9	7	16	4	1	5	6	11	17	9	7	16	4	1
6	6	17	7	4	5	11	9	16	1	6	17	7	4	5	11	9	16	1
7	7	11	1	7	11	1	7	11	1	7	11	1	7	11	1	7	11	1
8	8	7	18	11	12	1	8	7	18	11	12	1	8	7	18	11	12	1
9	9	5	7	6	16	11	4	17	1	9	5	7	6	16	11	4	16	3
10	10	5	12	6	3	11	15	17	18	9	14	7	13	16	8	4	2	1
11	11	7	1	11	7	1	11	7	1	11	7	1	11	7	1	10	15	11
12	12	11	18	7	8	1	12	11	18	7	8	1	12	11	18	7	8	1
13	13	17	12	4	14	11	10	16	18	6	2	7	15	5	11	15	9	12
14	14	6	8	17	10	7	3	4	18	5	13	11	2	9	12	16	15	1
15	15	16	12	9	2	11	13	5	18	4	3	7	10	16	6	14	5	8
16	16	9	11	5	4	7	17	6	1	16	9	11	5	4	7	17	6	1
17	17	4	11	16	6	7	5	9	1	17	4	11	15	11	4	7	1	10
18	18	1	18	1	18	1	18	1	18	1	18	1	18	1	18	1	8	3

As primitive roots, such numbers are applicable which by multiplication by power of 2 from $x, x^2 \ldots . x^{18}$ and with division by modulus of 19 giving numbers from 1 to 18, those numbers are primitive roots [3,4].

(p, Gamm, Betta) – public key M = (Gamm, Betta) – signature

$$\alpha = 14$$
$$1 \le a \le p - 2$$
$$1 \le a \le 17$$
$$a = 12$$
$$\beta = 14^2 \bmod 19$$
$$\beta = 11$$
$$(p, \alpha, \beta) = (19,14,11) - open\ key$$
$$M = x = 41$$
$$1 \le 4 \le p - 2$$
$$1 \le r \le 17$$
$$\gamma = \alpha^r \bmod p$$
$$r = 13$$
$$\gamma = \alpha^{13} \bmod p \quad x = M = 41$$
$$\gamma = 14^{13}\ mod\ 19 = 2$$
$$\delta = (41 - 12 * 2) * 13^{-1}\ mod\ 18$$
$$\delta = (17) * 13^{-1}\ mod\ 18$$
$$\delta = (17) * 7 = 119$$
$$M = (\gamma, \delta) - signature\ M = (2,119)$$

Check

$$\delta^{\gamma}\gamma^{\delta} \equiv \alpha^x\ mod\ p$$
$$11^2\ 2^{119} \equiv 14^{41}\ mod\ 19 = 10$$

Checking that

$$\delta^{\gamma}\gamma^{\delta} \equiv \alpha^x\ mod\ p$$

$$11^2\ 2^{119} \equiv 14^{41}\ mod\ 19 = 10$$

Then the process of verification is accomplished.

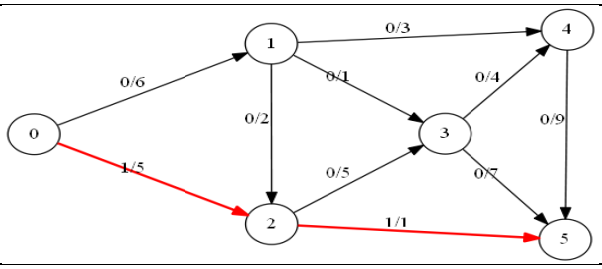
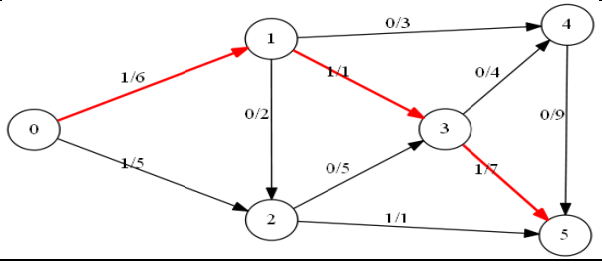
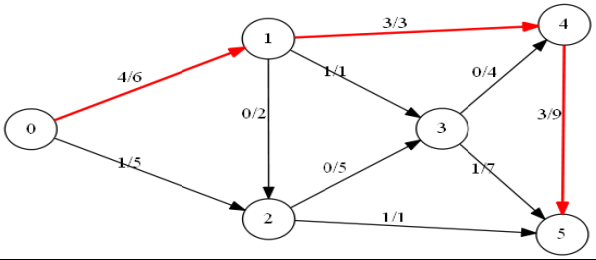
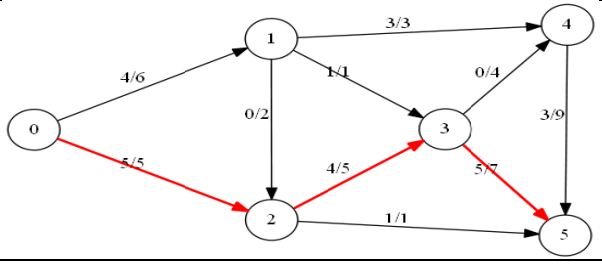
The algorithm of Ford-Fulkerson. A dynamic algorithm for finding the maximum flow in a transport network was developed in 1956 by mathematicians Lester Randolph Ford Jr. and Delbert Ray Fulkerson. The algorithm for finding the maximum flow concluded to search any path from s to t by dfs while such paths are existing.

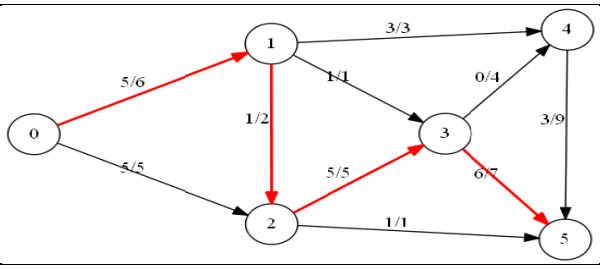
Non-formal description of the algorithm:

1. All flows are set to zero. The residual network initially is matching with the original transport network.
2. In residual network searching path from s to t, by dfs. If such path does not exist then the algorithm finishes its work.
3. On founded path passing maximal possible flow:
1. On given path in residual network searching edge with minimal capacity c_{min}.
2. For each edge in founded path incrementing the flow on c_{min}, in reverse direction decreasing on c_{min}.
3. The residual network is updating. For edges in the founded path and in reverse direction, a new throughput is calculated.
4. Return to step 2.

Table 2 - Tracing of the Ford-Fulkerson algorithm on transport network with 6 vertexes

All illustrations of oriented weighted graphs (transport networks) presented in SFDP notation.

	G
	
	Iteration description
	All flows are set to zero. The residual network initially is matched with the original transport network. Blocking flow on the 1st iteration of the Ford-Fulkerson algorithm consists of the following paths: 1. {0,2,5} 1 unit of flow
	G
	
	Iteration description
	Blocking flow on the 2nd iteration of the Ford-Fulkerson algorithm consists of the following paths: 2. {0,1,3,5} 8 units of flow
	G
	
	Iteration description
	Blocking flow on the 3rd iteration of the Ford-Fulkerson algorithm consists of the following paths: 1. {0,1,4,5} 3 units of flow
	G
	
	Iteration description
	Blocking flow on the 4th iteration of the Ford-Fulkerson algorithm consists of the following paths: 1. {0,2,3,5} 4 units of flow
	G



Iteration description

Blocking flow on 5th iteration of Ford-Fulkerson algorithm consists of following paths:

1. {0,1,2,3,5} 1 unit of flow, Maximum flow $|f|$ equals 10.

Symmetric block encryption algorithm Blowfish with key dependable S blocks of substitution. Optionally the 3rd trusted side could use block symmetric cipher for encrypting packets with open keys. Symmetric block cipher Blowfish is one of a kind cipher based on Feistel network and wherein having key dependable S blocks. Symmetric block cipher Blowfish have an unaccustomed size of key in 448 bits for symmetric block ciphers which is more inherent to stream ciphers like A5-1, RC-4 [5].

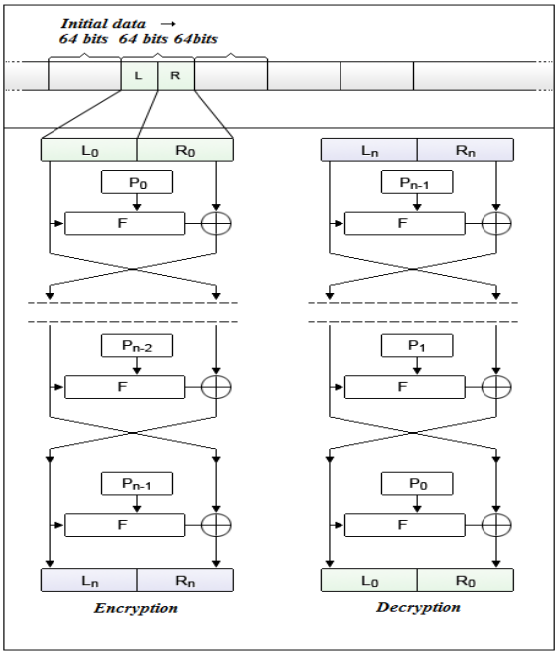


Figure 3 - Scheme of Blowfish algorithm

Function F(X)

1. 32 bits input data are divided into 4 8 bits blocks (X_1, X_2, X_3, X_4). Each of that blocks are indexed by numbers of S blocks $S_1 - S_4$
2. On values $S_1[X_1], S_2[X_2]$ conducting addition by modulus of 2^{32}, also on values $S_3[X_3], S_4[X_4]$ conducting addition by modulus 2^{32}
3. Results of that operations are output values of function F(X)

Formation of round keys

1. Arrays P, S initializing with the help of secret key K
2. Values $P_1 - P_{18}$ initialized by fixed string of hexadecimal representation of Pi number.
3. Operation XOR conducted on array P_i with first 32 bits of key K. Next with second 32 bits and so on.

Encryption of keys and substitution tables of S-blocks

1. Occurring alternate encryption, initial encrypted value 64 bits zero string. Results are written in values of $P_1 - P_{18}$, $S_1 - S_4$, following operations occurring until all values of $P_1 - P_{18}$, $S_1 - S_4$ would be not formed.

Appliance of blocking flow in steganography, LSB algorithm. If a following blocking flow {0,1,2,3,5} is used then writing data: 01011 would be performing at zero, first, second, third and fifth LSB bite of media container:

01001010 01101011 01101010 01011011 01001000 01001001 00001010

Conclusion. Not all systems of Digital Electronic Signatures require additional confirmation factors of sides, insertion of output data of the Ford-Fulkerson algorithm (blocking flow, transport network) improves the security of Electronic Digital Signature. Due to the fact that transport network by itself is not encrypted by El-Gamal algorithm but hashes this allows to reduce the amount of data for encryption to increase performance and data of blocking flow, transport network would be serving not as key but the kind of client identification tags participants of data transmission channel.

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АҚПАРАТТЫ СТЕГЕОГРАФИЯЛЫҚ ҚОРҒАУДЫҢ ЖӘНЕ АУТЕНТИФИКАЦИЯ ТИІМДІ СХЕМАСЫ МАКСИМАЛДЫ АҒЫНДЫ ТАБУДЫҢ АЛГОРИТМДЕРІ НЕГІЗІНДЕ

Аннотация. Эль-Гамаль алгоритміне негізделген электрондық цифрлық қолтаңбаның тиімді схемасын әзірледі, көлік желісі және оңы ағынды блоктау (шығыс деректері) Форд-Фалкерсон максималды ағынын табудың алгоритмдері тараптардың аутентификациясы үшін қосымша деректер ретінде қызмет етеді. Көлік желісі және ағынды блоктау қосылған сұлба тиімді деп саналады өйткені көптеген ұқсас блоктау ағындар және түрлі көлік желілері болуы мүмкін осы ағындармен байланысты.

Түйін сөздер. стеганография, Форд-Фалкерсон алгоритм, ағынды блоктау, криптография, ағым, аутентификация.

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ЭФФЕКТИВНАЯ СХЕМА СТЕГАНОГРАФИЧЕСКОЙ ЗАЩИТЫ ИНФОРМАЦИИ И АУТЕНТИФИКАЦИИ НА ОСНОВЕ АЛГОРИТМОВ НАХОЖДЕНИЯ МАКСИМАЛЬНОГО ПОТОКА

Аннотация. Разработанная эффективная схема электронной цифровой подписи, на основе алгоритма Эль-Гамаля, транспортная сеть и ее блокирующие потоки (выходные данные) произведенные алгоритмом нахож-дения максимального потока Форда-Фалкерсона служат дополнительными данными для аутентификации сторон. Схема с добавлением транспортных сетей и их блокирующих потоков считается эффективной так как может существовать множество одинаковых блокирующих потоков и различных транспортных сетей, ассоциированных с данными потоками.

Ключевые слова: стеганография, алгоритм Форда-Фалкерсона, блокирующий поток, криптография, поток, аутентификация.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 23 – 30

UDC 004.056 (045)

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STATUS, PERSPECTIVES AND MAIN DIRECTIONS OF THE DEVELOPMENT OF CYBERSECURITY OF INFORMATION AND COMMUNICATION TRANSPORT SYSTEMS OF KAZAKHSTAN

Abstract. The article contains the results of a comparative analysis of previous studies in the field of cybersecurity of information and communication transport systems. The analysis was carried out in the context of the solved problem of the further development of methods and models for the recognition of cyber threats, anomalies and attacks directed against information and communication transport systems, as well as assessing the risks of information security of the transport industry as one of the components of the critical infrastructure of the Republic of Kazakhstan. The urgency of the task is also caused by the formation of a unified information and communication environment of the transport industry in Kazakhstan, the introduction of new and modernization of existing information systems in transport in the conditions of increasing the number of destabilizing effects on the availability, confidentiality and integrity of information.

Key words: information and communication systems, information security, critical computer systems, information security system, cyberattack detection systems.

Introduction

In the condition of globalization, there is arisen significantly the role of the transport infrastructure for ensuring the development of trade and economic relations between countries, their cultural, tourist and sport relations, as well as international transit traffic. The participation of the Republic of Kazakhstan (RK) in international integration processes in the field of transportation is a non-alternative trend, but it must be accompanied by the creation of a modern infrastructure compatible with the infrastructure of the countries with which the RK interacts with the simultaneous protection of national interests.

The solution of these tasks is impossible without effective information support systems that integrate control processes, data processing, monitoring, communications, etc. Modern information technologies (IT) on transport in conjunction with navigation and surveillance systems provide an opportunity to track and analyze traffic flows on the railways, roads, oil and gas pipelines, air and waterways, etc. It is also possible to carry out the accumulation and analysis of the received information in intelligent transport networks, to use the data for the decision-making and operation of transport and logistics centers.

The aim of the work is a comparative analysis of previous researches in the field of cybersecurity of information and communication transport systems, in the context of the problem of the further development of methods and models for cyberthreats recognition, anomalies and attacks directed against information and communication transport systems (ICTS), and also assessment of the risks for information security branch as one of the component of the critically important infrastructure of Kazakhstan.

A review of previous researches

For Kazakhstan, the problem of information protection and information and cyber security (IS and CS) ensuring of the transport sector have a particular importance. This is primarily connected to the size of the territory and the geopolitical location of Kazakhstan, with political and socio-economic policies aimed at further strengthening of sovereignty.

Intervention in national, regional and municipal automated information and control systems on transport is a frequently mentioned threat for cyberattacks of intruders [1-4]. The high degree of human

involvement in transport logistics and transportation processes control does not reduce the risks associated with cyberattacks and with unauthorized intervention in work of ICTS [4-8]. At the same time, the statistics of IS and CS incidents in the world ICTS are replenished every year, Table 1 (data are based on the analysis [9-17]).

Table 1 - Intervention in work of ICTS

№	Year	Country	Event	Describedconsequences
1	2002	United Kingdom (UK)	Unauthorized access to the service telephone connection of the railway and to the semaphore control system.	Disconnected from communication control room, a failure in the semaphore switching system [11].
2	2003	Sweden, Gothenburg	Hacking of ACS of city buses and taxi traffic.	Loss of control over the movement schedule for several hours [4, 13].
3	2014	Russia	The virus disconnected the video cameras fixing the "Strelka-ST" high-speed mode in Moscow and in the region.	The cameras are disabled for several days [11].
4	2003	USA	SQL Slammer virus violates ACS of Continental Airlines company	Cancellationofflights [2].
5	2008	China	In the Chinese city of Weifang there was arrested a man who committed the largest attack in the history of China on Chinese transport companies	Downtime of transport companies in Weifang
6	2008	Pakistan, India	Hackers from Pakistan hacked the access to the site of the Indian Railway Company	The site did not work more than 12 hours
7	2012	Russia, Netherlands, UK, USA	The hacker group Anonymous has committed cyberattacks on the servers of Gazprom, Rosneft, Shell, BP Global and ExxonMobil	In the free access there were thousands of mail accounts of employees and company data [13, 18].
8	2013-2014	Somalia, USA, UK, Norway and others.	There was released the report of a Rapid7 company on the facts of interference in the operation of GPS systems of oil platforms, tankers and container ships in the Persian Gulf and in the Aden Strait.	The facts of software failure on drilling platforms for 19 days are fixed [11, 18].
9	2016	Ukraine	Hacking the video-broadcast system in the metro in Kiev	Replacementofvideocontent

The increase of the number of cyber attacks on ICTS in recent years increased an interest to the development of effective information security systems (ISS) focused on the specifics of the transport [1, 3, 6, 8, 11, 14].

In general, the authors were focused on the problems of IS and CS of certain types of transport: aviation [1, 2]; pipeline, as an element of critical infrastructure [3-5]; automobile [6]; sea and river [7, 8]; railway [9-12]. The results of a comprehensive assessment of the role of information and cybersecurity of the transport as a component of the national security of the state and its critical infrastructures are presented in works [13-17]. However, we note that the works do not contain descriptive models that allow to identify the patterns of situation evolution related to the IS and CS on transport. Most of the researches did not have apractical implementation in the form of applied software, which would allow, in particular, to develop a specific methodological basis for organizing the ICTS protection system taking into account their specificity.

Insufficient attention to the problem of ICTS cyber security can lead to interception of control and to the failures in the dispatching control systems of the transport. As the worst result, there can be the consequences with human casualties. As an additional risk, there can be considered the lack of ICTS standardization and their components responsible for IS and CS [2, 6, 11, 13, 18].

In works [14, 16] there was analyzed the methodology of intellectual modeling, designed for analysis and decision-making in insufficiently structured situations of IS and CS of ICTS. At the current stage, the researches [13] are not brought to hardware or software implementation.

Difficult to analyze and decision-making support, regarding the ICTS protection, are the weakly formalized and structured tasks of IS and CS with the appearance of new classes of attacks [2, 4, 5, 13, 16]. In this case, the ICTS condition parameters can be represented by qualitative indicators, which is not always advisable.

Therefore, taking into account the controversy in the reviewed works, it is relevant to solve the task of carrying out new researches aimed at developing the methods and models for IS and CS of ICTS control, taking into account the peculiarities of their infrastructure, as well as dynamically changing requirements for the control of cybersecurity on transport.

Information and communication transport systems as an object of cyberattacks

The active application expansion of the IT sphere and critically important information transport systems (CIITS) in Kazakhstan, especially in the segment of mobile, distributed and wireless technologies, is accompanied by the appearance of new cyber threats. This is confirmed by the increase of the number of incidents related to cybersecurity (CS) and by the protection of information in CIITS [18, 19]. Threats are very real, because the attackers can get the opportunity to intercept passwords, separate files, geolocation information, broadcast audio and video data, monitor Wi-Fi networks, web cameras, information boards on roads and railways, stations, airports, etc.

Nowadays, many projects in the field of transport control are developing in the direction of creating of large situational centers (SC) that provide solutions for specific tasks, in particular, for the protection of CIITS. Investing of innovative projects, for example in the field of CS and information security, is characterized by a high degree of uncertainty and risk. Many enterprises and companies, engaged in CIITS service, spending a large amount of money on information security systems (ISS) and CS, do not feel confidence that the chosen investment strategy makes the ICTS infrastructure really safe.

A serious problem in the CS of CIITS area is the protection against unauthorized access (UAA). The seriousness of the problem is evidenced by the fact that even one person who has access to CIITS for a short time can completely paralyze the work of any strategic railway, seaport, gas or oil transport enterprise site, etc.

Virtually any ICTS can act as an object of attack.

In order to implement it an attacker (intruder) needs to activate the ICTS vulnerabilities. As the statistics [11, 13, 18] show, such vulnerabilities do not become less.

Nowadays, the transport industry in the whole world and in the RK, in particular, is passing through the stage of transformation and adaptation to new digital technologies. The current state of many means of informatization and automation of transport systems is still based on traditional SCADA. However, there is already an active connection to the Internet both of the vehicles themselves and of the components of the transport infrastructure: video surveillance cameras, information boards, smart stops, cloud infrastructure, etc. All these elements are vulnerable to cyberattacks. According to the data of [18], only during the period from March 2015 to May 2016 ICTS has been compromised to DoS attacks and other destructive influences by computer intruders more than 44 times.

The comprehensive nature of the tasks of the ICTS formation in RK requires their systematization and selection of priorities [19]. Today, in the transport sector of the Republic of Kazakhstan there are developed a number of industry information systems and communication networks which operate autonomously and are not interconnected (Table 2).

Almost all elements of the ICTS can become objects of cyberattacks. As the analysis of real attacks showed the following categories of objects in infrastructural solutions of information and communication systems of the transport industry are the most vulnerable [1, 4, 6, 7, 11, 14, 18]: 1) data processing centers, automated control systems for various modes of transport (SCADA, etc.); 2) peripheral equipment components (for example, information boards); 3) devices on programmable logic controllers (PLC); 4) systems and communication channels for data exchange between dispatchers and vehicles; 5) navigation systems using GPS and GLONASS.

Table 2 - Automated information and control transport systems (Republic of Kazakhstan)

Type of the transport	Name	Typical tasks	Peculiarities
1	2	3	4
Railwaytransport	ACS on RS	Automated control systems on rolling stock.	The system works on the server complex IBM Z9. There are used PLC Siemens, ABB, GE, Schneider Electric, Emerson and others.
	ACS Client	Accounting of cargo, execution of invoices, etc.	The ACS is based on the software and hardware complex P780 IBM, DBCS Oracle.
	ACS «Express-3»	In the on-line mode: requests for the information; Purchase of electronic tickets on trains of international and republican communications; and etc.	The system is based on the software and hardware complex P780 IBM, DBCS Oracle.
	ACS for RWI	Automated control system for cargo and railway wagons integrity in motion provides: video surveillance in real time with the passage of the train, the state of wagons, the presence of locking and sealing devices on the locking mechanisms of doors and hatches and so on.	Software TNS-INTEC (RK)
	Etc.		
Automobile and traffic control systems on highways	ACS logistics, software «Autograph»; Wialon Hosting software and etc.	Integration with business information systems of cargo carriers; Identification of the possibilities of cargo carriers; Access to the order pool corresponding to the parameters of the particular carrier; Formation of transportation documents; Payment for services rendered; Control of the passage of the cargo.	They work on Windows, Android platforms. there are used PLC GE, Schneider Electric, Emerson, etc.
Seatransport	Navi-Harbour 1000	The unified information system of the port community (ISPC) provides: accounting of the port's work (accounting of railway wagons, trucks and other rolling stock located in the port) preparation of electronic and shipping documents; preparation of paper transportation documents; interaction of AIS enterprises with ISPC; interaction of ISPC with customs AIS for the transfer of electronic data on the cargo; formation of statistics, reports and accumulation of the archive; others	The system is based on the hardware and software complex P780 IBM, Oracle DBCS, MySQL Work on Windows platforms. There are used PLC Siemens, ABB, GE, Schneider Electric, Emerson, etc.
Aviationtransport	ACS of SAP ERP, B2B services, E-ticket, (on the example of Air Astana and etc.)	The corporate control system based on SAP ERP of the Republican state enterprise on the right of economic management "Kazaeronavigation" provides: complex automation of business processes of financial and economic activity of enterprises; optimizes and unifies the processes of information exchange. B2B services provide: booking of passenger and cargo transportation; viewing of the flights schedule, free passenger and cargo places; executionofinvoices; others	Software SAP AG (Germany)

Окончание таблицы 2

1	2	3	4
Pipelinetransport	ACS PLT	ACS PLT and ACS ERP provide key processes for the gas and oil transportation on the territory of the Republic of Kazakhstan. Key functions: financial and tax accounting; accounting of current and non-current assets; accounting for material flows and electronic bidding; operational control of the technological process; quality control; planning and control; budgets control; costs, revenues control and profitability analysis; project control and capital investments; sales control; personnel administration and organizational management; organization of analytical reports; others	ACS is based on the hardware and software complex P780 IBM, Oracle DBCS and additional software "Serk Controls" (Great Britain) and SAP AG (Germany). There are used PLC Siemens, Schneider Electric, Emerson and etc. TNS-INTEC (RK) software and etc.
Intermodal (multimodal) centers of logistics, surveillance, navigation by means of GPS, GLONASS	"Teltonika" and others – software complex unites in itself – DBCS, software for services, cartographic software, etc.	"Teltonika" and other similar systems. Key functions: determination of coordinates and parameters of motion; storage of data in non-volatile memory; data transmission on request from the dispatch center; data transfer and/or recording of GPS data; data encryption; notification of incoming/outgoing messages, etc.	Cryptographicdataprotection

Forming the IS policy and the IS control system for the ICTS (ACS and AIS) listed in Table 2 it is assumed that the interpretation of the terms "information security" and "cyber security" is broader than the term "information transport technologies security".

Therefore, we can write:

$$FCS = \left\{FCS_{ij} : i = 1,2,...,m : j = 1,2,...,n\right\} \cup \\ \cup \left\{FCS_{q+v} : q = \sum_{i=1}^{n} n_i, v = 1,2,...,h\right\}, \quad (1)$$

where FCS – IS and CS of ICTS function; O_i – IS and CS assessment objects; $i = 1,2,...,m$, $j = 1,2,...,n$, n – theamount of FIS for IS and CS of ICTS control system elements; $q = \sum_{i=1}^{n} n_i$ – a complex of FCS for all assessment objects O_i.

We suppose that the elements of the FCS_{ij} set may not fully satisfy the requirements of the IS and CS of ICTS. For example, a similar situation is possible with the appearance of new types or classes of cyberthreats and vulnerabilities in ICTS [1, 3, 5, 6, 10, 11, 13, 18]. This, in turn, leads to an increase of information risks [2] associated with the operation of ICTS.

Now, as a rule [1, 2, 6, 11], a risk level is set, which is considered acceptable and there is no need to take measures to stop the attempts of the NAA to ICTS.

Then, guided by the global research task, the following assumptions are accepted at the developing methods, models and algorithms for the IS and CS of ICTS control system:

1) the ICTS is influenced by the actions of the attacking side (external or internal). The actions of the attacking side can lead to a partial loss or non-fulfillment of the functions of the IS and CS;

2) the attacking side influence on the ICTS is not always probabilistic. Consequently, traditional models for calculating the probability of overcoming the attacking contours of IS should take into account the targets of such attacks (targeted attacks);

3) the vector of attack can proceed both from within the transport company and from outside. Not all actions of the attacking side (threats, anomalies and directly cyber attacks) can be effectively recognized and detected;

4) assessment of the consequences of the attack on the basis of statistical analysis methods is not always correct if it is a targeted attack.

Previously, a number of authors [1, 11, 6] proposed to use a special indicator for quantitative characteristic of the degree of the current cyber attack hazard on information systems, in particular ICTS, which can be calculated (measured) at any time - an indicator of current risks (ICR):

$$C_{ICR} = C_{ICR}(\overline{X}), \tag{2}$$

where $\overline{X}_{ICR} = (x_{ICR_1},...,x_{ICR_i},...,x_{ICR_{MI}})$ – ICR value vector, *MI* – amount of threats for ICTS. It is accepted that $C_{ICR} = (0 \div 1)$.

Uncertainty of methods for calculating the probability of threats for ICTS, in particular for integrating of the activities of autonomous IC and ACS for certain modes of transport, as well as potential vulnerabilities, is a major problem in the process of obtaining quantitative assessments of the risks of IS and CS of ICTS violation. For complex open systems, which include ICTS, it is more appropriate to evaluate the worst case scenarios. In particular, you can apply the guaranteed result method to assess the probabilities of implementing cyberthreats for ICTS.

There can be used the information security parameter [6, 11, 13] – SE. We suppose that for the data protection (IPM –DP_m), where *m*– IPM number, there is a probability of detection and subsequent blocking of the threat within the boundaries of the perimeter – P_{PE_m}. The value P_{PE_m} can be regarded as the expected theoretical efficiency of the IS perimeter.

The level of security of the *i* node of the ICTS perimeter (for example, SCADA, B2B, satellite navigation systems, information service, etc.), taking into account [1, 4, 6, 11, 13, 14], is determined as**:**

$$SE_i = 1 - V_{cis_i}, \tag{3}$$

where V_{cis_i} – importance (significance) of the IS incident at the *i* node of the ICTS.

Then, for each ICTS node we determine the significance of the IS incident as:

$$V_{cis_i} = L_i \cdot KR_i \cdot CO_i \cdot DP_i \cdot C_{ICR}, \tag{4}$$

where V_{cis_i} – the significance of the IS and CS incident; L_i – IS and CS violation level; KR_i – criticality of information assets (IA); CO_i – level of confidence to the IS and CS metrics; DP_i – IS level; $C_{ICR} = 0 - 1$ – coefficient, *i* – ICTS node number (for example, a network segment).

The degree of ICTS protection is defined as follows:

$$SE_{CIS} = \prod_{i=1}^{n} (1 - L_i \cdot KR_i \cdot CO_i \cdot DP_i \cdot C_{ICR}), \tag{5}$$

where*n* – amount of nodes (for example, modules) in ICTS.

Therefore, within the researches it is necessary to continue work on the further development of methods and models of the IS and CS of ICTS control system, taking into account the criticality factor of these infrastructures (Figure 1).

This, in turn, will allow more efficient assessment of the levels and risks of IS and CS of ICTS violation. In addition, there is set the task of the development of intelligent protection systems with the inclusion in the IS contours of the decision-making support sub-systems to counter unauthorized access and cyberattacks in ICTS. The implementation of these measures will make it possible in the near future to develop an effective methodology for prompt response and decision-making during the threats for the and CS of ICTS of the Republic of Kazakhstan [19, 20].

The conducted researches contribute to the proclaimed in the Republic of Kazakhstan strategy of digitalization of production processes, development of transport and logistics infrastructure, introduction of digital technologies on transport and creation of an intelligent transport system.

Conclusion

As a result of the conducted researches there were made following conclusions:

1. was shown that in order to carry out effective IS and CS policy for ICTS, for the selection and implementation of ISS, it is necessary to analyze cyber threats and vulnerabilities for such systems taking into account the specificity of each type of transport.

2. it is necessary to develop a unified methodology for the creation of protected SC of the transport adapted to the conditions of potential targeted cyber attacks.

3. it is necessary to continue comprehensive researches on the modeling of potential intruder strategies for the implementation of complex targeted cyberattacks directed against ICTS. This will allow more effective evaluation of the reliability of the operation of information security systems for ICTS.

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ҚАЗАҚСТАН КӨЛІГІНІҢ АҚПАРАТТЫҚ-КОММУНИКАЦИЯЛЫҚ ЖҮЙЕЛЕРІНІҢ КИБЕРҚАУІПСІЗДІГІНІҢ ҚҮЙІ, БОЛАШАҒЫ ЖӘНЕ НЕГІЗГІ БАҒЫТТАРЫ

Аннотация. Мақалада көліктің ақпараттық-коммуникациялық жүйелерінің киберқауіпсіздік аймағында алдынғы зерттеулердің салыстырмалы талдаудың нәтижелері келтірілген. Талдау шешілетін проблеманың көліктің ақпараттық-коммуникациялық жүйелеріне қарсы бағытталған кибершабуылдарды, шабуылдарды және ауытқулықтарын тану әдістері мен үлгілерінің ары қарай даму аясындаорындалған, сонымен қатар Қазақстан Республикасының критикалық маңызды инфрақұрылымның құрамы ретінде көлік саласының ақпараттық қауіпсіздігі үшін тәуекелдерді бағалау аясында. Мәселенің маңыздылығы Қазақстанның көлік саласының бірыңғай ақпараттық-коммуникациялық ортасын қалыптастырумен, ақпараттың тұтастығына, қолжеткізімдігіне және конфиденциалдығына тұрақсыздандырғыш әрекеттер саны көбеюіне байланысты көлікте бар ақпараттық жүйелерді жаңарту және жаңа жүйелерді еңгізумен шартталған.

Тірек сөздер: ақпараттық-коммуни кациялық жүйелер, ақпараттық қауіпсіздік, критикалық маңызды компьютерлік жүйелер, ақпаратты қорғау жүйесі, кибершабуылдарды табу жүйелері.

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СОСТОЯНИЕ, ПЕРСПЕКТИВЫ И ОСНОВНЫЕ НАПРАВЛЕНИЯ РАЗВИТИЯ КИБЕРБЕЗОПАСНОСТИ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ СИСТЕМ ТРАНСПОРТА КАЗАХСТАНА

Аннотация. Статья содержит результаты сравнительного анализа предшествующих исследований в области кибербезопасности информационно-коммуникационных систем транспорта. Анализ выполнен в контексте решаемой проблемы дальнейшего развития методов и моделей распознавания киберугроз, аномалий и атак, направленных против информационно-коммуникационных систем транспорта, а также оценивания рисков для информационной безопасности транспортной отрасли как одной из составляющих критически важной инфраструктуры Республики Казахстан. Актуальность задачи также вызвана формированием единой информационно-коммуникационной среды транспортной отрасли Казахстана, внедрением новых и модернизацией существующих информационных систем на транспорте в условиях увеличения количества дестабилизирующих воздействий на доступность, конфиденциальность и целостность информации.

Ключевые слова: информационно-коммуникационные системы, информационная безопасность, критически важные компьютерные системы, система защиты информации, системы обнаружения кибератак.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 31 – 35

UDC 541.183(075)

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ANALYSIS OF MATHEMATICAL MODELS OF TECHNOLOGICAL SYSTEMS WITH CLUSTERING OR AGGREGATION

Abstract. A critical analysis of the main widely used aggregation models based on the Smoluchowski kinetic equations has been carried out. It is shown that these models have a drawback that the rate of evolution of the clusters concentration with given orders is assumed to be dependent immediately on the concentrations of clusters of lower orders at the same moment. Some prospective ways for overcoming the shortcomings of known models noted in the analysis have been proposed, and new equations have been derived.

Keywords: clustering, aggregation, kinetic equation, dispersed phase, modification, modeling, equations.

Introduction. Technological systems where physical and chemical transformations are accompanied by aggregation process of an internal phase and clustering with a complex internal structure are widely used in the chemical, pharmaceutical, metallurgical and other industries. Therefore, the problems of modeling and calculating of such systems attract great attention of researchers. However, despite a significant number of works, many problems remain poorly studied, and the common models of the clustering processes of internal phases in complex physical and chemical systems have a number of shortcomings deteriorating their practical value.

In this paper is given a brief review of the main commonly used aggregation models on the basis of Smoluchowski kinetic equations [1,2]. Some ways which are in the authors' opinion prospective ways of overcoming the shortcomings of known models noted during the analysis are also proposed.

Smoluchowski equation and its features. The growth of the cluster according to the Smoluchowski model takes place on the basis of attachment of primary particles and secondary crystals to it which enter the cluster surface through a diffusion mechanism. Whereby the growth of the cluster is described as the movement of the reacting zone, i.e. a region where new particles join the cluster. The particle trajectories start outside the region occupied by the cluster, and end at the moment the particle is in contact with the cluster. This process can also be described as a random walk using the Smoluchowski equation of the following form:

$$\frac{dn_k(t)}{dt} = \frac{1}{2}\sum_{i+i+j=k}\Phi_{ij}C_i(t)C_j(t) - n_k(t)\sum_{j=1}^{\infty}\Phi_{jk}C_j(t). \qquad (1)$$

Where $C_k(t)$- density of k –partial clusters.

The kernel Φ_{ij} of system of equations (1) takes into account the dependence of the collision cross section on the dimensions and mobility of clusters. Such an approach can be successfully applied to problems where there are sources and sinks that correspond to the presence of an external field in the point of neighborhood of equilibrium phase transition [2, 3].

A certain internal contradiction inherent in the kinetic equations of aggregation on the basis of the Smoluchowski binary coagulation model is that the rate of evolution of the concentration of clusters of a certain order is assumed to be dependent on the concentrations of clusters of lower orders at the same

time. It actually means the instantaneous formation of a cluster when its constituents physically interact between each other. At the same time, the relaxation time of the process is calculated on the basis of particular models that develop the physical mechanism of the aggregation process (for example, DLFO). In addition specificities of the mechanism are usually become apparent only as to the method of calculation of coagulation kernels without changing the kinetic equation form. This approach does not allow to calculate the evolution of the system with incomplete information on the initial concentrations of clusters, and also take into account the memory effects in the system.

This contradiction can be eliminated only by modifying the kinetic equation form of aggregation itself, taking into account the relaxation times. Moreover, we proceed from the premise that the kinetic equation form can nevertheless be considered indirectly to the specifics of the physical nature and mechanism of the aggregation process if it is assumed that the main path of the influence of this specificity on the kinetic equation itself is the formation of a hierarchy of relaxation times. The derivation of the classical Fokker-Planck equation can be mentioned as an example of such approach [3].

The need to take into account the relaxation phenomena in the derivation of the kinetic equations of aggregation was noted by many researchers [4,5].

Consider for example the formation of rain drops in the atmosphere. At the initial moment of the formation of a drop, it is characterized by a certain initial size of the primary embryo, which we will consider as a cluster of the first order. Then the drops are combined with each other and become larger.

In order to describe the kinetics of the aggregation process, we need to know, first, what is the concentration of such drops (first order, second order), i.e. primary drops, combined in two, three drops etc. We need to know how fast the drops of different orders will be combined with each other. The kinetic coefficients required for such a description depend for example on the electric charge carried by the drops. And the electric charge depends on how long the drop is in the atmosphere. Herein lies the impact of the background of the process.

If the drops have different backgrounds, they will differently aggregate. We can not know all this information. But we can estimate the characteristic time during which this electric charge varies by a definite quantity. And with the help of the knowledge of this relaxation time, the influence of unknown in details background on the kinetics of the process can be estimated.

one can make an assessment of how the entire prehistory, which is not known in detail, will affect the kinetics of the process.

All this is fully applicable to the description of aggregation processes in systems with chemical sources of a dispersed phase [6].

Earlier, the papers [4-6] considered the problems of modeling of heat and mass exchange processes based on the methodology of relaxation transfer kernels. Here the derivation of nonlocal kinetic equations of aggregation in homogeneous disperse systems on the basis of the same methodology is proposed for discussion. For binary coagulation is used the Smoluchowski equation as the base model [2].

This is about temporal nonlocality, i.e. about the delay of the process taking into account the hierarchy of relaxation times. The choice of the model equation in this case is a technical issue. Other models can be also used [7,8]. More importantly, the application of the methodology of relaxation transfer kernels [6] for the modification of the kinetic equations is more formal than for the transfer equations. Thisapproachis controversial, ofcourse.

Another aspect of the problem is related to the fact that the Smoluchowski kinetic equation is written for a medium that is assumed to be absolutely homogeneous with respect to the volume concentration of clusters of different orders. The same assumption is made in the new model.

Modified Smoluchowski equation. Let's consider the modification of the Smoluchowski equation with the time lag of aggregation, which is intended to describe the effect of the characteristic time of formation of the aggregate on the kinetics of the process [6].

In our situation, the role of relaxation times is played by the characteristic times $\tau_{i,j}$ of aggregations $i-$ and $j-$. Then the following nonlocal modification of Smoluchowski equation is proposed for the aggregation process in a polydisperse system [6, 7]:

$$\frac{\partial C_i}{\partial t} = \frac{1}{2}\sum_{j=1}^{i-1}\int dt_1 \Phi_{i-j,j}(t,t_1) C_{i-j}(t_1) C_j(t_1) - \sum_{j=1}^{\infty}\int dt_1 \Phi_{i,j}(t,t_1) C_i(t_1) C_j(t_1) \tag{2}$$

The model equations for the elements of the coagulation matrix are as follows [6]:

$$\frac{\partial}{\partial t}\Phi_{i,j} + \frac{\Phi_{i,j}}{\tau_{i,j}} f^0_{i,j} = 0 \ . \tag{3}$$

Then the integro-differential equations take the following form:

$$\begin{aligned}\frac{\partial C_i}{\partial t} = \frac{1}{2}\sum_{j=1}^{i-1}\int dt_1 \Phi^0_{i-j,j} \exp\left(-\frac{f^0_{i-j,j}}{\tau_{i-j,j}}(t-t_1)\right) C_{i-j}(t_1) C_j(t_1) - \\ \sum_{j=1}^{\infty}\int dt_1 \Phi^0_{i,j} \exp\left(-\frac{f^0_{i,j}}{\tau_{i,j}}(t-t_1)\right) C_i(t_1) C_j(t_1)\end{aligned} \tag{4}$$

For the case of an isotropic and homogeneous medium, relations (4) can be regarded as ordinary differential equations

The time derivatives of the cumulative elements have the following form

$$\Phi^0_{i,j} C_i(t) C_j(t) - \frac{f^0_{i,j}}{\tau_{i,j}} \Phi^0_{i,j} \int_0^t dt_1 C_i(t_1) C_j(t_1) \exp\left(-\frac{f^0_{i,j}}{\tau_{i,j}}(t-t_1)\right). \tag{5}$$

Then the equation can be changed to the following form:

$$\begin{aligned}\frac{d^2 C_i}{dt^2} = \frac{1}{2}\sum_{j=1}^{i-1}\Phi^0_{i-j,j} C_{i-j}(t) C_j(t) - \sum_{j=1}^{\infty}\Phi^0_{i,j} C_i(t) C_j(t) - \\ -\frac{1}{2}\sum_{j=1}^{i-1}\frac{f^0_{i-j,j}}{\tau_{i-j,j}}\int dt_1 \Phi^0_{i-j,j} \exp\left(-\frac{f^0_{i-j,j}}{\tau_{i-j,j}}(t-t_1)\right) C_{i-j}(t_1) C_j(t_1) + \\ +\sum_{j=1}^{\infty}\frac{f^0_{i,j}}{\tau_{i,j}}\int dt_1 \Phi^0_{i,j} \exp\left(-\frac{f^0_{i,j}}{\tau_{i,j}}(t-t_1)\right) C_i(t_1) C_j(t_1)\end{aligned} \tag{6}$$

Let's take derivative with time once again:

$$\begin{aligned}\frac{d^3 C_i}{dt^3} = \frac{d}{dt}\left(\frac{1}{2}\sum_{j=1}^{i-1}\Phi^0_{i-j,j} C_{i-j}(t) C_j(t) - \sum_{j=1}^{\infty}\Phi^0_{i,j} C_i(t) C_j(t)\right) - \\ -\frac{1}{2}\sum_{j=1}^{i-1}\frac{f^0_{i-j,j}}{\tau_{i-j,j}}\Phi^0_{i-j,j} C_{i-j}(t) C_j(t) + \\ +\frac{1}{2}\sum_{j=1}^{i-1}\left(\frac{f^0_{i-j,j}}{\tau_{i-j,j}}\right)^2\int dt_1 \Phi^0_{i-j,j} \exp\left(-\frac{f^0_{i-j,j}}{\tau_{i-j,j}}(t-t_1)\right) C_{i-j}(t_1) C_j(t_1) + \\ +\sum_{j=1}^{\infty}\frac{f^0_{i,j}}{\tau_{i,j}}\Phi^0_{i,j} C_i(t) C_j(t) - \\ -\sum_{j=1}^{\infty}\left(\frac{f^0_{i,j}}{\tau_{i,j}}\right)^2\int dt_1 \Phi^0_{i,j} \exp\left(-\frac{f^0_{i,j}}{\tau_{i,j}}(t-t_1)\right) C_i(t_1) C_j(t_1)\end{aligned} \tag{7}$$

Carrying out separate average over groups of indices for elements describing formation and destruction of i -, we have the system of equations

$$\begin{aligned}
&\frac{d^3C_i}{dt^3} = \frac{d}{dt}\left(\frac{1}{2}\sum_{j=1}^{i-1}\Phi^0_{i-j,j}C_{i-j}(t)C_j(t) - \sum_{j=1}^{\infty}\Phi^0_{i,j}C_i(t)C_j(t)\right) - \\
&-\frac{1}{2}A_1\sum_{j=1}^{i-1}\Phi^0_{i-j,j}C_{i-j}(t)C_j(t) + \\
&+\frac{1}{2}B_1^2\sum_{j=1}^{i-1}\int dt_1\Phi^0_{i-j,j}\exp\left(-\frac{f^0_{i-j,j}}{\tau_{i-j,j}}(t-t_1)\right)C_{i-j}(t_1)C_j(t_1) + \\
&+A_2\sum_{j=1}^{\infty}\Phi^0_{i,j}C_i(t)C_j(t) - \\
&-B_2^2\sum_{j=1}^{\infty}\int dt_1\Phi^0_{i,j}\exp\left(-\frac{f^0_{i,j}}{\tau_{i,j}}(t-t_1)\right)C_i(t_1)C_j(t_1)
\end{aligned} \tag{8}$$

More compact view of the system is taken after changing

$$\begin{aligned}
&\frac{d^3C_i}{dt^3} + (B_1+B_2)\frac{d^2C_i}{dt^2} + B_1B_2\frac{dC_i}{dt} = \\
&= (B_1+B_2+\frac{d}{dt})\left(\frac{1}{2}\sum_{j=1}^{i-1}\Phi^0_{i-j,j}C_{i-j}(t)C_j(t) - \sum_{j=1}^{\infty}\Phi^0_{i,j}C_i(t)C_j(t)\right) - \\
&-\frac{1}{2}A_1\sum_{j=1}^{i-1}\Phi^0_{i-j,j}C_{i-j}(t)C_j(t) + A_2\sum_{j=1}^{\infty}\Phi^0_{i,j}C_i(t)C_j(t)
\end{aligned} \tag{9}$$

A special feature of equation (9) is the existence of solutions describing the passage of disturbance with finite velocity [8]. The further development of the proposed model may consist in taking into account the difference in the characteristic times of coagulation in the aggregation of globules of different orders.

At the same time, the analysis of the obtained equation shows that the use of the local form of Smoluchowski equations with aggregation matrices subject to equations of the form (3) is completely correct for small parameter point because a correction to the local form has at least a second order of smallness [7].

Conclusion. The article gives a brief critical analysis of models of dispersed phase aggregation in physical and chemical systems. The need to take into account the relaxation phenomena is shown and techniques of derivation of the kinetic equations of aggregation with phenomena of time lag in the formation of aggregated clusters of disperse phase is outlined. This methodology can be used for modeling of dynamic processes in memory systems based on nonlocal transfer equations.

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КЛАСТЕРЛЕУ НЕМЕСЕ АГРЕГАТТАУМЕН ТЕХНОЛОГИЯЛЫҚ ЖҮЙЕЛЕРДІҢ МАТЕМАТИКАЛЫҚ МОДЕЛЬДЕРІН ТАЛДАУ

Аннотация.Смолуховтың кинетикалық теңдеу негізінде агрегациялаудың кеңінен қолданылатын негізгі модельдердің критикалық талдамасы жасалынды. Осы модельдерге кемшіліктер тән екені көрсетілген, ол белгілі бір реттегі кластерлер концентрациясының эволюция жылдамдығы дәл сол уақыт мезетінде төменгі ретті кластерлердің концентрациясына тәуелді болатынына негізделген. Сондай-ақ талдау барысында белгілі модельдердің анықталған кемшіліктерін жеңудің авторлардың ойы бойынша анағұрлым перспективті жолдары ұсынылған және жаңа теңдеулер шығарылған.

Түйін сөздер: кластерлеу, агрегаттау, кинетикалық теңдеу, дисперстік фаза, түрлендіру, модельдеу, теңдеу.

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АНАЛИЗ МАТЕМАТИЧЕСКИХ МОДЕЛЕЙ ТЕХНОЛОГИЧЕСКИХ СИСТЕМ С КЛАСТЕРИЗАЦИЕЙ ИЛИ АГРЕГАЦИЕЙ

Аннотация. Осуществлен критический анализ основных широко используемых моделей агрегации на основе кинетических уравнений Смолуховского. Показано, что эти моделям присущ недостаток, заключающийся в том, что скорость эволюции концентрации кластеров определенного порядка полагается зависимой от концентраций кластеров низших порядков в тот же момент времени. Предложены также некоторые перспективные по мнению авторов пути преодоления отмеченных при анализе недостатков известных моделей и выведены новые уравнения.

Ключевые слова:кластеризация, агрегация, кинетическое уравнение,дисперсная фаза, модификация, моделирование, уравнения.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 36 – 42

UDC 517.946+681.3

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SOLUTION OF THE PROBLEM OF LOWERING OF MATERIALS OF VISCOUS LAYER DOWN THE HILLSLOPE

Abstract. The article deals with the problem of a modeling investigation of the mechanism of the landslides origin of sedimentary rocks. It is assumed that a viscous layer of rock, located on the surface of a stable elevation, with a decrease in the coefficient of viscosity, material flows down the slope under the influence of gravity. To study this process, a mathematical model method was used, as a result of which a mathematical model of the given process was obtained and a mathematical problem on the solution of a quasilinear equation of parabolic type was formulated. To solve the mathematical problem, a finite-difference method was used; a nonlinear implicit calculation scheme was chosen on the basis of which an algorithm for solving the problem was formulated and a computer program was developed. A numerical experiment was performed for various possible variants; the results are presented in the form of graphs and tables.

Keywords: sedimentary rocks, rheological properties, creep, mechanism of landslides origin, mathematical model, solution algorithm, numerical experiment.

The setting of the problem. One of the causes of catastrophic phenomena occurring in foothill areas or on hillslopes of elevations is the lowering of ground materials down their slope. As a rule, with the preservation of certain conditions, a stable position of ground materials remains. However, under the influence of natural phenomena, for example, prolonged heavy rains that lead to a change in the viscosity properties of the materials composing the upper layers of the ground, creep motions may occur under the influence of gravity. Research in this direction is relevant since the study of the mechanism of origin of one of such phenomena frequently occurring on the Earth is considered important for the prevention of catastrophes associated with them [1,2].

It is known [3,4,5] that sedimentary rocks, which cover more than 75% of the surface of the terrestrial land, have the property of creep. "Creep is a phenomenon of gradual growth of strain in time with constant stress and a decrease in strength under long-term loading" [5, p. 36]. Therefore, creep is the cause of such phenomena as landslides, mudflows, glacier flow and others.

The proposed article is devoted to a model investigation of one version of the mechanism of landslides origin when the ground lowering occurs under the influence of its own weight with a change in their rheological properties. In this case, a physical model of "creeping" flows in the viscous layer is used [3,4,7,8], and for the study of the process under consideration - the mathematical model method [6].

Mathematical model and setting of the mathematical problem. Let us consider a certain viscous layer of a certain thickness (power) lying on the surface of a stable hill. It is assumed that at the initial time the viscous layer is in a stable position, i.e. there is no movement in it. Then, because of the decrease in the coefficient of viscosity of the layer, it moves down the hillslope under the influence of its own weight. It is required to compile a mathematical model of this problem and set its mathematical formulation.

To solve the problem, it is necessary to introduce the notations for the main parameters describing the process under consideration.

Let it be assumed that there is a rectangular coordinate system, in which x and y - horizontal coordinates, and z – vertical coordinate; z axis is directed upwards, backwards to the direction of the gravitational vector $\vec{g}$ (Figure 1).

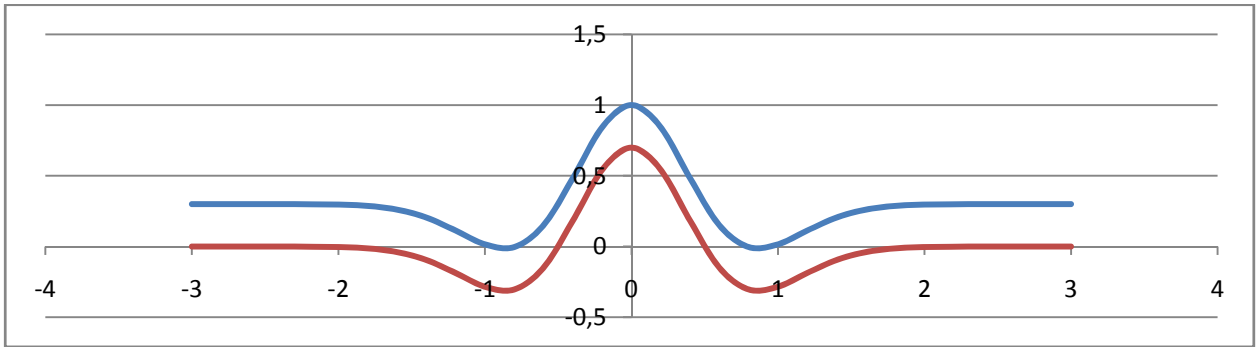

Figure 1 - Initial position of a viscous layer resting on a hill

It is assumed that the center (vertex) of the hill coincides with the origin of coordinates ($x = 0$) and z axis is a line of symmetry. The boundary between the moving part (the viscous layer) and the fixed part of the hill is determined by the function $z = \xi(x, y)$, and the free surface of the viscous layer - $z = u(x, y, t)$. Here t - time. The required function is $z = u(x, y, t)$.

It is assumed that the thickness of the viscous layer is little in comparison with the horizontal dimensions, which makes it possible to use a similar mathematical model of the problem considered in the work of the author. The transition to dimensionless parameters and the simplifying transformations associated with it allow to write down the corresponding mathematical dependences. In this case, the free surface of the viscous layer under consideration is described by the following differential equation in dimensionless variables [10,11]:

$$\frac{\partial u}{\partial t} = \frac{ER}{3} \cdot [\frac{\partial}{\partial x}(u - \xi)^3 \frac{\partial u}{\partial x}) + \frac{\partial}{\partial y}(u - \xi)\frac{\partial u}{\partial y})]. \quad (1)$$

Here, $z = \xi(x, y)$ is a function that determines the boundary surface between the viscous layer and the underlying fixed base. Let it be given in the following form [10]:

$$\xi(x, y) = (1 - f) \cdot e^{-\frac{x^2+y^2}{b}} \cdot [1 - \frac{2(x^2 + y^2)}{b}],$$

where $f -$ initial thickness of the viscous layer. In the equation there is a single parameter $ER = \frac{\rho g H^3}{\eta UL}$, which is dimensionless, depending on the physical and geometric properties of the viscous layer under consideration; where $\rho -$ the density of the material and $\eta -$ the dynamic coefficient of the viscosity layer, $g -$ acceleration of gravity, $U, H, L -$ characteristic values: speed, vertical and horizontal dimensions respectively.

The received equation (1) is a quasilinear equation of parabolic type with regard to the function $u(x, y, t)$.

The solution of the equation (1) makes it possible to obtain a picture of the change in the free surface of the structure under consideration, to calculate the values of the moving velocities of the materials in the layer by the following formulas [11]:

$$u_x = \frac{ER}{2} \cdot \frac{\partial \varepsilon}{\partial x} \cdot [(z - u)^2 - (u - \xi)^2];$$
$$u_y = \frac{ER}{2} \cdot \frac{\partial \varepsilon}{\partial y} \cdot [(z - u)^2 - (u - \xi)^2]. \quad (2)$$

It follows from the setting of the problem that the initial condition (at $t = 0$) for solving equation (1) has the following form:

$$u(x, y, 0) = e^{-\frac{x^2+y^2}{b}} \cdot [1 - \frac{2(x^2 + y^2)}{b}]. \quad (3)$$

This function (3) determines the initial position of the free surface of the viscous layer under consideration. It is obtained as a result of the transition to dimensionless parameters by means of the following substitution [10]:

$$b = \frac{B}{L}, \quad x = \frac{x}{L}, \quad y = \frac{y}{L}, \quad Z_0 = \frac{Z_0}{H}.$$

Since we consider a layer, the characteristic horizontal dimension (L) of which is large enough in comparison with its vertical dimensions (H), it can be assumed, that:

$$u \to 0 \text{ on condition } x \to \pm\infty,\ y \to \pm\infty. \tag{4}$$

This means that at points away from the center of the hill ($x = 0$), the free surface of the layer very closely coincides with the horizon $(z = 0)$. For numerical calculation, we can consider the boundary conditions as follows:

$$x = \pm d,\ u(\pm d, y, t) = 0; \quad y = \pm d, \quad u(x, \pm d, t) = 0. \tag{5}$$

In this case, the value d can be chosen several times more than the dimensionless value of the maximum hill height. This is done for the purpose of approximate replacement of the condition at infinity.

The setting of the mathematical problem. Thus, the resulting set of formulas (1) - (5) forms the mathematical model of the problem set here, which allows us to formulate the following mathematical problem: *it is required to solve the equation (1) for the initial condition (3) and the boundary conditions* (5).

On the method of solving the mathematical problem. Obviously, because of the presence of nonlinearity with respect to the desired function, the equation (1) cannot be solved by an analytical method, therefore, a finite-difference method is used here. According to academicians Tikhonov A.N. and Samarskiy A.A. [9, p. 593], "At present, the finite-difference method is the only method that allows to find effectively a solution of quasilinear equations".

In the quasilinear equation (1), the coefficient of the highest derivative of the desired function is a power function with respect to the same function. For the stability of the solution of this type of equations, it is expedient to use an implicit calculation scheme that is nonlinear with respect to the values of the required function [9].

The calculation scheme. In order to reduce the amount of computational work, we can confine ourselves to solving the two-dimensional problem. Selecting the steps h and τ by independent variables x and t respectively, we can get the following calculation scheme:

$$\frac{u_i^{j+1} - u_i^j}{\tau} = \frac{ER}{3 \cdot h} \cdot [(u_{i+1}^{j+1} - \xi_{i+1})^3 \cdot \frac{u_{i+1}^{j+1} - u_i^{j+1}}{h} - (u_i^{j+1} - \xi_i)^3 \cdot \frac{u_i^{j+1} - u_{i-1}^{j+1}}{h}], \tag{6}$$

$i = 1, 2, 3, \ldots, n; \quad j = 1, 2, 3, \ldots, m;$ $n -$ the number of points of division by x, and $m -$ by t.

It is clear that this scheme is nonlinear with respect to the values of the required function u_i^{j+1}; so to solve this system of algebraic equations, it is necessary to use the iteration method. To transform the equations (6) we introduce the following notations:

$u_i^{j+1} = u_i -$ value of the function on the new layer and the new iteration;

$u_i^{j+1} = w_i -$ value of the function on the new layer, for the previous iteration;

$u_i^j = v_i -$ the value of the function on the previous layer.

Taking these notations into account, and also after the simplest transformations from the formulas (6), we can obtain the following equation:

$$A_i u_{i-1} - (1 + A_i + A_{i+1}) \cdot u_i + A_{i+1} \cdot u_{i+1} = -v_i, \tag{7}$$

where

$$A_i = \frac{ER \cdot \tau}{3h^2} \cdot (\frac{w_i - \xi_i + w_{i-1} - \xi_{i-1}}{2})^3, \ i = 1, 2, 3, \ldots, n. - 1 \tag{8}$$

Formula (7) is a system of algebraic equations, the main matrix of which has a special form - tridiagonality. To solve this system of equations, a sweep method is used for each iteration. The use of the iteration method allows to obtain a solution of the problem with a specified accuracy, and also the stability of the solution will be ensured.

Now conditions on the boundaries should be added to the system of equations (7); from the formulas (5), the following conditions can be obtained:

- the condition on the left border, at $x = 0,$ where the maximum of the desired function is reached and the first derivative is zero, which implies $u_0 \approx u_1$;

- the condition on the right boundary, away from the center, at $x = 3,$ It can be assumed that the value of the required function is zero; i.e. $u_n = 0.$ Because of the symmetry for the left side of the domain $-3 \le x \le 3$ the results of the solution will be the same as for the right side of the domain. Therefore, we can confine ourselves to solving the problem for one, the right-hand side, of the domain.

Algorithm for solving the problem. For each iteration, the system of equations (7) is solved by the sweep method. As the zero approximation, the value of the desired function on the previous layer is used.

Within the iteration, the following operations will be performed:

1^0. First, the values of the coefficients of the system of equations (7) should be determined by the formulas (8).

2^0. In the direct run, unknown coefficients are determined using the following formulas:

$$\alpha_1 = 1; \quad \beta_1 = 0; \tag{9}$$

$$\alpha_{i+1} = \frac{A_{i+1}}{1 + A_i + A_{i+1}}; \quad \beta_{i+1} = \frac{v_i + A_i \cdot \beta_i}{1 + A_i + A_{i+1}}, \; i = 1, 2, 3, \ldots, n-1. \tag{10}$$

3^0. Then, in the reverse run, the values of the desired function are determined using the following formulas:

$$u_n = 0; \quad u_i = \alpha_{i+1} \cdot u_{i+1} + \beta_{i+1}, \quad i = n-1, n-2, \ldots, 1. \tag{11}$$

4^0. The iterative process continues until the accuracy condition is satisfied; it is given by the following inequality:

$$\max\{|u[i] - w[i]|\} < \varepsilon, \tag{12}$$

where $\varepsilon -$ a sufficiently small positive number, which must be given in advance. Inequality (12) determines the largest deviation between the values of the desired function for two iterations.

Numerical implementation of the algorithm. The development of a computer program for solving this problem is not very difficult. The computer program was developed [12,13], with the help of which a numerical experiment was carried out. The following specific data are included in the numerical experiment plan:

- for a dimensionless quantity ER the following four values were accepted: $ER = 0{,}01;$ $ER = 0{,}1;$ $ER = 1{,}0;$ $ER = 10;$

- steps on independent variables: $h = 0{,}02;$ $\tau = 0{,}0001;$

- the initial thickness of the layer is assumed to be constant and equal to $f = 0{,}3;$

- to determine the accuracy of calculations it is assumed $\varepsilon = 0{,}0001;$

- the calculations were carried out for the instants of time $0 \le t \le 10$;

- The interval over the horizontal variable was $-3 \le x \le 3.$

Results of the numerical solution of the problem. It should be noted that the solution of this problem depends only on one dimensionless parameter $ER.$ Therefore, the numerical experiment was carried out for different values of this parameter. This parameter is determined by the physical and geometric characteristics of the viscous layer under consideration, therefore the initial numerical data are taken from the special literature on the physical and mechanical properties of rocks [3,4,5]. Elementary calculations have shown that for most sedimentary rocks, including clay ones, covering a significant part of the earth's surface, the order of the values of the dimensionless parameter ER may be within 0.01; 0.1; 1.0; 10. For these values of this parameter, calculations were made.

As a result of the numerical implementation of the algorithm for solving this problem, results are obtained, which are presented in the form of graphs and tables. There was determined the positions of the viscous layer for different instants of time in the range $0 \le t \le 10$ for different values of the dimensionless parameter ER. Because of the fact that at $ER = 0{,}01$ the change in the initial position of the viscous layer turned out to be insignificant, the graph for this case is not presented here. Figures 2 - 4 show the positions of the viscous layer at the time point $t = 10$ for parameter values ER: $0{,}1; 1{,}0; 10$.

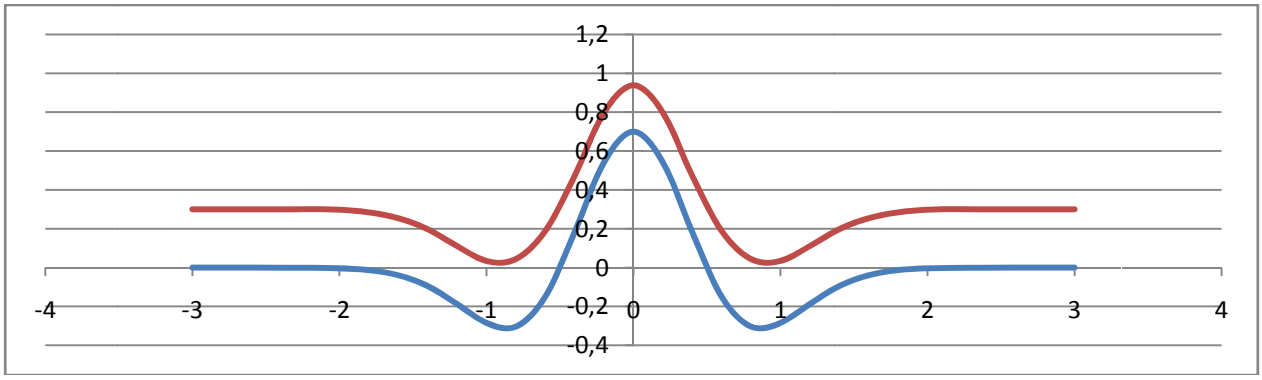

Figure 2 - The position of the viscous layer at $t = 10$ for $ER = 0{,}1$.

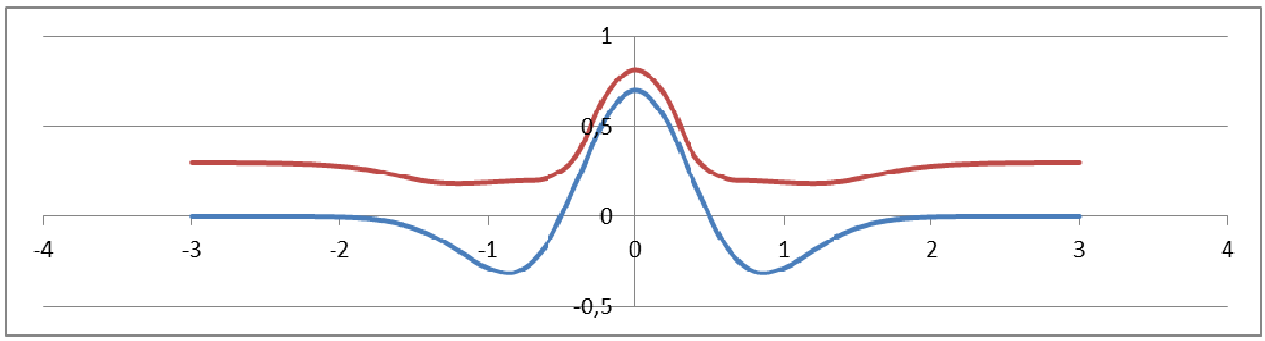

Figure 3 – The position of the viscous layer at $t = 10$ for $ER = 1$.

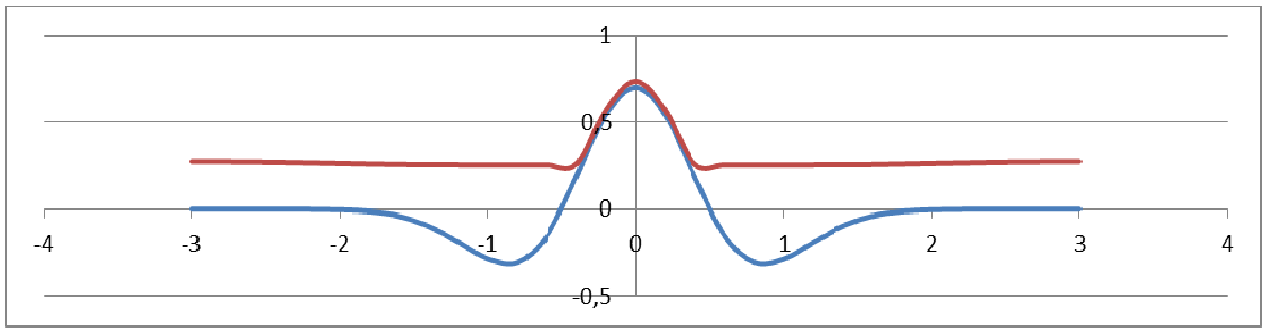

Figure 4 – The position of the viscous layer at $t = 10$ for $ER = 10$.

Conclusions. The main parameter affecting the process under consideration is the dynamic coefficient of viscosity of the layer. Therefore, when studying this process, it is necessary to take into account the change in the viscosity of the layer materials as the main factor. The dimensionless parameter depends inversely on the dynamic coefficient of viscosity of the layer under consideration. At low values of the coefficient of viscosity η the parameter value ER will be great, and conversely, when the viscosity coefficient is of great importance, this parameter will have a small value.

From an analysis of the obtained results, it follows that for a sufficiently large value of the dynamic coefficient of viscosity of the layer under consideration ($ER = 0{,}1$ and $ER = 0{,}01$) the change in the

initial state of the layer will be insignificant. In fact, the lowering of the maximum point (the vertex) of the outer surface of the layer during the period of time $t = 10$ is for the case when $ER = 0{,}1$, only by 6.15% (decrease from 1 to 0.9385), and for the case when $ER = 0{,}01$, only by 1.09% (the same, from 1 to 0.9891). For comparison, there can be given the data for $ER = 1$ and $ER = 10$. In the last two cases, the viscosity coefficient will have relatively small values. The lowering of the viscous layer materials will be significant at this; the descent of the top of the layer is: for the case at $ER = 1$ about 18%, and for $ER = 10$ - 26%. Figure 5 shows the graphs showing the changes in the vertex for three cases discussed above.

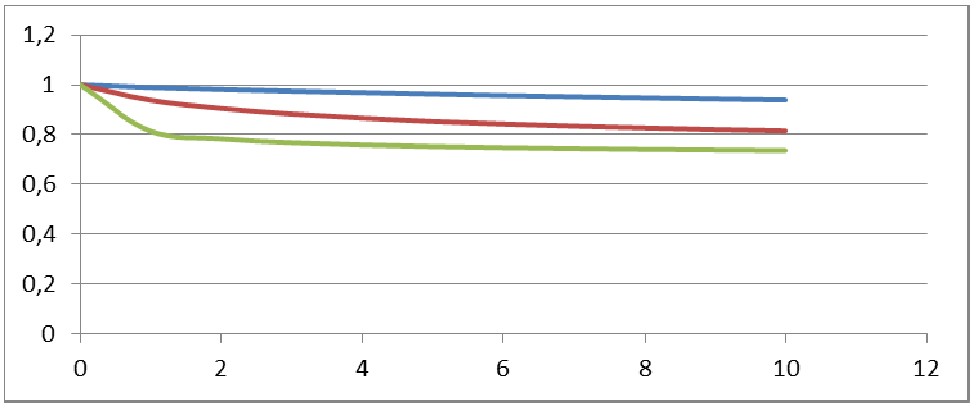

Figure 5 - Graphs for changing the maximum value of the function $u(0,t)$ in time for different values of the parameter ER :
- top line for $ER = 0{,}1$;
- middle line for $ER = 1$;
- lower line for $ER = 10$.

In addition, it should be noted that due to the lowering of the layer materials, the upper parts are thinning (Figure 4), and due to this process, the lower parts of the considered area thicken, where sedimentary rocks accumulate, the thickness of which reaches considerable sizes. For example, the thickening at the lowest level (on the sole) of the hill for the various variants was in the following values:

Table 1- Maximum increase in the layer thickness

ER	0.1	1.0	10
Layer thickness	0.3408	0.4972	0.5527
% of increasing	13.6	65.7	84.2

In conclusion, it should be noted that the results of the solution of this problem allow a theoretical (mathematical) description of the mechanism of the occurrence of landslides lying on elevated areas. An assessment of the changes that occur due to landslides with a decrease in the coefficient of viscosity of sedimentary rocks was made. The obtained results of the study make it possible to estimate the scale of catastrophic consequences due to the occurrence of landslides. For example, it can be seen from Table 1 that there is an increase in the thickness of the layer in the lower parts of the earth's surface by 65-84%, which occurs due to rocks sliding from the upper parts of the hill. This means that these places on the earth's surface are covered by sedimentary rocks of considerable volume. This situation can lead to undesirable consequences.

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УДК 517.946+681.3

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ТҰТҚЫРЛЫ ҚАБАТТЫҢ МАТЕРИАЛДАРЫНЫҢ ҚЫРАТ БАУРАЙЫНА ТӨМЕН ТҮСУІ ТУРАЛЫ ЕСЕПТІ ШЕШУ

Аннотация. Мақалада шөгінді тау жыныстарының көшкінінің пайда болуының механизмін модельдік зерттеу туралы мәселе қарастырылған. Тұрақты қырат бетінде орналасқан тау жыныстарының тқтқырлы қабатының тұтқырлық коэффициенті төмендегендеөз салмағының әсерімен қырат баурайымен төмен қарай қозғалады деп ұйғарылған. Осындай процесті зерттеу үшін математикалық модельдеу әдісін қолдану нәтижесінде квазисызықтық парабола типіндегі теңдеуді шешу туралы математикалық есеп қойылған. Есепті шешу үшін шектелген-айырма әдісі қолданылған; сызықтық емес әрі айқын емес есептеу схемасы таңдалынып, есептің алгоритмі мен компьютерлік программасы құрастырылған. Әртүрлі варианттар үшін сандық эксперимент орындалды; есептеу нәтижелері графиктер мен кестелер түрінде берілген.

Түйін сөздер: шөгінді тау жыныстары, реологиялық қасиеттер, жылжу, көшкіннің пайда болу механизмі, математикалық модель, есептеу алгоритмі, сандық эксперимент.

УДК 517.946+681.3

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РЕШЕНИЕ ЗАДАЧИ ОБ ОПУСКАНИИ МАТЕРИАЛОВ ВЯЗКОГО СЛОЯ ПО СКЛОНУ ВОЗВЫШЕННОСТИ

Аннотация. В статье рассматривается задача о модельном исследовании механизма возникновения оползней осадочных горных пород. Предполагается, что вязкий слой породы, находящийся на поверхности устойчивой возвышенности, при уменьшении коэффициента вязкости возникает движение материалов вниз по склону под действием силы тяжести. Для исследования данного процесса использован метод математического моделирования, в результате которого получена математическая модель данного процесса и сформулирована математическая задача о решении квазилинейного уравнения параболического типа. Для решения математической задачи использован конечно-разностный метод; была выбрана нелинейная неявная расчетная схема, на основе которой сформулирован алгоритм решения задачи и разработана компьютерная программа. Проведен численный эксперимент для различных возможных вариантов; результаты представлены в виде графиков и таблиц.

Ключевые слова: осадочные породы, реологические свойства, ползучесть, механизм возникновения оползней, математическая модель, алгоритм решения, численный эксперимент.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 43 – 46

UDK666.973.2.00.2.

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SELECTION OF INITIAL CHARGE MATERIALS FOR MUD PROTECTION STRUCTURES

Abstract. In this article we consider the selection of initial charge materials for structures of mud protection structures. To study the development of the optimal content of the composite material used to erect a protective structure, it is necessary to determine their physicochemical properties of the starting charge materials. As initial charge materials in the form of fillers, the use of Karaganda steel melting slag waste from Arcelor Mittal Temirtau JSC plant, granulated electrothermophosphor slag of Novo Zhambul Phosphor Plant, and mineral wool as micro-reinforcement are proposed.The waste of slate-pipe production and Portland cement of M300 grade are used as binders.X-ray phase analysis of samples of electrothermophosphor slag and steel-smelting slag was carried out on a DRON-3 instrument in the angular interval 8-640.

Key words: Electrothermophosphor slag, steel-smelting slag, composite material, mud protection structures.

Introduction. In modern conditions, when the activation of dangerous geological processes is influenced by human economic activity as well as natural factors, the problem of implementing effective protective measures and structures with the current degree of development of mountainous and foothill areas acquires a mass significance for the state.Dangerous geological and natural processes determine the conditions for economic development of the areas, as intensive development causes serious difficulties for the construction and operation of various structures; therefore, it requires taking preventive protective measures.

The development of a general line in the implementation of engineering protective measures and facilities without an analysis of the current conditions of the protection systems is impossible [1].

The bulk of the constructed facilities on the territory of the Republic of Kazakhstan played a positive role in reducing damage during the passage of debris flows and is ready to fulfill its functions in the future.

A number of facilities have been destroyed as a result of extreme situations of natural disasters, such as mudflows, avalanches, landslides which can be an example of the inefficient design solutions. Part of it fell into disrepair due to inadequate ongoing and major repairs during operation.The imperfection of protective structures and the fragility of their functioning is largely determined by the lack of the necessary regulatory framework for their design, construction and operation.

Methods of research. To study the development of the optimal content of the composite material used to erect a protective structure, it is necessary to determine their physicochemical properties of the starting charge materials.As initial charge materials in the form of fillers, the use of Karaganda steel melting slag waste from Arcelor Mittal Temirtau JSC plant, granulated electrothermophosphor slag of Novo Zhambul Phosphor Plant, and mineral wool as micro-reinforcement are proposed.The waste of slate-pipe production and Portland cement of M300 grade are used as binders.

Chemical content of Portland cement in% of mass:Al_2O_3 – 4.00, Fe_2O_3 – 4.04 CaO -65.70, MgO – 1.93. SO_3 -2.5, SiO_2-21.50. Chemical composition of mineral wool wastes, in% by weight:Al_2O_3 – 9.7, Fe_2O_3 -1.6, CaO – 39.0, MgO – 2.2, SO_3-0.9, SiO_2-45.80.Chemical composition of waste of slate-pipe production, in% of mass:Al_2O_3 -3.85, Fe_2O_3-4.145, CaO -50.0, MgO – 53.5, SO_3-1.65, SiO_2-20.80.

Physico-chemical analysis of slags in the scanning electron microscope ISM-6490LV. Chemical content of steelmaking slag (Karaganda city), in% of mass:Na - 0.83, Na_2O -1.12, Mg -5.25, MgO - 8.70, Al - 5.59, Al_2O_3 - 10.56, Si – 15.40, SiO_2 - 32.95, S - 1.32, K - 0.89, K_2O – 1.07, Ca – 28.21, CaO – 1.07, Ti – 0.55, TiO_2 – 0.91, Mn – 0.46, MnO – 0.60, Fe – 0.81, Fe_2O_3 – 1.15, Ni – 0.22, NiO – 0.27, O – 40.47.

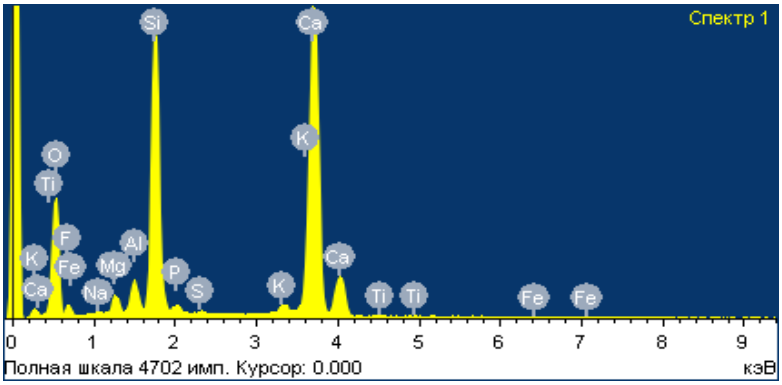
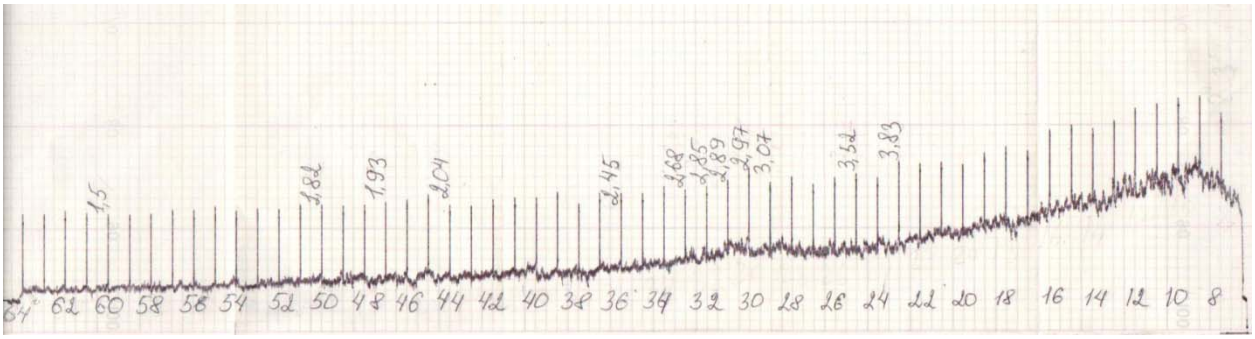


Figure 1 - Spectral analysis of steelmaking slag (Karaganda city).

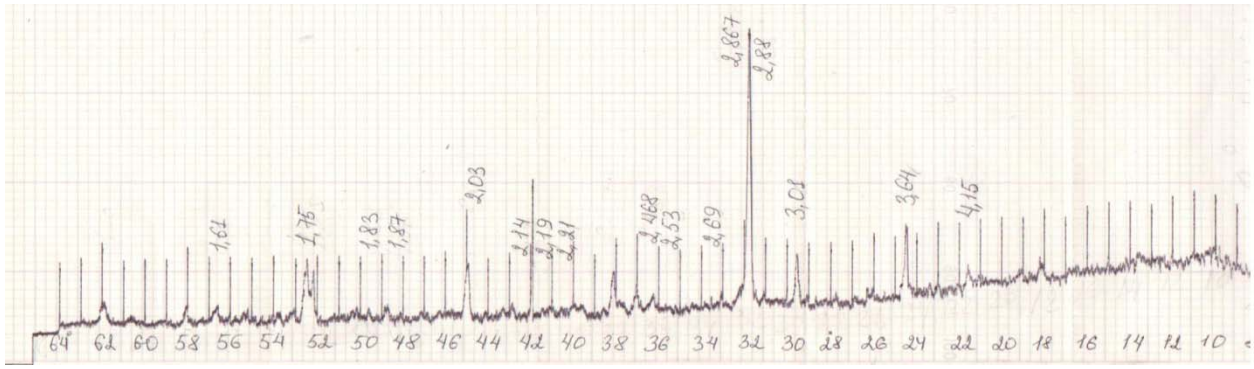
Chemical composition of electrothermophosphor slag (Taraz city), in% of mass:F – 4.83, Na – 0.31, Na_2O – 0.42, Mg – 1.47, MgO – 2.44, Al – 2.14, Al_2O_3 – 4.04, Si – 17.69, SiO_2 – 37.84, P-0.64, P_2O_5 – 1.47, S – 0.22, K – 0.84, K_2O – 1.01, Ca – 33.53, CaO – 46.91, Ti – 0.09, TiO_2 – 0.14, Fe – 0.28, Fe_2O_3 – 0.40, O -37.97.X-ray phase analysis of samples of electrothermophosphor slag and steel-smelting slag was carried out on a DRON-3 instrument in the angular interval 8-640.

The diffractogram of electrothermophosphor slag shows that the sample has mainly a vitreous phase. The components of the crystalline phase are calcium pyrosilicate $Ca_3Si_2O_7$ with values of interplanar distances$\frac{d}{n}$ = 2.89-2.68-3.07A^0 and calcium metasilicate $CaSiO_3$ c$\frac{d}{n}$ = 2.97-3.83-3.52A^0. In small amounts melilite of variable composition is present from 2CaO • Al_2O_3 • SiO_2 to 2CaO • Mg • 2SiO_2 with values of interplanar distances $\frac{d}{n}$= 3.07-2.85-2.45-2.04-1.93-1.82-1, 51A^0.



The presence of merwinite (3CaO • MgO • 2SiO_2) with analytical lines$\frac{d}{n}$ = 2,867-2,69-2,21-2,03-1,87A^0 was established on the diffractogram of the steel-smelting slag. The intensity of the diffraction maxima c$\frac{d}{n}$ = 4.15-3.64-2.88-2.69-2.53-1.83A^0 indicates the presence of monticellite (CaO • MgO • SiO_2) also in the sample there is an iron-containing phase-wustite (FeO) with values of interplanar distances$\frac{d}{n}$ = 2.14 - 2.468 - 1.51A^0.

The results of the physical-chemical and X-ray-phase analyzes made it possible to recommend the optimal content for composite materials production, which has a low cost for use in the construction industry and waste disposal in industry.A composite content of composite material including Portland cement, waste of mineral wool and slate-pipe production, electrothermal phosphorus slags and steelmaking slags was developed.



Results of the study. On the basis of an analytical review of domestic and foreign literature and patent sources, research tasks have been carried out to develop more robust composite materials for the production of mud protection structures.

To propose for discussion in the Ministry of Emergency Situations of the Republic of Kazakhstan "Kazselezashchita" the results of the study, in order toallocate funding for carrying out after a detailed study and obtaining a sample of a mud protection structure, as well as testing its model shape in conditions close to real.

The discussion of the results. The most difficult task for science in the field of engineering protection of territories is how to predict the approach of danger and what measures to take to reduce the risk of natural disasters. With a scientifically substantiated approach to solving these problems, it is possible to save huge material resources, improve the ecology, and, most importantly, preserve people's lives.

Conclusions. Dangerous natural processes of exogenous origin of mud flows are widespread in the mountainous regions of Kazakhstan, occupying about 10% of its territory. About one-fourth of the republic's population lives in areas that are more or less susceptible to the effects of dangerous processes, and about a third of its economic potential is concentrated.

At present, the natural risk caused by the manifestations of dangerous processes exceeds the acceptable level. The existing system of measures to prevent damage is not entirely adequate to threats. The schemes of protection of territories from dangerous processes developed in the 1980s have not been fully implemented and are now largely outdated. This is due, on the one hand, to the appearance of more progressive methods of protection, on the other hand, with the appearance within the zones of exposure of dangerous processes of new economic objects, often erected without regard for natural hazards.

General schemes for protecting the population and territories from hazardous natural processes should include the full range of protective measures, not limited to, as was the case in the schemes of the last century, only engineering facilities.

The results of the conducted experiments and industrial tests made it possible to recommend the optimal composition for the production of strong bending mud protection structures, which has a low cost for use in the construction industry. Resource-saving and energy-saving technologies were developed with the use of production wastes, phosphorus, steel, mineral wool and slate-pipe production.

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СЕЛДЕН ҚОРҒАЙТЫН ҚОРҒАНЫС ҚҰРЫЛЫМДАРЫ ҮШІН БАСТАПҚЫ ШИКІЗАТТАРДЫ ТАҢДАУ

Аннотация: Бұл мақалада селден қорғайтын қорғаныс құрылымдарын үшін бастапқы шикізаттарды таңдау қарастырылған. Қорғаныс құрылымын тұрғызуға арналған композициялық материалдың оңтайлы құрамының зерттеу үшін, бастапқы шикізаттардың физикалық-химиялық қасиеттерін анықтау қажет. Бастапқы шикізаттар ретінде Қарағанды қаласындағы АҚ «Арселор Миттал Темиртау» зауытының болат балқыту қалдығының шлагы, Жаңа жамбыл фосфор зауыты қалдықтарының электро термофосфорлы шлагы және микро күшейту ретінде минералды мақта алынды. Сонымен қатар тұтқыштар ретінде шиферлі-құбыр өндірісінің қалдықтары мен М300 маркалы портландцемент қолданылды. Электротермофосфорлы және болат балқыма шлактарының рентгено-фазалық талдауы ДРОН-3 құралында 8-64^0 бұрыштар арақашықтығында интервалында) жасалынды.

Түйін сөздер: Электротермофосфорлы шлак, болат балқыма шлак, композициялық материал, селден қорғайтын қорғаныс құрылымдары.

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ПОДБОР ИСХОДНЫХ ШИХТОВЫХ МАТЕРИАЛОВ ДЛЯ СЕЛЕЗАЩИТНЫХ КОНСТРУКЦИЙ

Аннотация. В данной статье рассматриваются подбор исходных шихтовых материалов для конструкций селезащитных сооружений. Для изучения разработкиоптимального состава композиционного материала, применяемого для возведения защитных сооружении требует необходимости определения их физико-химических свойств исходных шихтовых материалов. В качестве исходных шихтовых материалов в виде заполнителей предлогается применение отходов Карагандинского сталеплавильного шлака завода АО «Арселор Миттал Темиртау», гранулированный электротермофосфорный шлак Ново Джамбулского Фосфорного завода, а минеральная вата как микроармирование. Отход шиферно-трубного производства и портландцемент марки М300 применямые как вяжущие. Исследован рентгено-фазовый анализ образцов электротермофосфорного шлака и сталеплавильного шлака проводился на приборе ДРОН-3 в интервале углов 8-64^0.

Ключевые слова: Электротермофосфорный шлак, сталеплавильный шлак, композиционный материал, селезащитные конструкции.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 47 – 53

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INTERACTIVE VIRTUALIZATION IN THE ENVIRONMENT OF FLASH-CC, JAVA SCRIPT OF ALGORITHMS OF MATHEMATICAL COMMUNICATIONS THE PHENOMENON OF WAVE OPTICS

Abstract. The wave optics – considers light distribution, by means of Huygens' principles which pass through the power relations. Nevertheless, the considered in optics, all wave phenomena, by means of optical instruments are based on laws of wave optics. For example, the interference and the diffraction. Many tasks of the theory of optical installations are based on laws of wave optics. In this work, algorithms of mathematical communications of wave optics, i.e. laws of interference, diffraction of light rays, are considered on the studied virtual and interactive installation on the computer when passing light through a bi prism of Frenel and the diffraction grating, etc., as in an actual pilot unit.

Optical processes of an interference and diffraction are visualized and interactively virtualized by means of the computer program Adobe Flash-CC environments. The laboratory work was made on a research of processes of wave optics is very effective at development of this course, and the technology of creation of VIL described in this article, is very relevant for creation of the similar virtual and interactive laboratories (VIL) in other objects.

This virtual interactive laboratory development is introduced in educational process of the Eurasian technological university and is successfully applied in tutoring.

Keywords: Algorithm, the virtual interaktivization, wave optics, interference, diffraction, experiment of Young, coherence, mathematical functions.

Introduction. Historically the first interference experience which received an explanation on the basis of a wave theory of light was experience of Young (1802). In experience of Young light from a source as which the narrow crack of S served fell on the screen with two close located cracks S_1 and S_2 (picture 1). Passing through each of cracks, the light bunch broadened owing to diffraction therefore on the white screen E light bunches which passed through cracks S_1 and S_2, were blocked. In the field of overlapping of light bunches was observed the interference figure in the form of the alternating ghost and dark fringes.

Young was the first who understood that it is impossible to observe interference at addition of waves from two independent sources. Therefore in its experience of a crack S_1 and S_2, which can be considered according to a Huygens ‘ Principle as sources of secondary waves, were lit with light of one source of S. At the symmetric arrangement of cracks the secondary waves which are let out by sources S_1 and S_2, are in a phase, but these waves pass P different distances to an observation point r_1 and r_2. Therefore, the oscillation phases created by waves from sources S_1 and S_2 in the point P, generally speaking, are various. Thus, the task about wave interference comes down to a task about a superposition of oscillations of the same frequency, but with different phases. A statement that waves from sources S_1 and S_2 extend independently of each other, and in an observation point they just develop, is the experienced fact and carries the name of a principle of superposition. The simple harmonic wave extending in the direction of a position vector $\vec{r}$, registers in a look

$$E = a \cos(\omega t - kr),$$

where a – wave's of amplitude, $k = 2\pi / \lambda$ – wave number, λ – wave length, $\omega = 2\pi\nu$ – circular frequency. In optical tasks it is necessary to understand the module of a vector of a strength of electric field of a wave as E. At addition of two waves in a point P resultant fluctuation also happens at a frequency ω and has some amplitude of A and a phase φ:

$$E = a_1 \cdot \cos(\omega t - kr_1) + a_2 \cdot \cos(\omega t - kr_2) = A \cdot \cos(\omega t - \varphi).$$

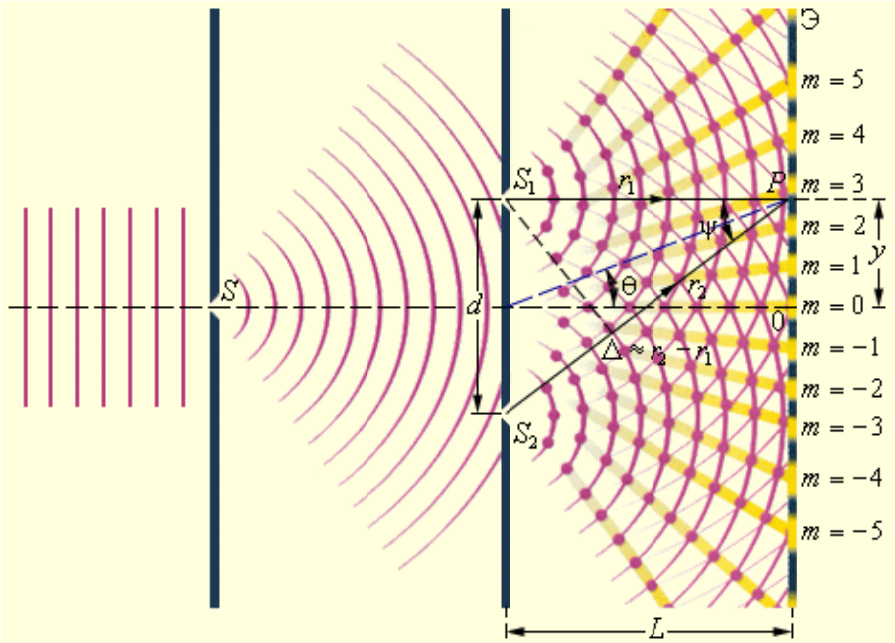

Figure 1 - Scheme of the interference experience of Young

There are no devices which would be capable to monitor fast changes of the field of a light wave in optical band; observed size is the energy stream which is directly proportional to a square of amplitude of an electric field of a wave. The physical quantity equal to a square of amplitude of an electric field of a wave, it is accepted to call intensity: $I = A^2$.

Simple angular transformations lead to the following expression for intensity of resultant fluctuation in a point P:

$$I = A^2 = a_1^2 + a_2^2 + 2a_1a_2 \cos k\Delta = I_1 + I_2 + 2\sqrt{I_1 I_2} \cos k\Delta, \quad (1)$$

where $\Delta = r_2 - r_1$ – so-called difference of the course.

Follows from this expression that the interference maximum (bright fringe) is reached in those points of space, in which $\Delta = m\lambda$ ($m = 0, \pm1, \pm2, ...$). As the same time $I_{max} = (a_1 + a_2)^2 > I_1 + I_2$. The interference minimum (dark strip) is reached at $\Delta = m\lambda + \lambda / 2$. Minimum value of intensity $I_{min} = (a_1 - a_2)^2 < I_1 + I_2$. In the figure 2 is shown distribution of intensity of light in the interference figure depending on the difference of the course Δ.

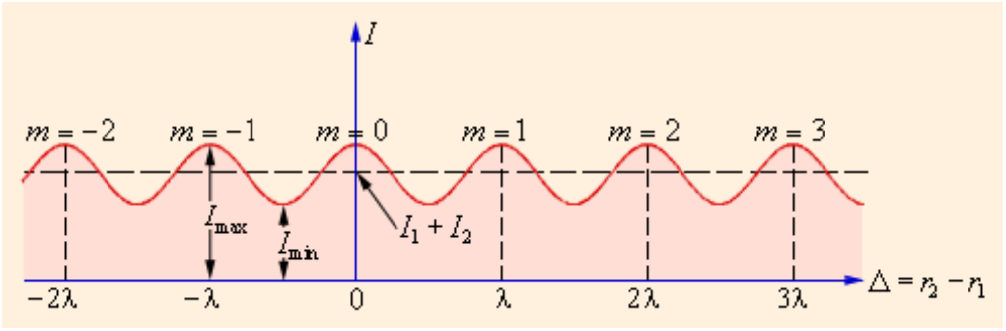

Figure 2 - Distribution of intensity in the interference figure.
An integral number of m – an order of the interference maximum

In particular, if $I_1 = I_2 = I_0$, i.e. intensity of both interfering waves are identical, expression (1) takes a form:

$$I = 2I_0(1 + \cos k\Delta). \quad (2)$$

In this case $I_{max} = 4I_0$, $I_{min} = 0$.

Formulas (1) and (2) are the universal. They are applicable to any interference scheme in which there is an addition of two simple harmonic waves of the same frequency. Distinction is shown only in how the difference of the course Δ depends on the provision of a point of observation of P. If in a tableau of Young through to designate observation point shift from a plane of symmetry, then for a case when $d << L$ and $y << L$ (in optical experiments these conditions are usually satisfied), it is possible to receive approximately:

$$\Delta \approx d \cdot \theta \approx \frac{d \cdot y}{L}. \tag{3}$$

At shift along a coordinate axis of y on the distance equal to an interference bandwidth Δl, i.e. at shift from one interference maximum in next, the difference of the course Δ changes on one wavelength λ. Therefore,

$$\frac{d \cdot \Delta l}{L} = \lambda \quad \text{или} \quad \Delta l = \frac{L \cdot \lambda}{d} \approx \frac{\lambda}{\psi}, \tag{4}$$

where ψ – angle of convergence of "beams" in an observation point *P*. Let's execute the quantitative assessment. Let's say that d distance between cracks S_1 and S_2 equally to 1 mm, and the distance from cracks to the screen E makes L = 1 m, then $\psi = d / L = 0{,}001$ rad. For green light (λ = 500 nanometers) we will receive $\Delta l = \lambda / \psi = 5 \cdot 10^5$ nm = 0,5 mm. For red light (λ = 600 nanometers) $\Delta l = 0{,}6$ mm. In such path Young for the first time measured lengths of light waves though accuracy of these measurements was small.

Actual light waves are not strictly monochromatic. Owing to the fundamental physical reasons radiation always has statistical property. Atoms of a light source radiate independently of each other in casual instants, and the radiation of each atom lasts very short time ($\tau \le 10^{-8}$ s). Resultant radiation of a source in each instant consists of deposits of huge number of atoms. Through order time τ all set of radiating atoms is updated. Therefore cooperative radiation will have other amplitude and that is especially important, other phase. The phase of the wave radiated by an actual light source remains approximately constant only on order time slices τ. Separate "scraps" of radiation of duration τ are called hemlocks. Hemlocks have the space length equal to cτ where with – light velocity. Fluctuations in different hemlocks are not coordinated among themselves. Thus, the actual light wave represents the sequence of wave t with randomly changing phase. It is accepted to say that fluctuations in different hemlocks are incoherent. The time slice τ during which the oscillation phase remains approximately constant is called a coherence time.

The interference can arise only at addition of coherent fluctuations, i.e. the fluctuations which are falling into to the same Zug. Though phases of each of these fluctuations are also subject to random changes in time, but these changes are identical therefore the difference in phase of coherent fluctuations remains to a constant. In this case steady is observed the interference figure also, therefore, is carried out a principle of superposition of fields. At addition of incoherent fluctuations the difference in phase appears a random function of time. Interference fringes experience random movements here and there, and in time Δt their filing which in optical experiments much more a coherence time ($\Delta t >> \tau$), there is the complete averaging. The recording device (an eye, a photographic plate, a photo cell) will record in an observation point the average value of intensity equal to the sum of intensity of $I_1 + I_2$ of both fluctuations. In this case the law of addition of intensity is carried out.

Methods of observation of an interference

To the invention of lasers in all optical instruments coherent waves received by method of division of a light beam into two beams. Passing the divided two rays of light two various geometrical paths received a difference in phase and at a slip gave the interference figure.

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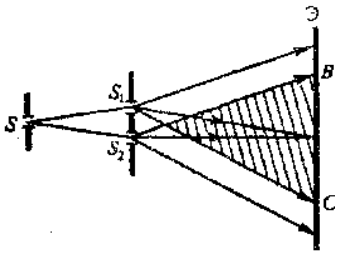
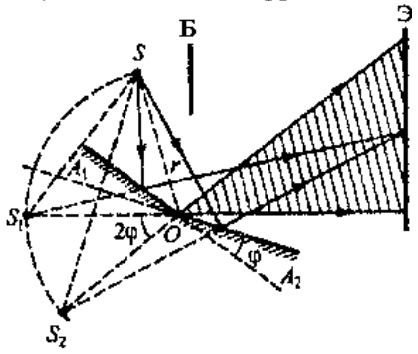
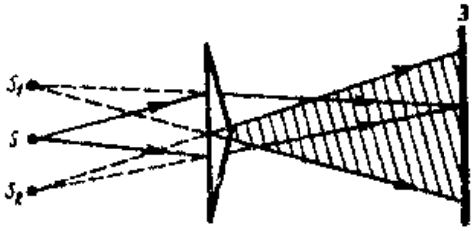
1. Method of Young. Passing light through a crack of S gets on two cracks S_1 and S_2, carrying out a role of two sources of coherent waves, through whom pass give a difference in phase, iinterferentsionny picture BC it is observed on the screen E .



2. Fresnel mirrors Свет от источника ***S*** gets on two plane mirrors of A_1O and A_2O. These mirrors have a small corner of an arrangement φ to each other and give two virtual images of S_1 and S_2, S light source which are carrying out a role of two coherent light sources. The interference figure is observed on the screen. That light did not get directly on the screen is applied the valve B .



3. Fresnel biprism. Light from a source S after passing through a biprism, refracting forms two sources of coherent waves of S_1 and S_2 and when imposing on the screen give the interference figure.



4. Lloyd's mirror. The S-point source of light is located close to a surface of a plane mirror of M. The light source of S and its virtual image of S_1 carry out a role of two coherent light sources.

Interactive tools and virtualization on the computer of laws of wave optics in the program environment Flash-CC, Java - script.

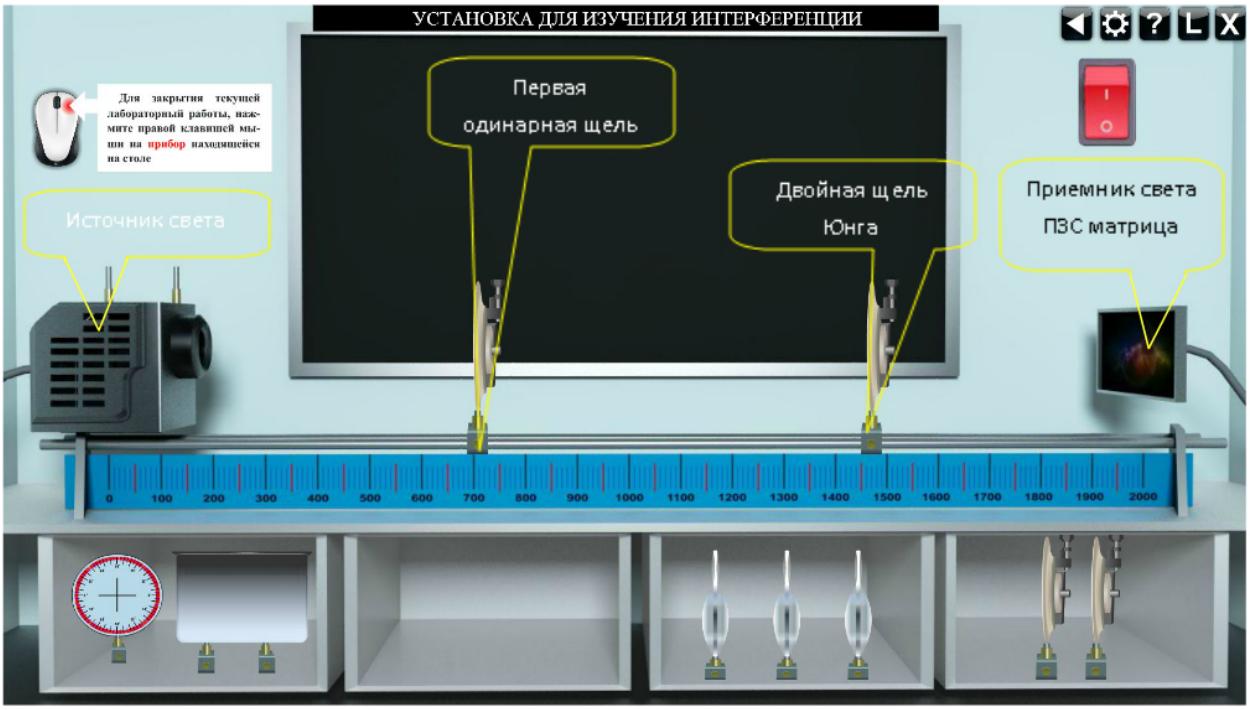
The present requirement of time for transfer larger volume information on the Internet, including animation images in driving work with them demands the large volume of memory. And for reduction of capacity of use of memory use for the virtual – interactive tools of Flash technologies is very efficient. [3,4]. From the basic vector – the graphic Flash format of technologies Shore wave Flash (SWF) – a branch was created. But, it is not the first vector format; it is the Web broadcast mechanism – pages to SWF as finding of the graphic representation, the coordinating link of an instrumental inventory and the graphic representation. Advantage of SWF-of the application it it easily an acceptability on other

Wednesday, i.e. this format is used in different is information – the program platform (in the Mac OS Macintosh operating system, in OS - Windows OS). One more feature of SWF – the constructed main images not only accept animation but also are padding, an opportunity to create interactive elements and audio of installation. Besides, mathematical formula communications of physical processes can be turned into interactive elements, management of their changes give the chance, to carry out on the computer, interactive virtual researches. For example, as shown in the drawing that the mathematical dependences found Shelli's for reflection and light refraction and to form interactive virtual laboratory, very conveniently the formats SWF, CC of them – the program Flash environment. For transfer on distances of interactive multimedia additions are carried out on the known SWF format – in the Web application for the Internet.

Why, to emergence of this application of this format in Macromedia, for browsers of two main networks of the Plug in component, and to distribution to Internet Explorer and Netscape Communicator the worldwide computer network affected. One more reason popularity of SWF – a format this very mild and convenient application instruments for other platforms development of Macromedia. For example:-for creations of the multimedia presentations use the program device – Macromedia Director Shockwave Studio,

- and are used the program device to creation of graphic images – Macromedia Authorwave, Macromedia Course Builder. Therefore among Web – the publication the most recognizable and easily applied publication is Macromedia Flash Web – gives the chance to decorate each website with animation and to collect the complete page. Action Script Tools - allows to collect Web addition efficiently and its modern languages similarly probably on the scenario Java Script, Action Script and by means of the editor of Devigger is the solution of often applied elements. When there is a work of Flash – Mkh you can construct the collected clip or import graphics, later in process of work will be able to process and by means of an assembly ruler use effect of resuscitation (Time line) [4]. Such clip or the movie can be interactive, i.e. particular images can be changed at discretion and to influence events in the clip. You export it

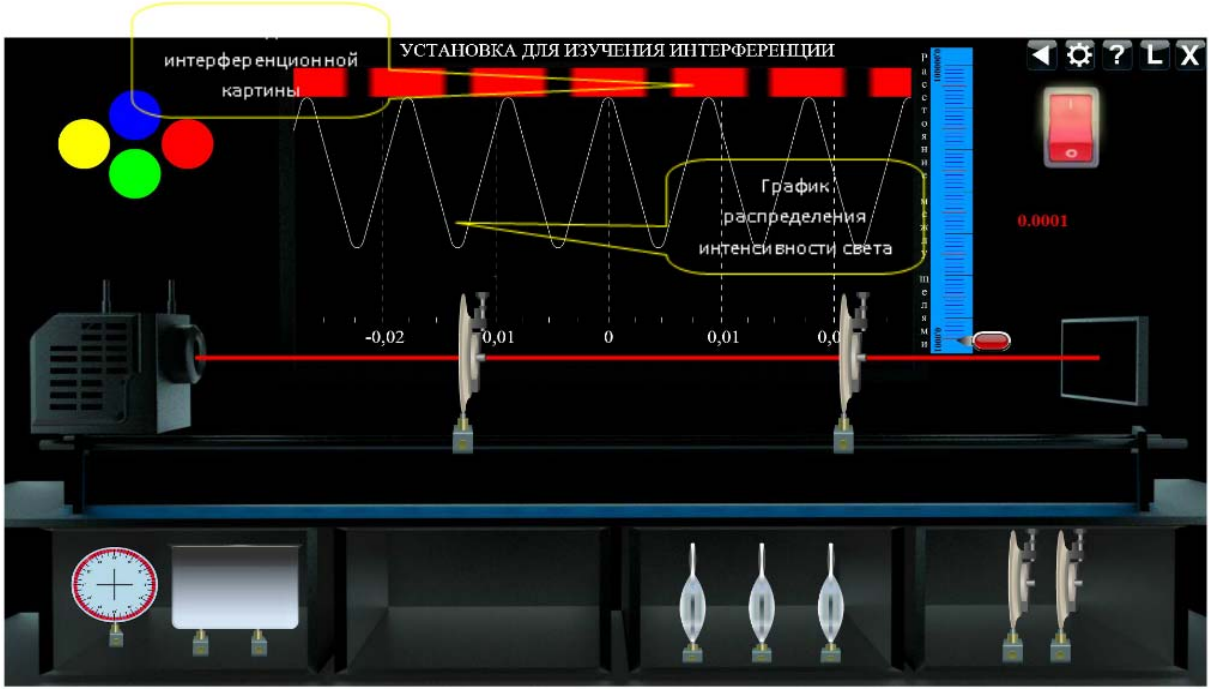
INSTALLATION FOR STUDYING OF THE INTERFERENCE



Turn of devices. The click by the right button of a mouse on the image of light filters, an individual crack and a double crack of Young deploys these devices by 90 degrees. The choice of the light filter (blue, green, red, yellow) is carried out by click of the left-hand button of a mouse on area of the light

filter. Parameters of an individual crack do not change. At a turn of a crack of Young the window of parameters in which it is possible to see and change distance between cracks and light wavelength opens. These parameters are given in meters. After the choice of parameters it is necessary to press the accept button.

Movement of a crack of Young on a bench. Guide the index of a mouse at the screw of fastening of a crack on an optical bench (the hand will appear). Press and hold the left-hand button of a mouse, moving a mouse to the right or to the left. Pressing the remove button in a window of parameters, leads to removal of installation. It must be kept in mind that installation will work only when all devices are installed in operative condition and in laboratory light is switched off.



Rescaling of the schedule of intensity of light. Establish the index of a mouse in the top left-hand corner of that area of the schedule which you want to see in an expanded scale. Press and hold the left-hand button of a mouse. Move the index from top to down and from left to right to the necessary point. Release the button. You will see the enlarged image on the screen. To return the schedule to a reference state, it is necessary to make the same, only driving of a mouse from right to left and from below up.

Conclusion.

As a part of informational technologies the new branch develops - it is the virtual interactive tools and visualization of the hardly understood subjects of physics, chemistry, biology and other objects [5]. And creation is virtual – interactive laboratories on called a subject meet the operated measuring apparatuses very seldom. Therefore the technology of creation of the virtually-interactive laboratory (VIL) for the section of physics given in this work. "The optics - ray optics" will be very relevant to creators similar to VIL – at higher step in other objects of knowledge. Such VIL – on the computer are very effective for development of a particular course of knowledge and develop self-contained research skills and awaken to creative searching of research techniques. Given VIL on ray optics, due to rituality and interactive intervention in change process an experiment condition, it is very useful to fast development of a subject of physics by students and to development of skills researching it. Brought VIL – on ray optics are introduced in educational process of the Eurasian Technological University and are successfully applied there.

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ТОЛҚЫНДЫҚ ОПТИКА ҚҰБЫЛЫСТАРЫНЫҢ МАТЕМАТИКАЛЫҚ БАЙЛАНЫСТАР АЛГОРИТМІН FLASH-CC, JAVA SCRIPT-,БАҒДАРЛАУ ОРТАЛАРЫНДА ИНТЕРБЕЛСЕНДІ ВИРТУАЛДАУ

Аннотация.Толқындық оптика-Гюйгенс принципіне сүйене отырып, энергетикалық қатынастар арқылы өтетін, жарықтың кеңістікте таралуын қарастырады. Оптикалық құралдар көмегімен, оптикада қарастырылатын барлық толқындық құбылыстар, толқындық оптика заңдарына негізделген. Мысалы, интерференция және дифракция құбылыстары. Оптикалық қондырғылардың көптеген теориялық есептеулері толқындық оптика заңдарына сүйенген. Осы жұмыста,толқындық оптиканың математикалық байланыстарының алгоритмі, яғни,жарықтың интерференция, дифракция заңдары компьютерде, виртуалды-интерактивті зерттеу қондырғысында жарық сәулесі Френельдің бипризмасы арқылы және дифракциялық решетка арқылы өткенде зерттеліп қарастырылады, тура, реалды эксперименттік қондырғыдағы сияқты. Интерференция және дифракциядағы оптикалық процесстер, Adobe Flash-CC-компьютерлік бағдарлама ортасында көрнекіленіп, интерактивті түрде виртуалданған. Толқындық оптика процесстерін зерттейтін, жасалынған осы лабораториялық жұмыс, осы курсты меңгеруде өте құнды болып есептеледі, ал компьютерде виртуалды-интерактивті зертхана (ВИЗ) жасау технологиясы басқа пәндерден ВИЗ жасауға өте қолайлы және актуалды. Мақалада келтірілген-виртуалды-интерактивті зертханалық жұмыс Евразия технологиялық университетінің оқыту процессіне енгізіліп, студенттердің білім саласында қолданылуда

Түйін сөздер: Алгоритм, виртуалды интербелсенді, толқындық оптика, интерференция, дифракция, дифракциялық решетка, монохромат,когерентті толқын, математикалық функционалды байланыстар.

УДК:535.4+004.9

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ИНТЕРАКТИВНАЯ ВИРТУАЛИЗАЦИЯ В СРЕДЕ FLASH-CC, JAVA SCRIPT АЛГОРИТМОВ МАТЕМАТИЧЕСКИХ СВЯЗЕЙ ЯВЛЕНИИ ВОЛНОВОЙ ОПТИКИ

Аннотация. Волновая оптика – рассматривает распространение света, с помощью принципов Гюйгенса., которые проходят через энергетические отношения. Тем не менее, рассматриваются в оптике, все волновые явления с помощью оптических приборов, а также величина дифракционного явления.Многие задачи теории оптических установок основаны на законах волновой оптики. В данной работе, алгоритмы математических связей волновой оптики, т.е. законов интерференции, дифракции световых лучей, рассматриваются на исследуемой установке при прохождении света через бипризму Френеля и дифракционную решетку.

Оптические процессы интерференции и дифракции визуализированы и интерактивно виртуализированы с помощью компьютерных программных сред Adobe Flash-CC. Сделанная, лабораторная работа по исследованию процессов волновой оптики очень эффективна при освоении данного курса, а технология создания ВИЛ описанной в данной статье, очень актуальна для создания аналогичных виртуально-интерактивных лаборатории(ВИЛ) по другим предметам.

Данная виртуально- интерактивная лабораторная разработка внедрена в учебный процесс Евразийского технологического университета и успешно применяется в обучении.

Ключевые слова: Алгоритм, виртуальная интерактивизация , волновая оптика, интерференция, дифракция, эксперимент Юнга, когерентность, математические функции.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 54 – 62

UDC 636.1.082

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DAIRY PRODUCTIVITY AND MILK COMPOSITION OF MARES OF DIFFERENT GENOTYPES

Abstract. In the article, the materials of studies of the milking capacity of mares of different genotypes and the milk composition under the conditions of a stationary koumiss farm are presented. For the first time, the results of studies on the variability and interrelationship of the main components of milk and milk yield of mares under stable and pasture conditions are summarized and given in a comparative aspect. There are pedigree differences in the quantity and quality of milk, Novoaltaisk-Kazakh cross-breeds have a higher milking capacity, followed by the Kazakh mares of the Jabe type and the Don-Kazakh crossbreeds. During the lactation period, 1482.2 liters of commercial milk yield from the Kazakh mares of the Jabe type, 1513.4 liters from the Novoaltaisk-Kazakh hybrids and 1267.6 liters from the Don-Kazakh hybrids were received.

The highest fat content in milk was 1.79% in the Kazakh mares of Jabe type, in the Novoaltaisk-Kazakh hybrids it was 1.64% and in the Don-Kazakh hybrids - 1.52%. The protein content in milk of the Kazakh mares of Jabe type and the Novoaltaisk-Kazakh hybrids are practically the same 2.02 - 2.01%, and in the Don-Kazakh hybrids are only 1.87%. Variability of the fat content by lactation months is below the variability of milk yield and ranges from 5.06 to 7.88%. The correlation coefficient between milk yield and content of fat, protein, sugar had a negative value, and a positive relationship between the fat content and dry substance.

Keywords:genotype, milking capacity, lactation, variability, fat, protein, sugar, correlation.

Introduction

In the context of the complex mechanization of agricultural production, significant opportunities appear for the development of productive horse breeding in the direction of the production of koumiss and horse meat associated with extensive pasture lands in Kazakhstan (187 million hectares).

Great attention is paid to the development of horse breeding, especially herd horse breeding, as an important productive branch, in the Pavlodar region, where there are 8 million 235 thousand 900 hectares of steppe and semi-desert pastures and more than 135 thousand heads of horses, where horse herding is most effective. Herd horses, like many other species of animals, are able to selectively eat a necessary vegetation for them while free moving in the pasture area, which contributes to the production of environmentally friendly horse meat and koumiss [1].

Koumiss production in Kazakhstan has rich centuries-old traditions. Koumiss has always been a favorite drink for the Kazakhs and replaced the wine, mineral water and other drinks for them. The Republic annually produces about 24 thousand tons of koumiss, and by 2020 it is planned to produce up to 30 thousand tons.

In the solution of this problem, the transfer of dairy horse breeding to an industrial base, by means of the creation of large stationary koumiss farms, is of great importance. So, in the Pavlodar region, there are two stationary koumiss farms "Altai" and "Sakyp", which produce koumiss all year round.

Under the same conditions of feeding, care and maintenance, the mares of different breeds differ in unequal productivity in terms of quantity and quality. Therefore, a comparative study of the economic traits of horses contributes to the proper selection of the breed for certain specific conditions, that opens

up great additional reserves in increasing the production of horse breeding products. It is also important to study the nature and types of the interrelationship of the main selection characteristics of milking capacity: milk yield, fat and protein content in milk.

According to the chemical composition, the mare's milk differs significantly from the milk of other animal species, and the content of milk sugar and the qualitative composition of the protein is close to the human one. The similarity is also observed in the content of the "C" vitamin. The mare's milk is poorer in fat and protein than in cow milk. However, the milk of mares has a sugar content 1.5 times, and the vitamin "C" is almost 10 times more than cow's one. By the amount of lactose and ash, the mare's milk and human milk are almost at an early stage[2, 3, 4].

In dairy horse breeding, all these issues are not fully studied in the complex, while in dairy cattle breeding they are explored quite deeply [5, 6, 7]. This situation has determined the direction of our research.

The object of the research – milch Kazakh mares of Jabe type and their cross breeds from factory breeds, bred in the conditions of the "Altai" peasant farm of Lebyazhinsk district of the Pavlodar region.

The aim of the research. To study the production and chemical composition of milk of mares of different genotypes, to determine the degree of variability, the interrelationships of the main components of milk among themselves and with the milk yield.

Method or methodology of the work. Studies of milk productivity and the chemical composition of milk were carried out at the stationary koumiss farm of the "Altai" peasant farm in the Lebyazhinsk district of the Pavlodar region on three groups of mares in the period 2016-2017.

There were 30 milch mares under the experience, 10 of them were Kazakh of Jabe type, 10 heads of the Novoaltaisk-Kazakh and 10 heads of the Don-Kazakh cross breeds.

To characterize the development and type of body build, the test mares were measured and weighed. From each animal 4 measurements were taken: height at the withers, oblique body length, chest girth and metacarpus girth [8]. For the purpose of studying the features of the body build of mares, the indices were calculated: format, wide body, massive and boniness. The live weight of mares was established by weighing on a monochrome scales in the beginning and in the end of lactation before morning feeding and watering.

The maintenance of milking mares in autumn-winter period is horsy-pasture, and in spring-summer - pasture.

The mares were milked 6 times a day, with intervals between milking of 2-2.5 hours with the DDU-2 electric milking machine.

In the autumn-winter period, except pasture vegetation, the mares were given coarse and concentrated fodder by classes, taking into account the live weight and productivity[9].

Commercial milking capacity was determined monthly during lactation by the method of milking control, twice a month on two adjacent days. Milk productivity was calculated taking into account the milk sucked at night by the formula of Saygin I.A. [10].

The chemical analysis of mares' milk was carried out in the laboratory of the Innovative Eurasian University in Pavlodar on the MilkoScan analyzer. The content of protein, fat and sugar in milk was determined. The percentage of dry fat-free residue "DFMR" in milk was determined by the difference in milk and distilled water values according to the "DFMR" scale.

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

Results of the research

*Zootechnical characteristics of milking mares.*In the "Altai" farm, along with the thoroughbred breeding of Kazakh horses of Jabe type injecting blood was used to increase the productivityof the Novoaltaisk and Don breeds, which produced positive results.

The body measurements and live weight of milking mares of different genotypes are given in Table 1.

The data in Table 1 show that the milking mares of the Novoaltaisk-Kazakh cross breeds are very tall (148.4 cm) with an elongated body (158.5 cm), a deep chest (191.5 cm), excellent boniness (20.3 cm), high live weight (506.0 kg), massiveness index - 154.7.

Kazakh jabe type mares, having a sufficient height of 142.7 cm, an oblique body length of 148.8 cm, a chest girth of 178.3 cm and a live weight of 436.2 kg are slightly inferior to the Novoaltaisk-Kazakh cross breeds by 69.8 kg (16.0%) in live weight, nevertheless, they have a high massive index-150.4.

Table 1 - average body measurements and live weight of test groups (n for 10 heads)

Indicators	Groups of mares					
	Kazakh of Jabe type		Novoaltaisk-Kazakh cross breed		Don-Kazakh cross breed	
	$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv
Measurements, cm: height at the withers	142.7±0.47	1.04	148.4±0.70	1.49	147.4±0.65	1.40
oblique body length	148.8±0.51	1.09	158.5±0.68	1.37	153.6±0.58	1.20
chest girth	178.3±0.70	1.24	191.5±0.69	1.13	174.0±0.57	1.04
metacarpus girth	18.4±0.11	1.85	20.3±0.21	3.25	19.7±0.18	2.89
Live weight, kg	436.2±3.42	2.47	506.0±4.07	2.54	412.6±3.12	2.39
Body build indexes,%::format	104.3	-	106.8	-	104.2	-
chest girth	124.9	-	129.0	-	118.0	-
boniness	12.9	-	13.7	-	13.4	-
massive	150.4	-	154.7	-	128.9	-

Mares of the Don-Kazakh hybrids differ in harmonious body build, they do not have a high chest girth (174.0 cm), typical for the riding constitution of the exteriors, slightly inferior to the first two groups of mares by live weight on 23.6 kg (5.4%) and 93.4 kg (22.6%). The mares of this group do not have a high massive index of 128.9.

By measuring the height at the withers, the oblique body length and the chest girth of the mares of all three groups, the more stable parameters of the coefficient of variability (from 1.04 to 1.49) are inherent. Higher coefficients of variability were observed in mares in live weight (2.39-2.54), then in metacarpus girth (from 1.85 to 3.25). In further breeding and pedigree work, the selection of horses according to live weight and boniness will yield positive results in improving these characteristics.

Milking mares of all three groups had a strong type of constitution, a well-developed chest, rounded ribs, an elongated body. The strong type of the body build of mares can be judged by the development of theskeleton. So, the boniness index was: among the Kazakh mares of jabe type - 12.9, in the Novoaltaisk-Kazakh hybrids - 13.7 and in the Don-Kazakh hybrids-13.4.

*Dairy productivity.*Studies conducted in 2016-2017 on the stationary koumiss farm of the Altai peasant farm showed that mares of different genotypes had unequal dairy production. Higher dairy productivity in pasture and horsy-pasture conditions is in the Novoaltaisk-Kazakh cross breeds. Then in the descending order, there are the Kazakh mares of the jabe type and females of the Don-Kazakh hybrids (Tabilica 2).

Table 2 - Actual (commercial) milk yield of mares by lactation months, l (n by 10)

Indicators	Month of lactation (2016-2017)						
	May II	June III	July IV	August V	September VI	October VII	November VIII
Kazakh jabe type							
$X \pm m_x$	9.1±0.37	9.2±0.31	8.7±0.33	7.5±0.29	5.9±0.25	4.9±0.24	3.1±0.19
Cv	18.1	15.1	16.8	17.1	18.9	21.5	26.3
Novoaltaisk-Kazakh cross breeds							
$X \pm m_x$	9.3±0.50	9.4±0.48	9.0±0.41	7.8±0.38	5.8±0.36	4.6±0.34	3.2±0.29
Cv	16.9	16.1	15.8	15.5	19.8	23.7	28.7
Don-Kazakh cross breed							
$X \pm m_x$	7.2±0.29	7.9±0.40	7.5±0.29	6.7±0.30	5.1±0.22	4.2±0.19	2.8±0.17
Cv	17.9	22.4	17.3	19.7	19.5	20.4	27.4

From the data in Table 2, it can be seen that the lactation curve by the months of lactation in the mares of all three groups changed markedly. The higher actual mare's milk yield was shown in the 2-3 month of lactation, then the yield gradually decreased, and more sharply towards the end of lactation.

In the milch Kazakh mares of jabe type and the Novoaltaisk-Kazakh cross breeds, after 2 months of lactation, there is a decrease in individual variability of the milk yield, which reaches the lowest index in the Kazakh mares of the jabe type (15.1), in Novoaltaisk-Kazakh cross breeds in the fifth month - 15.5 and in the Don-Kazakh hybrids in the fourth month of lactation - 17.3, after which an increase in the coefficient of variability is observed, especially sharply in the 7th and 8th month of lactation.

Our studies showed that mares of different genotypes had different milking capacities (Table 3).

The data of Table 3 show that for 214 days of lactation, the dairy productivity of the Novoaltaisk-Kazakh cross breeds was 3167.2 liters, the Kazakh mares - 3103.0 liters and the Don-Kazakh hybrids - 2632.2 liters.

Commercial yield, received from the mares of the first group, amounted to 1482.2 liters, the second group - 1513.4 liters and the third - 1267.6 liters. The yield of the Novoaltaisk-Kazakh cross breeds exceeds the yield of the Kazakh mares of jabe type by 2.1% or 31.2 liters and the Don-Kazakh mares by 19.4% or 245.8 liters.

Table 3 - Dairy productivity of mares of different genotypes during the lactation period, l

Groups of mares	Actual milk yield		Dairy productivity		Live weight, kg	For 100 kg of live weight
	For a day	For a lactation	For a day	For a lactation		
Kazakh of jabe type	6.93±0.19	1482.2±39.3	14.5±0.39	3103.0±89.6	436.2	711
Novoaltaisk-Kazakh cross breeds	7.07±0.28	1513.4±52.9	14.8±0.54	3167.2±108.5	506.0	626
Don-Kazakh cross breed	5.92±0.17	1267.6±35.3	12.3±0.33	2632.2±73.6	412.6	638

However, according to the milking capacity index (per 100 kg of live weight), the mares occupy a slightly different position than according to the absolute indicator. This indicator was the greatest in the Kazakh mares of jabe type (711 kg), then in the Don-Kazakh cross breeds (638 kg) and in the Novoaltaisk-Kazakh cross breeds (626 kg). These data are consistent with the studies of professor Barmintsev Yu.N. [12], who notes that better numbers for the milking capacity index are for local breeds such as Kazakh, Bashkir and Novokirgiz, than for heavy-duty, trotting and riding breeds. He believes that such a valuable quality of horses of local breeds must be preserved and perfected in the course of breeding work.

*Chemical composition of the mares milk.*Studies of the chemical composition of mares milk of different genotypes are of great scientific and practical interest since on the basis of these data it is possible to perform an assessment of the breeds and to develop ways of their further improvement.

Information on the chemical composition of milk of mares of different genotypes is given in Table 4.

From the data in Table 4, it can be seen that the milk of the Kazakh mares of jabe type (10.68), of the Novoaltaisk-Kazakh cross breeds (10.50) contains more dry matter than the milk of the Don-Kazakh hybrids (10.23).

The highest fat content in milk was also found in the Kazakh mares of jabe type (1.79). The second place in fat-milking is occupied by the Novoaltaisk-Kazakh cross breeds (1.64), then the Don-Kazakh cross breeds (1.52). It is known that in the production of koumiss from mare's milk the fat remains practically unchanged since the normal microflora of koumiss does not produce a lipase that breaks down fat into glycerin and fatty acids.This is remarkable in that the components of milk fat of mares, especially linoleic, linolenic and arachidonic acids, which have vitamin properties and are not synthesized in human and animal organisms, are fully used in the use of koumiss[13, 14].

Table 4 - Milk composition of mares of different genotypes on average for lactation

Groups of mares	Indicators	Content in the milk, %				
		dry matter	fat	protein	sugar	DFMR
Kazakh of jabe type	$X \pm m_x$	10.68±0.06	1.79±0.02	2.02±0.03	6.48±0.05	8.90±0.05
	Cv	2.66	5.26	6.10	3.37	2.58
Novoaltaisk-Kazakh cross breeds	$X \pm m_x$	10.50±0.08	1.64±0.03	2.01±0.03	6.51±0.03	8.71±0.05
	Cv	2.50	5.06	5.12	1.27	1.94
Don-Kazakh cross breed	$X \pm m_x$	10.23±0.05	1.52±0.03	1.87±0.02	6.32±0.04	8.72±0.04
	Cv	2.10	7.88	4.66	3.00	1.92

The protein content in the milk of the Kazakh mares of jabe type is 2.02%, of the Novoaltaisk-Kazakh cross breeds - 2.01%, that is, they are almost the same, while in the Don-Kazakh cross breeds is only 1.87%.

According to the sugar content in the milk of mares, the Novoaltaisk-Kazakh cross breeds (6.51) are on the first place, followed by the Kazakh mares (6.48) and the Don-Kazakh cross breeds (6.32). Milk sugar plays an important role in the production of koumiss, it is the main source of nutrition for lactic acid bacteria. Under the action of endocellular enzymes of bacteria, milk sugar is hydrolyzed with the formation of various substances that give koumiss a certain flavor and aroma. Therefore, it is important to have comparative data on the content of this component in the milk of mares of different genotypes [15, 16, 17].

The content of non-fat dry matters plays a substantive role in the qualitative evaluation of milk. If the fat content in mare's milk is subjected to the greatest changes under the influence of various factors, the amount of DFMR fluctuates within relatively narrow limits. According to our data, in the milk of mares of different genotypes, the content of DFMR was different. So, in the milk of the Kazakh mares of jabe type the DFMR content is more by 2.14% compared to the Novoaltaisk-Kazakh cross breeds and by 2.02% more than in the Don-Kazakh cross breeds.

The highest variability in milk composition was observed in the Kazakh mares in comparison with crossed animals, which is the basis for conducting an effective selection on these grounds when selecting breeds for seasonal and stationary koumiss farms.

*Interrelation of the milk components with milk yield and between themselves.*We analyzed the interrelation between milk yield, the content of fat, protein and milk sugar in mares' milk during lactation, as well as the type of connection between these components (table 5).

Table 5 - Coefficients of correlation between the average indicators of milk components and milk yield in mares of different genotypes

Indicators	DFMR	Fat	Protein	Sugar	Milk yield
Kazakh mares of jabe type					
Dry matter	+0.115	+0.408	+0.366	+0.072	+0.072
DFMR		+0.252	+0.271	+0.038	+0.127
Fat			+0.231	+0.247	-0.371
Protein				-0.013	+0.076
Sugar					-0.526
Novoaltaisk-Kazakh cross breeds					
Dry matter	+0.353	+0.722	+0.839	+0.686	-0.537
DFMR		+0.221	+0.306	+0.326	-0.121
Fat			+0.397	+0.403	-0.388
Protein				+0.572	-0.198
Sugar					-0.020
Don-Kazakh cross breeds					
Dry matter	+0.680	+0.367	+0.049	+0.036	+0.382
DFMR		+0.012	+0.551	-0.018	+0.463
Fat			+0.129	+0.015	+0.084
Protein				+0.059	-0.071
Sugar					-0.127

Data of Table 5 show that the correlation coefficient between the milk yield and the fat content is negative in the milk of the Kazakh mares of jabe type and of Novoaltaisk-Kazakh crossbreeds, with the exception of the milk obtained from Don-Kazakh cross breeds (+0.084) where interrelation is expressed as a positive, but with a very low index. The largest negative correlation coefficient was obtained in the group of the Novoaltaisk-Kazakh cross breeds (-0.388), then in the Kazakh jabe type mares (-0.371).

Between the milk yield and the protein content in the milk, the correlation is also negative, with the exception of the Kazakh mares, where the correlation coefficient is close to zero, but has a positive sign (+0.076).

The negative relationship is most pronounced in the group of the Novoaltaisk-Kazakh cross breeds, where the correlation coefficient has a value -0.198, and for Don-Kazakh hybrids it is low (-0.071).

The relationship between milk yield and milk sugar in all three groups of mares is negative. It is most pronounced in the Kazakh mares of jabe type, where the correlation coefficient is high (-0.526). And in Novoaltaisk-Kazakh and Don-Kazakh cross breeds, the correlation coefficients are low (from -0.002 to -0.127).

The coefficient of correlation between milk yield and DFMR in the Kazakh mares of jabe type (+0.127) and the Don-Kazakh hybrids (+0.463) has a positive value, while in the Novoaltaisk-Kazakh cross breeds it is negative (-0.121).

The interrelation between fat and dry matter in all three mares was positive. Thus, in the Novoaltaisk-Kazakh cross breeds this indicator is +0.722, in the Kazakh jabe mares +0.408 and in the Don-Kazakh cross breeds +0.367.

The correlation coefficients between the protein and other milk components as well as between fat in all cases are positive, with the exception of protein-sugar in the Kazakh jabe mares, which has a negative value, but close to zero (-0.013).

Considering the interrelation between the milk yield and the percentage of fat in milk by lactation months, it can be seen that in mares of different genotypes, it manifests itself in different ways (Table 6).

Table 6 - Interrelation of the value of milk yield, percentage of fat, protein and sugar by lactation months

Groups of mares	Correlation coefficient by lactation months						
	II	III	IV	V	VI	VII	VIII
Milk yield - protein							
Kazakh mares of jabe type	+0.086	-0.298	+0.126	-0.456	-0.320	-0.397	+0.083
Novoaltaisk-Kazakh cross breeds	-0.186	-0.238	-0.439	-0.082	+0.144	-0.794	-0.152
Don-Kazakh cross breeds	-0.173	+0.002	+0.236	-0.092	-0.174	+0.311	-0.377
Milk yield- fat							
Kazakh mares of jabe type	-0.153	-0.807	-0.509	-0.310	+0.273	+0.032	-0.256
Novoaltaisk-Kazakh cross breeds	+0.147	+0.005	-0.375	-0.232	+0.183	+0.051	-0.019
Don-Kazakh cross breeds	-0.043	-0.320	+0.186	-0.207	+0.071	+0.050	+0.024
Milk yield – sugar							
Kazakh mares of jabe type	-0.158	-0.628	-0.570	-0.663	+0.127	+0.068	-0.033
Novoaltaisk-Kazakh cross breeds	-0.491	+0.090	-0.174	-0.265	-0.303	+0.745	-0.699
Don-Kazakh cross breeds	-0.017	-0.630	+0.205	-0.600	-0.364	-0.043	+0.165

From the data in Table 6 it is clear that during the lactation period, the relationship between the milk yield and the protein percentage in the mare's milk is expressed by small negative correlation coefficients. The highly negative connection is manifested in the Kazakh mares of jabe type in the third (-0.298), the fifth (-0.456), the sixth (-0.320) and the seventh (-0.397) months of lactation. In the Novoaltaisk-Kazakh cross breeds in the third (-0.238), the fourth (-0.439) and the seventh (-0.794) months of lactation, in the Don-Kazakh hybrids only in the eighth month of lactation (-0.377).

High negative correlation coefficients between milk yield and fat percentage in the Kazakh jabe mares are observed in the third (-0.807), the fourth (-0.509), the fifth (-0.310) and the eighth (-0.256) months of lactation. In the Novoaltaisk-Kazakh cross breeds, a high negative correlation was observed in the fourth (-0.375) and fifth (-0.232) months of lactation, and in the Don-Kazakh hybrids in the third (-0.320) and fifth (-0.207) months of lactation.

The interrelation between milk yield and sugar in all groups of mares was negative during the lactation period. Kazakh mares had a higher positive relationship (+0.127) only at the sixth month of lactation, and the Novoaltaisk-Kazakh mares (+0.745) at the seventh, and the Don-Kazakh hybrids (+0.205) at the fourth month of lactation.

The data of analysis of the ratio of protein-fat in the milk of mares of different genotypes are given in Table 7.

From the data given in Table 7, it follows that the highest protein-fat ratio is observed in the milk of the Kazakh jabe mares, on average for seven months of lactation this ratio is 0.88 with fluctuations during the whole lactation from 0.76 in the seventh to 0.96 in the fourth months of lactation.

In the more liquid-milking Don-Kazakh cross breeds, this ratio was 0.86 for the experimental period with fluctuations from 0.70 in the fourth to 0.94 in the eighth months of lactation.

The ratio of protein-fat in the milk was lower in the group of Novoaltaisk-Kazakh hybrids than in the other groups and it was 0.81 with fluctuations from 0.76 in the seventh month of lactation to 0.89 in the fourth month.

Table 7 - Ratio of protein and fat percentage in the milk to mares of different genotypes by lactation months

Month of lactation	Groups of mares		
	Kazakh mares of jabe type	Novoaltaisk-Kazakh cross breeds	Don-Kazakh cross breeds
II	0.90	0.83	0.78
III	0.92	0.85	0.79
IV	0.96	0.89	0.91
V	0.88	0.87	0.76
VI	0.80	0.78	0.70
VII	0.76	0.76	0.80
VIII	0.87	0.82	0.94
On average	0.88	0.81	0.86

Thus, an increase in the yield of mares for lactation may be accompanied by a decrease in the fat content of milk while maintaining its protein content. If the percentage of fat increases, it can decrease in milk. While the percentage of protein in some cases will increase if the fat content of the milk does not exceed a certain level, but it can stay on the same level or decrease in cases of a sharp increase in butterfat percentage.

Along with that, according to the lactation months, there are large variations in the ratio of the studied characteristics to the degree and nature of the relationship between them, which is obviously due to their different and relatively independent variability.

Conclusions

In the conditions of the stationary koumiss farm of the "Altai" peasant farm, the dairy productivity and the chemical composition of mare's milk of different genotypes are not the same. Novoaltaisk-Kazakh cross breeds (3167.2 liters) and Kazakh jabe mares (3103.0 liters) are more productive than the Don-Kazakh cross breeds (2632.2 liters). According to the milking capacity index, Kazakh mares are up front (711 kg), followed by the Don-Kazakh cross breeds (638 kg) and the Novoaltaisk-Kazakh cross breeds (626 kg).

In terms of fat, protein, DFMR, dry matter in the milk, the Kazakh jabe mares favorably differ from mares of the Novoaltaisk-Kazakh and the Don-Kazakh cross breeds.

The variability of the basic indicators of milk yield in mares is low and ranges from 15.1 to 28.7%, fat content in milk from 5.06 to 7.88%, protein from 4.66 to 6.10%, sugar from 1.27 up to 3.37%.

The interrelation between the fat and protein content in the mare's milk is positive, but not the same (from +0.129 to +0.397). Selection by butterfat percentage does not ensure a simultaneous increase in protein content in the milk. Therefore, horse breeding is expedient not to maximize the development of individual traits, but to optimize their combination.

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УДК 636.1.082

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ӘРТҮРЛІ ТҮРЛІ ГЕНОТИПТЕГІ БИЕЛЕРДІҢ СҮТТІЛІГІ ЖӘНЕ СҮТ ҚҰРАМЫ

Аннотация. Мақалада стационар қымыз фермасы жағдайында түрлі генотипті биелердің сүттілігі мен сүт құрамының зерттеу материалдары келтірілген. Алғашқы рет жайылымда және ат қораларда бағылатын биелердің сауылуы және сүттің негізгі компонентінің өзгергіштігі және өзара байланысының салыстырмалы аспектісінің зерттеу нәтижелері көрсетілген.

Зерттеулерден сүттің мөлшері және сапасына түрлік айырмашылықтар анықталған, жаңаалтай – қазақ қоспалары жоғары сүттілікке ие, кейінгі сатыда қазақы жабы биелері және дон – қазақ қоспалары. Лактация барысында алынған тауарлық өнім қазақ жабы биесінен 1482,2 л, 1513,4 л жаңаалтай – қазақ қоспасынан және дон – қазақ қоспасынан 1267,6 л.

Сүттегі майдың жоғары мөлшері 1,79% қазақы жабы биесінде байқалды, ал жаңаалтай – қазақ қоспаларында 1,64% және дон – қазақ қоспасында 1,52% теңелді. Қазақы жабы биесінің және жаңаалтай – қазақ қоспаларының сүтіндегі ақуыз мөлшері шамамен бірдей болды - 2,02 – 2,01%. Ал дон – қазақ қоспасында - 1,87% көрсетті. Сүттену айларындағы май мөлшерінің өзгергіштігі сауу өзгергіштігінен төмен және 5,06 до 7,88% құрады. Сауу арасындағы және май, ақуыз және қант мөлшерінің коэффицент корреляциясы теріс мәнге ие болды, ал май мөлшері және құрғақ заттардың арасындағы байланыс оң мәнге ие болды.

Түйін сөздер: генотип, сүттілік, сүттену, өзгергіштік, май, ақуыз, қант, корреляция.

УДК 636.1.082

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МОЛОЧНАЯ ПРОДУКТИВНОСТЬ И СОСТАВ МОЛОКА КОБЫЛ РАЗНЫХ ГЕНОТИПОВ

Аннотация. В статье приведены материалы исследований молочности кобыл разных генотипов и состав молока в условиях стационарной кумысной фермы. Впервые обобщены и даны в сравнительном аспекте результаты исследований по изучению изменчивости и взаимосвязи основных компонентов молока и удоя кобыл при конюшенно – пастбищном условий содержания. Установлены породные различия по количеству и качеству молока, более высокой молочностью обладают новоалтайско-казахские помеси, затем казахские кобылы типа жабе и доно-казахские помеси. За период лактации получен товарный удой 1482,2 л от казахских кобыл типа жабе, 1513,4 л от новоалтайско-казахских помесей и 1267,6 л от доно-казахских помесей.

Наиболеее высокое содержание жира в молоке 1,79% наблюдалось казахских кобыл типа жабе, у новоалтайско – казахских помесей оно равнялось 1,64% и доно – казахских помесей 1,52%. Содержание белка в молоке казахских кобыл типа жабе и новоалтайско – казахских помесей практический одинаковы 2,02 – 2,01%. А доно – казахских помесей всего лишь 1,87%. Изменчивость содержания жира по месяцам лактации ниже изменчивости удоя и составляет от 5,06 до 7,88%. Коэффициент корреляции между удоем и содержанием жира, белка, сахара имело отрицатешльное значение, а между содержанием жира и сухого вещества положительная связь.

Ключевые слова: генотип, молочность, лактация, изменчивость, жир, белок, сахар, корреляция.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 63 – 66

636/22/28/033

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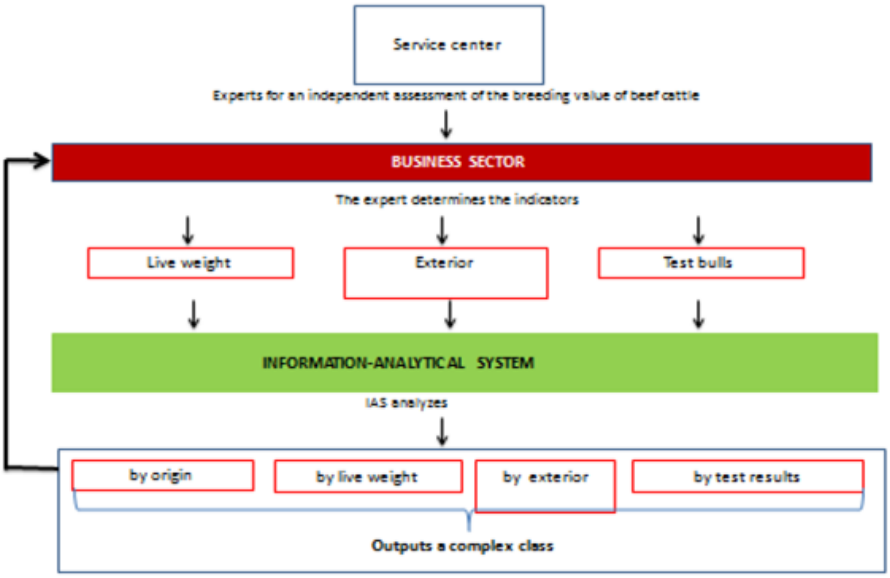
SOME ASPECTS OF SELECTION-BREEDING WORK IN MEAT CATTLE BREEDING

Abstract. In this article highlights the main aspects of selection and breeding work used in the specialized meat cattle breeding of the Republic at the present time. The need to preserve and develop the genetic diversity of livestock herds of beef breeds was noted, while preference should be given to cattle of domestic selection. Import should be carried out under obligatory scientific support and in pre-prepared farms. To increase the reliability of the origin of breeding animals, DNA testing should be widely implemented and the IAS database used.

Key words: specialized meat cattle breeding, genetics, selection, breeding, breeding work, productivity.

The increase in productivity, improvement of produced products quality is primarily due to the level of selection and breeding work carried out in beef cattle breeding, in which the system of assessing the breeding value of bred animals plays an important role. Until recently, the system of assessing the breeding value of specialized beef cattle has been applied in the post-Soviet states, based on materials obtained as a result of annual bonitation of breeding herds with considering of age and gender groups [1]. The main characteristics to be considered in bonitation of beef cattle are: the rate of growth of young animals and the cost of feed per 1 kg of growth in live weight; live weight of animals by age; milkiness of cows (according to the live weight of young animals at 6 months of age); point scoring the constitution and exterior; degree of manifestation of the genotype and severity pedigree accessory [2]. Bonitation is conducted with the participation of farm specialists, which does not fully ensure the reliability of the data obtained. To exclude subjectivity in the evaluation of breeding value to the practice of beef cattle breeding is recommended to enroot service centers on the submission of experts for the independent removal of the phenotypic indicators of the estimated livestock of breeding beef cattle with the entry of data into the database of the information and analytical system (IAS) (Picture1). Using of service centers and independent experts will allow to reliably and objectively evaluate the breeding quality of animals, which will determine the prerequisites for more careful selection of beef cattle for reproduction and further breeding.

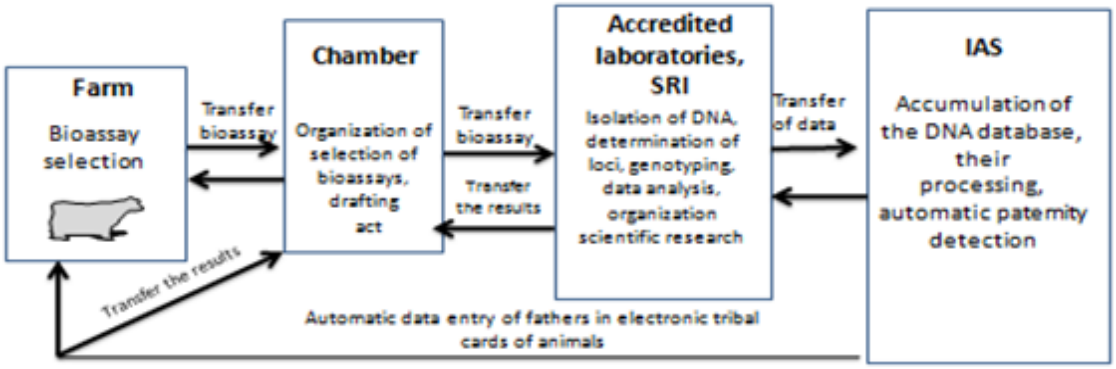
By completion of the integrated assessment of the breeding value of beef cattle, the received materials have a comprehensive analysis based on which the herd selection is planned (sample and pair selection, implementation of custom pairings, introduction of changes and additions to the perspective breeding plans, gathering of herds at the expense of their own repair youngsters, implementation of breeding procurement, etc.), as well as technological, feeding and veterinary activities. In practice, the leading world producers of breeding beef cattle in recent years widely used the method of index rating of breeding value. In our republic, prerequisites are also being created for the transition to this method: methodical approaches have been developed, and information and analytical system (IAS) with a data bank on breeding and productive characteristics of animals has been established and functioning [3,4]. However, as practice has shown, the reliability of the indicators entered in the database IAS was very low, due to lack of mechanism to ensure effective control over their receipt. In addition, the insufficient level of feeding of breeding animals in most farms does not allow them to fully disclose their genetically determined productive qualities.



Picture 1 - Organization of the assessment of breeding value of beef cattle

The established practice of herd reproduction in beef cattle, including breeding herds, the method of natural fertilization is used mainly: rarely manual and, more often, freestyle mating. This fact significantly reduces the effectiveness of breeding, and therefore the conduct of a genetic examination confirming the origin of breeding animals on the paternal line is considered an integral element of the organization of reliable pedigree accounting in meat cattle breeding. However, in the current situation index valuation of pedigree value is seen as premature and possible only after solving the problems of a full fodder base, and implementation of origin validation of genetic methods of breeding animals.

To ensure reliable data on the origin of pedigree beef cattle, in the pedigree chambers, according to existing methods, organize the selection of bioassay from the farms with the compilation of the necessary accompanying documents (Picture 2) and transfer the bioassay to accredited laboratories where the alleles of animals are determined at 12 loci, and the results are recorded to the IAS database, for processing and automatic origin determination.



Picture 2 - Determination of the authenticity of the origin of animal DNA by the method

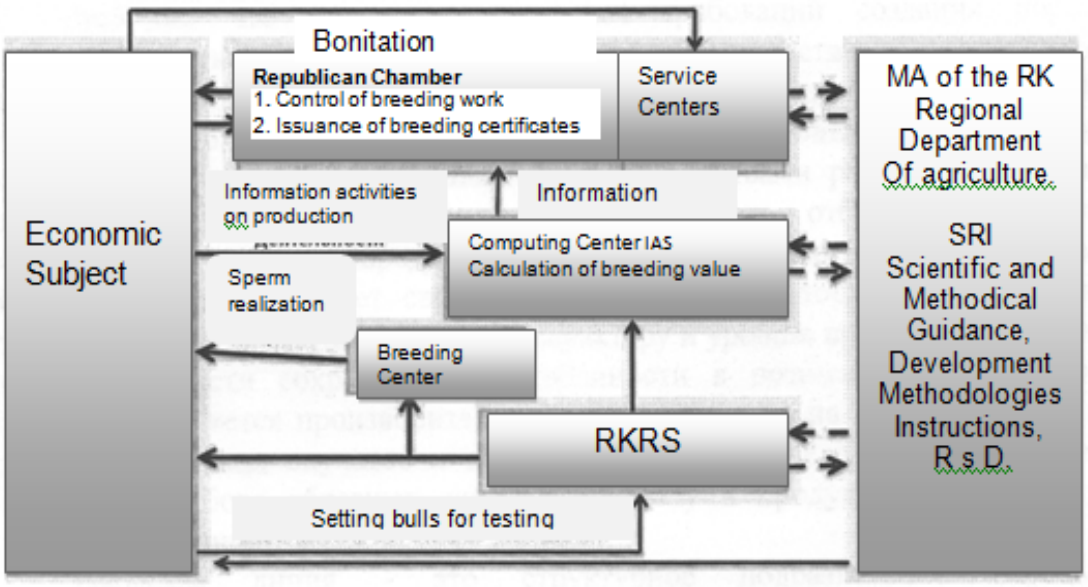
Genetic studies to confirm the authenticity of origin should first of all be carried out in groups of pedigree animals that are part of the compulsory material presented during the approbation of new breeding achievements (plant lines, breeds and types). Then, step by step, genetic studies should cover: a bull-producing group of cows entering the breeding core and accounting for 18-20% of the total breeding stock; bulls-producers working in the breeding herd, being tested for their own productivity and evaluated

for the quality of offspring; breeding core, which is 50-60% of the total number of cows; heifers after chipping and rearing, intended for the repair of the selection group, the breeding core and intended for breeding.

To ensure quality and smooth operation to determine authenticity of origin, it is necessary to fulfill the following conditions: to scientific-research institutions of the agro-industrial complex of the RK to work out unified domestic method for determining genetic tests for farm animals; to approve the mechanism for determining the origin of animal meat breeds by examining samples of genetic material at the legislative level.

Organization of breeding work in beef cattle as a whole should be a set of measures to improve the genetic potential of beef cattle, to obtain the maximum number of offspring, and high-quality beef, providing the maximum economic benefit.

In the process of selection and breeding beef cattle in the following units are involved, which require functional merge into a single system (Picture 3).



Picture 3 - Recommended scheme for managing breeding work in beef cattle breeding

Chambers and service centers provide selection and appointment of qualified boniters to the farms, organization of checks of the reliability of the results obtained in the process of bonitization, regularity of receipt and control over the introduction of current zootechnical events into the IAS database (calving, maternal padding, live weight indicators, etc.).

It is recommended to place the information and analytical system either under the Ministry of Agriculture of the Republic of Kazakhstan or at the lead scientific research institute, as in the first case, the administrative resource will be used (the MA is the customer of all livestock research) and the regulated legislative base, in the second case the primary basis of all livestock research will be provided, which is due to the fact that the primary function of IAS is to collect of reliable information and its primary analysis. Institutes further provide ready information on valuation of breeding value to chambers and business entities in the field of breeding livestock (farms, LTD, LPF, etc.). Experts' farms in turn formulate their proposals on ways to improve breeding bred breeding herds and sent to the chamber, which through SRI further provide scientific support for the work to solve the tasks.

It is known that one of the basic requirements for the creation of farm animals breeds and their improvement is the formation of an intra-breed structure. Possessing a certain monolithicity, any breed should be differentiated into separate structural elements with specific properties of development of a

particular feature, that as a result of skilful breeding and selection allow breed progress in general [5]. Each animal in the herd, and even more so in the breed, has its own characteristics, which are expressed not only in differences in physique, character and level of productivity, but also in the ability to preserve these features in the offspring. If such an animal is a producer, from it they leave on the tribe of sons and daughters, and from them the grandchild, etc. generation, which, with directed selection and selection, form a group of animals similar in type and productivity-a line.

Factory Line - is a structural unit of the breed, which is a genetically stable group of animals, having a common origin on the male side of the pedigree and characterized by the similarity and originality of the desired type and productivity. Factory lines are created as a result of purposeful selection and breeding, use of prepotent bulls-improvers.

In the USA and Western Europe, line breeding is usually considered only as a method of related breeding. This is due to the fact that the breeding of the lines, the system works with the breed requires its unity. However, due to the desire of farmers to provide their herds with valuable producers, appropriate selection was carried out, and the use of inbreeding inevitably leads to crosses, that is, the same methods of work as are used for breeding along lines are used. The improvement of breeds of livestock by the method of systematized breeding is based on the conduct of breeding work in the regions of the country according to a single program coordinated in accordance with the herds, with extensive use of bulls from highly productive lines and prospective related groups. Breeding along the lines in breeding herds is aimed at maintaining their genetic structure and intra-breed diversity, creating new genotypes with desirable qualities, including using the best global gene pool in the introductory cross. Doing breeding in commercial farms also be carried out when using the broad linear animals. Only under this condition in the reproduction of livestock is possible to carry out a reasonable selection of the group through the system of rotation of lines. Great stimulus for the increase of meat efficiency of commodity herds is cross connection lines with specific combining ability in breeding farms identified in effective combinations.

Undoubtedly, priority should be given to domestic breeds of beef cattle (Kazakh white-headed, Auliekolskaya, Santa-Gertruda, Zhetisu type), which are more cost-effective and best quality produced in the conditions of the traditional, extensive, stall-pasture system of cattle breeding in Kazakhstan, natural pasture products.

Import of beef cattle, which has been actively implemented in recent years, has shown mixed results: in farms where fodder and technological conditions similar to importing countries were created, the productivity of animals was quite high, at the same time imported livestock, contained in conventional peculiar domestic beef cattle breeding conditions, showed a low efficiency and a high exhaust. Import of beef cattle should be planned with appropriate conditions of feeding and housing in importing economies, and subsequent breeding is carried out under compulsory scientific support.

Thus, in order to increase the efficiency of conducting the beef cattle breeding industry in Kazakhstan, a systematic approach is needed that unites the efforts of scientists, farmers and administrative apparatus of the agro-industrial complex.

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ЕТТІ БАҒЫТТАҒЫ МАЛ ШАРУАШЫЛЫҒЫНДАҒЫ СЕЛЕКЦИЯЛЫҚ – АСЫЛДАНДЫРУ ЖҰМЫСЫНЫҢ КЕЙБІР ҚЫРЛАРЫ

Аннотация. Мақалада қазіргі уақытта республиканың мамандандырылған етті мал шаруашылығында қолданылатын селекциялық – асылдандыру жұмыстарының негізгі кезеңдері көрсетілді. Отандық селекцияға басымдақ бере отырып етті бағыттағы мал табындарының генетикалық әртүрлілігінің дамуы мен сақтау қажеттілігі айқындалды. Малды шетелден тасмалдау жүйесі алдын-ала дайындалған шаруа қожалықтарында міндетті тұрды ғылымдардың қатысуы негізінде жүзеге асырылуы тиіс. Асыл тұқымды малдардың шығу тегінің сенімділігін арттыру мақсатында ДНК тестілеуін кеңінен қолданып, ақпараттық талдау жүйесінің (IAS) деректер базасын пайдалану қажет.

Түйін сөздер: мамандандырылған етті мал шаруашылығы, генетика, селекция, мал өсіру, асылдандыру жұмысы, өнімділік.

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НЕКОТОРЫЕ АСПЕКТЫ СЕЛЕКЦИОННО-ПЛЕМЕННОЙ РАБОТЫ В МЯСНОМ СКОТОВОДСТВЕ

Аннотация. В статье приведены основные моменты организации селекционно-племенной работы, применяемые в специализированном мясном скотоводстве республики в настоящее время. Отмечена необходимость сохранения и развития генетического разнообразия стад скота мясных пород, при этом предпочтение должно отдаваться скоту отечественной селекции. Завоз по импорту следует осуществлять под обязательным научным сопровождением и в заранее подготовленные хозяйства. Для повышения достоверности происхождения племенных животных следует широко внедрять ДНК-тестирование и использовать базу данных ИАС.

Ключевые слова: специализированное мясное скотоводство, генетика, селекция, разведение, племенная работа, продуктивность.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 68 – 71

UDC339.9

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THE MAIN TENDENCIES OF THE CREATION AND DEVELOPMENT OF EURASIAN ECONOMIC UNION: PROBLEMS AND PROSPECTS OF INTEGRATION

Abstract. Now the international economic integration represents one of the main manifestations of globalization of the economy, developing within the universal process. Integration process is the difficult social phenomenon, which is characterized by a set of various factors, tendencies and directions. It means the possibility of allocation of several levels of integration, uniting both integration, and disintegration factors, depending on the sphere of their functioning. All factors, defining integration process, are distributed generally on global and regional levels. Only one organization, which has reached the higher level of integration in comparison with all other associations in the former Soviet Union, is the Eurasian Economic Community.It represents the international economic organization; created for effective advance by its participants of the process of formation of the Eurasian Economic unionand the Common economic space, and also for realization of other purposes and tasks, connected withdeepening of integration in economic and humanitarian spheres. The main objectives of Eurasian Economicunion are: formation of the common financial market, establishment of the general rules of trade in goods and services and their access to domestic markets, creation of the general unified system of customs regulation, creation of equal conditions for production and business activity, formation of the common market of transport services, creation of the general power space, formation of the system of collective security, ensuring free movement of the citizens of the states of Eurasian Economic unionin Community, etc.

Keywords: globalization, unification, regional market, economic risks, economic crises, economic relations, financial market, unification of economic relations, Eurasian union, customs regulation.

In 1994, the President of Kazakhstan, NursultanNazarbayev, first suggested the idea of creating a "Eurasian Union", during a speech at Moscow State University. Numerous treaties were subsequently signed to establish the trading bloc gradually. Many politicians, philosophers and political scientists have since called for further integration towards a monetary, political, military and cultural union. However, the member states decided to seek a purely economic union, having concerns about keeping their independence and sovereignty intact[1].

The Eurasian Economic Union has an integrated single market of 183 million people and a gross domestic product of over 4 trillion U.S. dollars. The EAEU introduces the free movement of goods, capital, services and people and provides for common policies in macroeconomic sphere, transport, industry and agriculture, energy, foreign trade and investment, customs, technical regulation, competition and antitrust regulation. Provisions for a single currency and greater integration are envisioned in future.

The union operates through supranational and intergovernmental institutions. The Supreme Eurasian Economic Council is the "Supreme Body" of the Union, consisting of the Heads of the Member States. The second level of intergovernmental institutions is represented by the Eurasian Intergovernmental Council (consisting of the Prime Ministers of member states). The day-to-day work of the EAEU is done through the Eurasian Economic Commission (the executive body), which is a supranational body similar to European Commission. There is also a judicial body - the Court of the EAEU[2].

The Eurasian Economic Union (officially EAEU, but sometimes called EEU or EAU) is an economic union of states located primarily in northern Eurasia. The Treaty aiming for the establishment of the EAEU was signed on 29 May 2014 by the leaders of Belarus, Kazakhstan and Russia, and came into force on 1 January 2015. Treaties aiming for Armenia's and Kyrgyzstan's accession to the Eurasian Economic Union were signed on 9 October and 23 December 2014, respectively. Armenia's accession treaty came into force on 2 January 2015. Kyrgyzstan's accession treaty came into effect on 6 August 2015. It participated in the EAEU from the day of its establishment as an acceding state. –**извикипедии!!!**

The Eurasian Economic Union is an international organization for regional economic integration. It has international legal personality and is established by the Treaty on the Eurasian Economic Union.The EAEU provides for free movement of goods, services, capital and labor, pursues coordinated, harmonized and single policy in the sectors determined by the Treaty and international agreements within the Union.The Member-States of the Eurasian Economic Union are the Republic of Armenia, the Republic of Belarus, the Republic of Kazakhstan, the Kyrgyz Republic and the Russian Federation.The Union is being created to comprehensively upgrade, raise the competitiveness and cooperation between the national economies, and to promote stable development in order to raise the living standards of the nations of the Member-States.

From February 1, 2016, new members of the Board of the Eurasian Economic Commission (EEC) chaired by the representative of the Republic of Armenia Tigran Sargsyan started their work. Most of the members of the Board exercised their powers in the previous four-year cycle of the EEC operation, which ensured a high level of continuity in the Commission. The decision that the former Prime Minister of Armenia Tigran Sargsyan would head the Board of the EEC was made in October 2015, at the session of the Supreme Eurasian Economic Council by the Presidents of the five countries of the Eurasian Economic Union (EAEU) in the Kazakh village Burabay. Taking into account the four-year practice of the Commission, as well as spheres of regulations within the competence of the EEC currently and in the mid-term, the heads of the EAEU Member States changed the number of the Board members. Now, the EAEU Member States are represented by ten Members of the Board - Ministers, including the Chairman - two Ministers from each Member State.

The Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation began its work in January 2010 and just a year and a half after, in July 2011, it started to operate at its full capacity: the customs territories of three states were combined into the common customs territory. Within the territory, the rules of the Customs Code, the single customs tariff, the single system of foreign trade and customs regulations, as well as the common legal framework in the sphere of technical regulation began to be applied.

In 2013-2014, the Eurasian Economic Commission and the authorities of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation were actively preparing the Treaty on the Eurasian Economic Union (EAEU) on behalf of their Presidents. Its adoption resulted in the completion of the codification of international treaties that constitute the regulatory legal framework of the Customs Union and the Common Economic Space. During this period, 5 rounds of negotiations were held to finalize the draft Treaty, which were attended by more than 700 experts from theMember States and the EEC. The final document containing nearly 1000 pages is divided into 4 parts that include 28 sections, 118 articles and 33 annexes [3, P.64].

On May 29, 2014, Astana hosted the session of the Supreme Eurasian Economic Council, where Presidents Alexander Lukashenko, NursultanNazarbayevand Vladimir Putin signed the Treaty on theestablishment of the Eurasian Economic Union. Many the Establishment and experts called this project the most ambitious and at the same time the most realistic and relying on the evaluated economic advantages and mutual benefits. Ample opportunities were opened for the business community of the Member States: the Treaty gave the "green light" to the formation of new dynamic markets with single standards and requirements for goods, services, capital and labor.

In the Eurasian Economic Union, the common market of medicines and medical products is scheduled to be launched at the end 2016. The common system introduced in the EAEU in this sphere will ensure their safety, efficiency and quality; create optimal conditions for strengthening competitiveness on the global market. Since March 1, 2016, within the EEC two new departments started their work: the Labor Migration and Social Security Department and the Internal Market Functioning Department. The

first one deals with matters related to labor migration and social security of workers, as well as intellectual property matters in the EAEU countries. The main task of the second one is consistent and effective removal of barriers, exceptions and restrictions in the domestic market of the Union.

Over the last several years, with 2015 being the year of particular activity, due to acquisition by the Union of the international legal personality after signing the Treaty on the EAEU, the EAEU Member States together with the Commission have strengthened the impact of the Union on external directions. Its prestige and importance in the international arena have increased significantly. This is confirmed not only by the expansion of the Eurasian Economic Union after the accession of the Republic of Armenia and the Kyrgyz Republic, but also by the growing interest in close cooperation with the EAEU shown by many countries around the world: China, Vietnam, Iran, India, Israel, Egypt, Singapore, MERCOSUR and ASEAN, and others. An important element of the strategy of economic cooperation in the EAEU may be a direct dialogue between the Eurasian and European Commissions. The prerequisites for such a dialogue have been created. In contrast to the global downturn, the consistent and successful transformation of the Eurasian space, based on the market economic principles with preservation of political independence and the existing cultural identity of the sovereign states, still continues [4, P.10].

Today, the Union is a recognized economic integration association having international legal personality. Almost 40 countries have formally expressed their desire to develop trade and economic cooperation with the EAEU, creating free trade areas. Expansion of trade and economic ties should give the impetus for strengthening the role of the Eurasian Economic Union in the world. The EAEU has all the prerequisites to become one of the key elements of the modern global economic architecture.

The Eurasian integration makes the domestic market more transparent and clear for businessmen and investors, thus contributing to its further expansion. Development of economic integration in the backdrop of slowing global economic growth could become a major drive for the diversification and economic development in the member states.

Last years of functioning of the Eurasian Economic Commission (EEC) - the EAEU permanent regulatory body. In the EEC, the Union countries have a unique opportunity to participate in the management of the EAEU on an equal footing. Since then, the Commission, together with the Governments and leading business structures of first three and then five countries, has made a lot of work in a number of sectors of economy - in trade, technical regulation, customs administration, fiscal and competition policy, etc. Within the Union, a market is being created with a population of more than 180 million people living mainly under common transparent rules, with a common system of technical regulation and common customs and tariff regulations. We took on the formation of a common market with the implementation of our basic principles: the free movement of goods, services, capitals andlabor. A common market of services began its operation. Plans on the establishment of agreed transport, industrial and agro-industrial policies are being implemented. Much has been done directly for the citizens of the Union - in the field of migration policy, within the framework establishing of commonlabor market. One of the main tasks of the Eurasian Economic Commission is to create, with the help of management solutions, an infrastructure of integration that is stable of fluctuations and changes of economic environment and, ultimately, contribution to raising the living standards of the population of the Union countries.

As we noted before the experience in forming of the Commission Board, will face serious and ambitious plans for deepening the integration. In 2019 there are planningto create the common market of electric power, to conduct a large-scale preparation for the start of the common markets of gas, oil and oil products, to address other global challenges for the benefit of the citizens of our states. The strategic success of the countries can be achieved only with the Union’s efficient operation. Moreover, the Commission’s activity has no political component. It is aimed at improving regulatory systems, reduction administrative barriers for more reducing development of the Union countries’ economies. For this the purpose, the EEC maintains a consistent dialogue with national business communities with regard to all major challenges, as it is business that is the major beneficiary of the Eurasian economic integration. The Commission ensures that the decision-making process is transparent and clear.

Thus, in the conclusionwe would like to stress, that for the stable development of the economies of the Member States, extension of cooperative collaboration of the Union countries’ business is extremely important. The countries of the EAEU face the task to integrate their industrial capacities to produce co-product and enter the markets of third countries.

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ЕУРАЗЭҚ-ТЫҢ ҚАЛЫПТАСУЫ МЕН ДАМУЫНЫҢ НЕГІЗГІ ҮРДІСТЕРІ: ИНТЕГРАЦИЯЛАНУ МӘСЕЛЕЛЕРІ МЕН БОЛАШАҒЫ

Аннотация. Қазіргі заманда экономиканың халықаралық интеграциясы жаһандық экономиканың одан әрі дамуының негізгі бағыттарының бірі болып отыр, бұл процесс универсалдылық сипатта жүзеге асырылуда. Интеграциялық процесс көптеген факторлармен сипатталады және оның санқырлы тенденциялары мен бағыттары бар. Осы процесс интеграцияның бірнеше сатылары бар екендігін анықтайды, олар кей жағдайларда біріктіретін интеграциялық, әрі дезинтеграциялық факторларға ие, олар осы процесстің қолданыс аясына қарай белгілі болады. Интеграциялық процесстерді анықтайтын барлық факторлар, міндетті түрде жаһандық және өңірлік дәрежелерде белгіленеді. Посткеңестік кеңістіктегі жалғыз ғана интеграцияның жоғарғы дәрежесіне қол жеткізген ұйым, ол -ЕурАзЭҚ. Еуразиялық экономикалық қауымдастық халықаралық экономикалық одақ болып есептеледі, оның негізгі алға қойған мүддесі қатысушы мемлекеттерге тиімды кедендік одақ құру және біркелкі экономикалық кеңістікті қалыптастыру, сонымен қатар басқа да интеграцияны одан әрі кеңейтетін оны экономикалық және гуманитарлық салаларда жүзеге асыратын іс-қимылдар жасау міндеттері тұр. ЕурАзЭҚ- тың негізгі алға қойған міндеттері: жалпы қаржылық нарықты қалыптастыру, ішкі және сыртқы нарыққа тауарлар мен қызмет түрлерінің қол жетімді ережелерін жасау, кедендік реттеудің жалпыунификацияланған жүйесін жасау, өндірістің және кәсіпкерлік іс-әрекеттің дамуына тең жағдайлар жасау.

Түйін сөздер: жаһандану, унификация, өңірлік нарық, экономикалық тәуекелдер, экономикалық кризистер, экономикалыққатынастар, қаражатнарық, экономикалық байланыстарды унификациялау, Еуразиялық одақ, кедендік реттеу.

УДК339.9

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ОСНОВНЫЕ ТЕНДЕНЦИИ ОБРАЗОВАНИЯ И РАЗВИТИЯ ЕВРАЗЭС: ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ИНТЕГРАЦИИ

Аннотация. В настоящее время международная экономическая интеграция представляет собой одно из основных проявлений глобализации экономики, развивающейся в рамках универсального процесса. Интеграционный процесс является сложным социальным явлением, которое характеризуется множеством различных факторов, тенденций и направлений. Он, по существу, означает возможность выделения нескольких уровней интеграции, объединяющих как интеграционные, так и дезинтеграционные факторы, в зависимости от сферы их функционирования. Все факторы, определяющие интеграционный процесс, распределяются, в основном, по глобальному и региональному уровням. Единственной организацией, которая достигла более высокого уровня интегрированности по сравнению со всеми другими объединениями на постсоветском пространстве, является ЕврАзЭС. Евразийское экономическое сообщество представляет собой международную экономическую организацию, созданную для эффективного продвижения её участниками процесса формирования Евразийского экономического союза и Единого экономического пространства, а также для реализации других целей и задач, связанных с углублением интеграции в экономической и гуманитарной сферах. Основными задачами ЕврАзЭС являются: формирование общего финансового рынка, установление общих правил торговли товарами и услугами и их доступа на внутренние рынки, создание общей унифицированной системы таможенного регулирования, создание равных условий для производственной и предпринимательской деятельности, формирование общего рынка транспортных услуг, создание общего энергетического пространства, формирование системы коллективной безопасности, обеспечение свободного передвижения граждан государств ЕврАзЭС внутри Сообщества и др.

Ключевые слова: глобализация,унификация, региональный рынок, экономические риски, экономические кризисы, экономические отношения, финансовый рынок, унификация экономических связей, Евразийский Союз, таможенное регулирование.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 72 – 78

JEL 338:506

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GREEN ECONOMY AS THE NEW WAY OF SUSTAINABLE DEVELOPMENT

Abstract. Sustainable development assumes complex coordination among themselves of three components – economic, social and ecological. The concept of "green economy"was appeared in the last two decades in order to provide more harmonious coordination between these components, which would be acceptable for all groups of the countries – civilized, developed, developing and the states with a transitional economy. The concept of "green economy" receives the increasing public response. It was actively discussed by experts, politicians, non-governmental organizations. The goal is to develop from "brown economy" to "green economy". The concept of "green economy" includes the ideas of many other directions in the economic science and philosophy (feministic economy, postmodernism, ecological economy, environment economy, anti-global studies, the theory of the international relations, etc.), connected with the problems of sustainable development. Supporters of the concept of "green economy" consider that the economic system, prevailing now, is imperfect. Though the concept of "green economy"has yielded certain results in increase in living standards of people in general, and especially its separate groups, negative consequences of functioning of this system are considerable: these are environmental problems (climate change, desertification, loss of biodiversity), exhaustion of the natural capital, large-scale poverty, small amount of fresh water, food, energy, inequality of people and the countries. All this creates threat for present and future generations. The present model of economy is called "brown economy".

Keywords: climate, principles of sustainable development, green economy, feministic economy, ecological economy, environment economy, anti-global studies, loss of a biodiversity, ecological taxation, natural capital.

In our opinion, in the conditions of climate change, for survival and development of humanity, transition to "green economy" is necessary, because this system of the types of economic activity, connected with production, distribution and consumption of goods and services, which lead to increase of the welfare of the person in the long term at the same time, without subjecting future generations to influence of considerable environmental risks or ecological deficiency.

For transition to "green economy" the wide range of tools is offered:

– the pricing corresponding to the principles of sustainable development, including refusal of inefficient subsidies, assessment of natural resources in terms of money and introduction of taxes on what harms the environment;

– policy of government procurement which encourages production of eco-friendly production and use of production methods, corresponding to the principles of sustainable development;

– reforming of the system of the "ecological" taxation, assuming accent shift from the tax on labor to taxes on pollution;

– growth of the state investments into the infrastructure, corresponding to the principles of sustainable development (including public transport, renewables, construction of energy efficient buildings) and the natural capital for restoration, maintenance and increases of volume of the natural capital;

– target state support of research and development, connected with the creation of environmentally friendly technologies;

– the social strategy, designed to provide coordination between the purposes in social area and the existing or offered economic strategy.

The big role in promotion of the concept of "green economy"play the Economic and Social Commissions for Asia and the Pacific Ocean (ESCAP), where are the following members from CIS countries: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tadzhkistan, Uzbekistan and Turkmenistan. In accordance with the initiative of ESCAP in 2005 the strategy of "green" growth was originally included four priority directions, such as: rational models of consumption and production; "gardening" of the enterprises and markets; steady infrastructure both "green" tax and budgetary reforms. Subsequently two more directions – investment into the natural capital and indicators of environmental efficiency have been added.

The Republic of Korea was the first country, which announced implementation of the concept of "green" growth as the national strategy. The main attention within this strategy was paid to three elements: industry, power and investments. Strategy is aimed at preservation of scales of productive economic activity at the minimum use of energy resources and other resources; minimizing of pressure upon the environment of all used types of energy and resources and taking measures for transformation of investments into nature protection activity and driving force of economic growth.

Many countries use various tools of "green economy" in the national policy and development strategies. At the same time many developing countries are afraid that use of model of "green economy" can slow down process of their development. This problem demands the additional analysis and discussions about the degree and levelof the possible expenses.

The program of development of the UN for the environment (UNEP) in 2008 has taken the initiative of "green economy", which has the purpose to use the historical opportunity in order to create the economy of tomorrow. The initiative of "green economy" is based on three main principles:

– assessment and promotion into the forefront of natural services at the national and international levels;

– employment of the population due to creation of "green" jobs and development of the corresponding policy;

– use of market mechanisms for achievement of sustainable development.

"The green economy" draws the increasing attention. In the Declaration on Green Growth,adopted at the Meeting of the Council at Ministerial Level on 25 June 2009,the foreign ministers have expressed determination to increase the efforts on further realization of the strategy of "green" growth and to encourage "green" investments and steady regulation of the natural resources. They have emphasized the determination to use "effective complexes of political measures in the field of climate" and to encourage "the reforms of domestic policy, aimed the prevention or elimination of ecologically harmful types of policy, which can interfere with "green" growth". Besides, they have suggested the Organization "to develop strategy of "green" growth to achieve economic recovery and social effective steady growth" [1].

Economic recovery and environmentally and socially sustainable economic growth are key challenges that all countries are facing today. A number of well targeted policy instruments can be used to encourage green investment in order to simultaneously contribute to economic recovery in the short-term, and help to build the environmentally friendly infrastructure required for a green economy in the long-term, noting that public investment should be consistent with a long-term framework for generating sustainable growth. Green growth will be relevant going beyond the current crisis, addressing urgent challenges including the fight against climate change and environmental degradation, enhancement of energy security, and the creation of new engines for economic growth. The crisis should not be used as an excuse to postpone crucial decisions for the future of our planet[1].

In order for countries to advance the move towards sustainable low-carbon economies, international cooperation will be crucial in areas such as the development and diffusion of clean technologies, for example, carbon capture and storage, renewable energy technologies, and application of green ICT for raising energy efficiency, and the development of an international market for environmental goods and services.

Green investment and sustainable management of natural resources need further efforts to use efficient and effective climate policy mixes, including through market-based instruments, regulations and other policies, to change behaviour and foster appropriate private sector responses. Such areas may

include smart, safe and sustainable low-carbon infrastructure and technologies that can contribute to building a sustainable low-carbon society. Approaches to recognise the value of biodiversity should be encouraged through appropriate instruments and consistent with relevant international obligations.

Domestic policy reform, with the aim of avoiding or removing environmentally harmful policies that might thwart green growth, such as subsidies: to fossil fuel consumption or production that increase greenhouse gas emissions; that promote the unsustainable use of other scarce natural resources; or which contribute to negative environmental outcomes. Green Growth Strategy is very important in order to achieve economic recovery and environmentally and socially sustainable economic growth.

In June, 2016 the leaders of the states of "Group-20" in Toronto, Canada, in the Declaration have fixed: "Trying to obtain steady and balanced growth, we will also promote work on assessment methods, considering social and ecological consequences of successful economic development" [2]. They have confirmed the commitment to ensuring ecologically balanced restoration and steady global growth.

The participants of this conference noted: "Don't suppress the economy of the future by investing in fracking and pipelines. Bitumen is a high risk investment. Exporting oil is not the solution. We should be accounting for cleanup and not extraction. We need more investment in R&D for green tech. We need to start burying carbon. Sequester it. We need to respect Indigenous peoples. We need to reexamine and repair the former Navigable Waters Protection Act. The Union-Pearson Express was not electrified, but should have been. We need to include community level projects. Develop green shipping and safe trucks. Pedestrianisation and cycling safety is important, as is more efficient buildings.This problem has multiple dimensions. Individual and community must both work together to transition to something more sustainable. Think of future generations. Connect with the earth. We are a part of the earth"[2].

"The green economy" becomes the central theme of discussion of other important international forums of high level. So, the questions of "green" growth as the strategy of sustainable development for Asia and Pacific region, in particular, rational use of resources, decrease in carbon emissions and sustainable city development were discussed at the 6-th Conference of Ministers of the Environment and Development of the Pacific region on September 27-October 2, 2010 in Astana, Kazakhstan.

At the Conference of the UN on sustainable development, which was held in Brazil in 2012 ("Rio+20"), one of two central themes of the conference was "green economy in the context of sustainable development and poverty eradication".

We consider, that in the conditions of global climate changesis quite necessary the development, institutionalization and realization of the statepolicy, which suppose the effective management of water resources:

•the announcement of zones of formation of the major water outflows of the country, especially protected natural territories;

• introduction of the technologies of water conservation and improvement of irrigating systems;

• expansion of the forest territory, around the main arteries of the country;

• construction of irrigational systems for improvement water irrigation of the population, living in mountain territories.

Development of the hydroenergy sector of the country remains the priority direction of sustainable development of national economy. For successful development of hydropower of the Republic of Kazakhstan, the following is very necessary:

• Energy efficiency and energy saving.

• Use of renewables.

• Improvement of tariff policy.

Kazakhstan is rich in natural resources including coal, oil, natural gas and uranium and has significant renewable potential from wind, solar, hydro and biomass. In spite of this, the country is currently dependent upon fossil fuels for power generation. Coal-fired plants account for 75% of total power generation leading to concerns over greenhouse gas emissions and impacts on human health and the environment. Recent economic growth in Kazakhstan has driven increased demand for energy services making the construction of additional generating capacity increasing necessary for enabling sustained growth. In this context, renewable energy resources are becoming an increasingly attractive option to help bridge the demand-supply gap.In the Draft Law On Amending Certain Legislative Acts of the Republic of Kazakhstan for Transition to Green Economywas noted: "The problem of power

deficiency becomes more sharply, the habitat continues to degrade" [3]. Price of oil is sharply changed,itis often depends from the global policy. In world practice there are the following sources of energy: solar, wind, geothermal energy, energy of sea and ocean, waves, inflows, etc. It is important also, that the set of renewable resources has reached a share of atomic energy and comes very close to the main types of fuel. In Kazakhstan today the share of renewable sources makes about 15% of fuel and energy balance and is presented practically only by hydropower. The share of other alternative sources makes 0,3-0,4%.

As we wrote before, the idea of a more sustainable economy has been talked about for decades. A key moment was the publication of the report Limits to Growth by the Club of Rome in 1972. In the last few years discussion around sustainability has become a key part of the global agenda. This is because the latest scientific studies and our direct experiences of environmental devastation and climate change are making it clear the economic model needs to change. The green economy was the central theme of the major United Nations conference on Sustainable Development (Rio+20) held in Rio in June 2012.

The green economy means different things to different people. Sometimes these perspectives overlap and sometimes they contradict each other. Some groups reject the concept of a green economy. The aim of Green Economy is to present these diverse viewpoints in one place.The examples below illustrate just two perspectives on the green economy.The key reference point for much of the work on the green economy comes from the United Nations Environment Programme (UNEP): "A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.

Meanwhile the view of civil society movements, who held an alternative summit during the UN Sustainable Development conference Rio+20 in June 2012 concluded: "The so-called "green economy" is just another facet of the current financial phase of capitalism, which also makes use of old and new mechanisms, such as the deepening of the public-private debt, the hyperstimulation of consumption, the concentration of ownership of new technologies, carbon and biodiversity markets, land grabbing, increased foreign ownership of land, and public-private partnerships, among others"[4].Governments decided to establish an intergovernmental process under the General Assembly to prepare options on a strategy for sustainable development financing.They also agreed to establish a high-level political forum for sustainable development. Decisions on its detailed form are expected to be taken during the upcoming session of the General Assembly, with the aim of having the first session of the forum at the beginning of the 68th session of the Assembly[4].

The "green economy" brings together a vast area of policies and research. Many of the issues are inextricably linked together with likely domino effects. Below are some potential impacts on thematic areas: development model,environment,energy. Re-focusing of the development model in the global North and South with increasing weight of economic sectors based on energy and the environment (e.g. natural capital).Ideas about valuing nature could have a huge impact on how the environment is conserved.New economic sectors based on the environment could change our use of nature.The transition from fossil fuels to renewable energy is at the heart of a green economy. The energy sources that are scaled up globally (fossil fuels or renewables) will determine if we are able to avoid irreversible climate change.

Climate change is already having impacts on existing conflicts and creating new ones. This is particularly the case between local communities in the global south over access to resources.Potential future conflicts linked to the green economy within or between local communities could be due to: climate mitigation projects (increases conflicts over land use and ownership); climate adaptation projects (unequal distribution of aid); natural capital projects (conservation restricts livelihoods); control over and location of energy projects (large-scale dams).

Historically, of course, the trend has not been towards green growth. On the contrary, economic expansion has imposed ever greater demands on natural systems - both in terms of the amount of resources that we extract or harvest, and the volume of emissions and waste that we expect the environment to absorb and neutralise.As is increasingly understood, this cannot continue indefinitely: the environment has natural limits in terms of how much it can provide and absorb.

Just look the basic facts. If global GDP grows at 3 % annually then a century from now the world economy will be almost 20 times larger than today. Already, humans appropriate more than half the

available freshwater and exploit most good quality soil resources. We are emitting ever more pollutants, greenhouse gases and waste. And we risk crossing critical environmental thresholds, leading to dramatic and irreversible damage to ecosystems.When we reflect on the demands that we are already imposing on our ecosystems, it's apparent that green growth isn't just a preferable approach to economic development. On the contrary, in the long term it's the only way to sustain economic growth. 'Brown growth' that destroys our natural systems can't be justified by the apparent gains it offers. Ultimately, it will diminish our prosperity in every sense.In contrast, the objectives of a green economy are to meet our needs - for food, transport, energy and so on - in a sustainable and equitable way.

Of course, understanding the concept of the green economy and its importance is only a first step. Key questions remain. What does a green economy look like? And how can we create a green economy in Europe? As explained above, a "green" economy is one in which policies and innovations enable society to generate more of value each year, while maintaining the natural systems that sustain us. Essentially, it's a pretty simple concept.Unfortunately, translating the idea into reality is hugely more complicated. Clearly, it will require technological innovation. But it requires lots of other changes too - to the way we organise businesses; the way that we design cities; the way we move people and goods around; the way we live, essentially.Effecting changes of this sort requires the engagement of all sectors, including policymakers, businesses and individual citizens. And that in turn implies the need for a mass of information to guide and inform decision-making.

The European Environment Agency(EEA) was established in order to gather, interpret and communicate regarding the European environment in order to support informed decision-making. As such, the Agency has an important role to play in developing the knowledge base on the green economy.This area of the EEA website will be developed through 2011, 2012 and beyond to highlight work by EEA and other partners at the national and international levels, explaining its relevance to the green economy debate.

However, resource efficiency won't guarantee steady or declining resource use. After all, we could become more efficient, but still put excessive demands on the environment. For that reason, in order to achieve sustainability, we also need to focus ecosystem resilience: the status, trends and limits of natural systems.

According to the "Basic Provisions of the Energy Strategy of Kazakhstan" similar tendencies will be observed in power balance of the country till 2030. The escalating loadings rendered on the environment by traditional power, industry, transport anthropogenic activity of mankind as the result of integration power, environmental and social economic policy.

In 2010 in Japan (Aichi Prefecture) was adopted in 2011-2020 Strategic Plan for the conservation and sustainable use of biodiversity as a structure designed for 10 years, under which all countries and stakeholders will take measures to conserve the biodiversity and provide the benefits for the people. Under the Strategic Plan as many as 20 ambitious yet achievable global targets known as the targets on conservation and sustainable use of biodiversity were adopted. The Governments committed themselves to set national targets in support of the targets for the conservation and sustainable use of biodiversity as adopted in Aichi. The development of national targets and their incorporation in the updated national biodiversity strategies and action plans for biodiversity are key elements of the commitments set out in the Strategic Plan.

Development of power at the beginning of the XXI century goes under the influence of the aspiration of the countries to ensure the energy security and independence, to limit emissions of greenhouse gases, to prevent global warming of climate. The Republic of Kazakhstan as the participant of the UN framework convention on climate change has own obligations for decrease the influence of power.

Thus, the power "turns green" process to the possession of traditional resources, market technologies, competition of power producing companies. Reasons that power will become more "elastic, flexible", decentralized and autonomous.

Kazakhstan needs to develop green power, considering the high cost of an electricity transmission and low density on settlements in the huge territory. It is difficult for small objects to reach the centralized electric power. Actually, approach of power source to the consumer is the new vector of the development of power in the world, for example, absolutely autonomous houses.

The Decree of the President of the Republic of Kazakhstan on May 30, 2013 No. 577,named"The concept on transition of the Republic of Kazakhstan to "green economy". One of the priority directions of development of "green economy" has determined the development of nonconventional alternative and renewable types of energy [5].

The Concept for the transition of Kazakhstan to green economy is the main program document prioritizing reformation of key sectors of Kazakhstan economy such as energy, agriculture, waste management, and water in order to ensure sustainable development of the country. The concept also raises issues concerning conservation and effective management of forest ecosystems, fishery and biodiversity in regard with the principals of sustainable development. Being scheduled until 2050, the concept serves as a basis for effective utilization of natural resources and improvement of well-being of Kazakhstani people through diversification of the economy, balanced development of the regions and creation of new jobs; and promotion of people's health through improvement of environmental conditions.

In conditions of increasing pace of economic development and intensification in use of natural resources, the question of further improving the system of territorial protection of nature becomes more urgent. Those conditions determine the need for further development of protected areas as an effective system of conservation of state biodiversity.

In the conclusion we would like to note that the era of power, based on burning of fossil fuel resources, gradually comes to the end. Creation of the power stations on traditional types of fuel has to become the most important aspect of power policy. The purpose of stabilization of emissions of greenhouse gases, each nation (country) will be forced to make notable turn to expansion of use of renewable energy. Kazakhstan's population of auls and villages remote from the power line for domestic and production needs. It is possible to our republic stage-by-stage reorientation of economy to use of renewable resources, diversification of power and technologies.

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ЖАСЫЛ ЭКОНОМИКА ТҰРАҚТЫ ДАМУДЫҢ ЖАҢА БАҒЫТЫ РЕТІНДЕ

Аннотация. Тұрақты даму жиынтық үш бөлік – экономикалық, әлеуметтік және экологиялық бір-бірімен өзара байланысын анықтайды. Соңғы екі онжылдықта қалыптасқан «жасыл экономика» тұжырымдамасы осы бөліктер арасындағы үйлесімді неғұрлым үйлестірілуін қамтамасыз етуге арналған және барлық елдер топтары үшін, оның ішінде дамыған, дамушы және өтпелі экономикасы бар елдер үшін қолайлы болмақ. «Жасыл экономика» концепциясы аса үлкен көпшілік резонансына ұласуда. Сарапшылар, саясаткерлер, үкіметтік емес ұйымдар оны белсенді талқылауда. «Қоңыр экономикадан» «жасыл экономикаға» дейін. «Жасыл экономиканың» тұжырымдамасы тұрақты даму проблемаларына байланысты экономикалық ғылым мен философияның (феминистикалық экономика, постмодернизм, экологиялық экономика, қоршаған орта экономикасы, антиглибалистика, халықаралық қатынастар теориясы және т.б.) көптеген басқа бағыттарының идеяларын қамтиды. «Жасыл экономика» тұжырымдамасын қолдаушылар қазіргі экономикалық жүйенің жетілмегендігі туралы пікірде. Бұл жалпы халықтың, әсіресе оның жекелеген топтарының, өмір сүру деңгейін жақсартуда белгілі бір нәтижелерге қол жеткізгенімен, осы жүйенің жұмыс істеуінің теріс салдары маңызды болып табылады: экологиялық проблемалар (климаттың өзгеруі, шөлдену,

биоалуантүрліліктің жоғалуы), табиғи капиталдың азаюы, кең таралған кедейлік, тұщы судың болмауы, тамақ, энергетика, адамдар мен мемлекеттердің теңсіздігі. Мұның барлығы қазіргі және болашақ ұрпаққа қауіп төндіреді. Экономиканың қазіргі үлгісі «қоңыр экономика» деп аталады.

Түйін сөздер: климат, тұрақты даму принциптері, жасыл экономика, феминистік экономика, экологиялық экономика, қоршаған орта экономикасы, антиглобалистика, биоәртүрлілікті жоғалту, экологиялық салық салу, табиғи капитал.

УДК 338:506

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ЗЕЛЕНАЯ ЭКОНОМИКА КАК НОВЫЙ ПУТЬ УСТОЙЧИВОГО РАЗВИТИЯ

Аннотация. Устойчивое развитие предполагает комплексную увязку между собой трех компонентов – экономического, социального и экологического. Сформировавшаяся в последние два десятилетия концепция «зеленой экономики» призвана обеспечить более гармоничное согласование между этими компонентами, которое было бы приемлемо для всех групп стран – развитых, развивающихся и государств с переходной экономикой. Концепция «зеленой экономики» получает все больший общественный резонанс. Она активно обсуждается экспертами, политиками, неправительственными организациями. Главной целью является развитие от «коричневой экономики» к «экономике зеленой». Концепция «зеленой экономики» включает в себя идеи многих других направлений в экономической науке и философии (феминистская экономика, постмодернизм, экологическая экономика, экономика окружающей среды, антиглобалистика, теория международных отношений и др.), связанных с проблемами устойчивого развития. Сторонники концепции «зеленой экономики» считают, что преобладающая сейчас экономическая система несовершенна. Хотя она дала определенные результаты в повышении жизненного уровня людей в целом, и особенно ее отдельных групп, негативные последствия функционирования этой системы значительны: это экологические проблемы (изменение климата, опустынивание, утрата биоразнообразия), истощение природного капитала, широкомасштабная бедность, нехватка пресной воды, продовольствия, энергии, неравенство людей и стран. Все это создает угрозу для нынешнего и будущего поколений. Нынешнюю модель экономики называют «коричневой экономикой».

Ключевые слова: климат, принципы устойчивого развития, зеленая экономика,феминистская экономика, экологическая экономика, экономика окружающей среды, антиглобалистика, утрата биоразнообразия, экологическое налогообложение, природный капитал.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 79 – 85

УДК 336.22

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METHODICAL TOOLKIT OF REGIONAL TAX POTENTIAL ASSESSEMENT

Abstract. In this article, the authors consider methodological tools for assessing the tax potential of the region. The relevance of the chosen topic was substantiated in the article. As methods used: deduction, induction and comparative-comparative methods. The authors analyze various approaches to the definition of the term tax potential. The author's interpretation of this concept is presented in the article. Next, methods for assessing the tax potential are considered. The first method analyzed was the method of a representative tax system. The second method is based on the gross regional product. The mechanisms of action of the assessment methods presented were considered. Using these methods, an analysis of the tax potential of the two regions - Almaty and Karaganda regions was carried out. With regard to the first method, it was noted that the Almaty region is unstable. The Karaganda oblast has an increase in the degree of realization of the tax potential in this indicator. According to the second method, there was an overfulfilment of the planned value in the Almaty region. While in Karaganda, this could only be fixed in 2017. In conclusion, ways to increase the tax potential of the region are given. The most effective of them is the improvement of the tax base of the region. As a proposal, tools have been described that can improve the accuracy of the assessment. These include a tax passport and a bloch-chain system. The results of the article can be used for further investigation of the analyzed issue. The proposed instruments can be used by local authorities for a more reliable assessment of their own tax potential.

Key words: tax potential, region, valuation method, tax passport, block-chain.

In modern conditions, the Republic of Kazakhstan has set itself the task of the country's dynamic social and economic development and its entry into the 30 most developed countries of the world. To achieve the goals, it is necessary to fulfill a number of conditions, among which it is necessary to note the effective assessment of the tax potential of the regions of the Republic of Kazakhstan and on this basis the further growth of their economy [1]. An effective assessment of the tax potential of the Kazakh economy requires a fair assessment of the revenue potential of each region's budget separately and of the economy as a whole [2]. The tax potential of the region is the most appropriate characteristic of potentially available financial resources, which will allow a rational assessment of the capabilities of each region and reduce the volume of transfers from small donor regions [3]. A correct assessment of the tax potential of the region makes it possible to assess the actual need for financial assistance, increase the autonomy of the regions, and to some extent eliminate the contradictions between the regions and the center due to the fact that the main reason is the injustice in the distribution of financial assistance [4]. Therefore, we are faced with the task of creating such a methodological tool for assessing the tax potential of the region, which will fully reflect the capabilities of the region, as well as identify sources of growth in tax revenues to the regional budget.

To accomplish the task, a number of the following methods will be used: deduction, induction, comparative-comparative methods, namely analysis, synthesis, comparison, classification, measurement, and factor analysis.

The most reliable assessment of the tax potential of each region is one of the most important factors in the formation of the budgetary and, therefore, the tax policy of the state as a whole, since this indicator is the most appropriate characteristic of available financial resources [5].

This topic is relevant for Kazakhstani practice in connection with the fact that in the Republic of Kazakhstan local budgets of the regions are differentiated by the volume of tax revenues. This is due, first of all, to their uneven development, which in turn is reflected in the level of the tax potential of the region. Thus, most of the regions of the Republic of Kazakhstan are recipients and need financial support due to the fact that their own tax potential of these regions is insufficient to fulfill the tasks assigned to them and cover their own expenses.

Ensuring political independence, industrial autonomy and economic independence of each region is a necessary element in the mechanism of accelerated, balanced and sustainable growth of the national macroeconomic system [6].

The tax potential in world practice is understood as the ability of the tax base, which is within the designated territory, to bring in tax revenues, i.e. income to local budgets. In turn, in the Republic of Kazakhstan, the tax potential should be understood as the maximum possible amount of tax revenues and other mandatory payments to the budget, calculated to determine the amount of revenue in the region [7].

The above concept in the author's interpretation took the following form: «The tax potential is not just a potential, possible amount of tax revenue, but a tax payment that does not lead to oppression of business activity and a decrease in the productivity of taxpayers, and this is the result of the interaction of tax authorities service with taxpayers and the effectiveness of fiscal efforts on the part of the state in the face of the tax authorities».

An assessment of the regional tax potential can be carried out in absolute terms or in indices that reflect the ratio of the sought-for indicator to the average value of the indicator on a country-wide scale or a selected group. Indices are a more fair reflection of reality, since they are less dependent on shortcomings in the methods of calculation used, and also reduce the influence of inflationary processes to a measurable extent [8].

In the world practice, there are many methods for assessing the tax potential, the most important of which can be called a method based on a representative system and a method based on gross regional product (GRP) [9].

One of the main methods for assessing the tax potential, as noted earlier, is the "method of a representative tax system". This system was developed by the expert commission of the United States of America on interbudgetary relations [10].

The essence of the use of a representative system as a method of assessing the tax potential is to calculate the amount of payments to the budget that can be collected under the conditions that the efforts of the tax authorities are at an average level, the structure of taxes and their rates are the same in all regions. According to the received data on collected taxes, the total amount of receipts is calculated, i.e. tax potential.

The main advantage of this method is that regression analysis can be used in it. Accordingly, the use of this analysis will reduce the amount of information necessary for measuring the tax potential. Consequently, the analyst will only need data on aggregate revenues in the analyzed region, as well as a set of several variables used in the form of indirect measures of regional tax bases [11].

Despite the existing advantages of the presented method of assessing the tax potential of the region, it has its shortcomings, the main ones of which can be eliminated by improving the tax reporting used. To do this, it is necessary to carry out more operative work in the field of the formation of official information on taxable bases for a number of taxes used in a representative tax system (RNS) [12].

According to the GRP-based method, you can assess the level of the tax potential by using the product of the weighted average tax rate (in this case excluding cities of republican significance, based solely on these areas) for the previous period and the projected GRP value for the period under evaluation.

At the same time, the weighted average tax rate is measured in percent, calculated as "the ratio of the amount of tax liabilities of all regions to the total value of their GRP" [13].

Next, we calculate the tax potential for the above valuation methods for two regions of the Republic of Kazakhstan - Almaty and Karaganda regions.

The RNS method is applied in relation to budget-forming taxes, to which CIT may be attributed in the regions under consideration. The base of taxation, closely related to the volume of receipts of payments for the selected tax, is the profit before taxes (PDN) of companies. The first step is to calculate the weighted average representative rate for CIT. To calculate the regional tax potential of the analyzed

areas for 2017, the data on actual tax revenues for the CIT to the budget generated in the territories of the regions under consideration will be used, and as a basis for taxation it will be decided to apply the PDN indicator for 2016. The above mentioned data will be used to determine the weighted average tax rate.

Thus, the weighted average tax rate for CIT, calculated as the ratio of the average for the regions of the amount of actual collected CIT revenues and the average value of the tax base (PDN) in the regions of the country, was 0.2647 or 26.47% in 2016. Similarly, the weighted average tax rate for CIT for 2014 and 2015 was calculated. Thus, the indicator in question was 44.09% in 2014, 35.11% in 2015, and 26.47% in 2016.

The next step for calculating the regional tax potential for CPN for 2017 for the analyzed regions should be to multiply the weighted average tax rate for 2016 and the index of PDN for the same period. Thus, the calculation for Almaty oblast for 2017 is 89.24 billion tenge, multiplied by 26.47%, as a result we get 23.62 billion tenge – tax potential according to the CPI of Almaty region. Similarly, we will calculate the Almaty region for 2015 and 2016, then compare the obtained values with the actual volume of tax revenues by CIT, i.e. we will reveal the degree of implementation of the Almaty tax potential for CPN as the ratio of the actual volume of PDN and the forecast value multiplied by 100%.

A similar algorithm to perform calculations Karaganda tax capacity of the CIT for 2015 - 2017 as follows: the average rate of the country by region for the previous period multiplied by the index of the same period of PDN. For example, the Karaganda tax potential for 2017 is calculated by multiplying the weighted average tax rate in 2016 from the Karaganda oblast PDN for 2016. The results of the calculations are shown in Table 1.

Table 1 – Degree of realization of tax potentials for CPN of Almaty and Karaganda regions for 2015-2017

Year	**Almaty region**			**Karaganda region**		
	Tax potential, billion tenge	Actual tax revenues, billion tenge	Degree of realization,%	Tax potential, billion tenge	Actual tax revenues, billion tenge	Degree of realization,%
2015	28,72	11,2	39	30,63	20,43	66,7
2016	14,05	22,19	157,94	21,99	62,55	284,45
2017	23,62	24,95	105,63	24,71	77,48	313,56
Note – Calculated by the author on the basis of source data [14]						

Thus, we assessed the regional tax potential for CIT for the two analyzed areas for 2015-2017 as part of the RNS method. Dynamic analysis of the forecast value of Almaty tax potential according to CIT showed that this indicator differs by instability in the period under review. In 2016, the indicator in question decreased in comparison with the previous period by KZT14.67 billion or 51.1%. This significant increase is due to a simultaneous decrease in the two components. First, the reduction of the average weighted tax rate by 8.98%. Secondly, the narrowing of the tax base for CIT in the region under consideration, i.e. a decrease in the PTP indicator by KZT25.12 bln. or by 38.6%. In 2017 there was an increase in the absolute value of the forecast value of the tax potential of the analyzed region due to a significant increase in the volume of MAP and a reduction in the average weighted tax rate by 8.64%.

With regard to the Karaganda region, we can note a similar situation, i.e. in the period from 2015 to 2016, there was a reduction in the forecasted indicator of the tax potential by 8.64 billion tenge in absolute terms and by 28.2% in percentage terms. And in the next period there is an increase in the indicator under consideration, which amounted to 2.72 billion tenge or 12.4%. The reasons for such fluctuations are similar to those noted for the Almaty region.

According to the data of Table 18, in 2015 the Almaty region did not realize the existing tax potential. In 2016, the degree of implementation of the regional tax potential for CIT increased significantly (by 118.94%). This increase can be explained by a decrease in the forecasted value of the tax potential for CIT, along with an increase in the actual accumulated tax revenue for the tax analyzed. The increase in the degree of implementation of the regional tax potential in 2016 is replaced by a fall of 52.31% in the subsequent period. This is due to the simultaneous increase in the forecasted value of the regional tax potential and the actual volume of tax revenues for the analyzed tax, but has a different growth rate of 68% and 12%, respectively.

When comparing the extent to which the regional tax potential is realized for the tax in question in Almaty and Karaganda oblasts, it can be noted that the latter shows an increased level of tax burden arising from the production of actual tax revenues in excess of the forecast value of the regional tax potential. Regarding the dynamics of the indicators analyzed in both regions, growth in the analyzed period can be noted, but at the same time, in the Karaganda region it is characterized by high speed, as it increased by 246.86% in 2015-2017.

Thus, we assessed the Almaty and Karaganda tax potential for CIT for 2015-2017. Based on the results of the comparative analysis, it was revealed that the dynamics of the regional tax potential for the tax analysis of Almaty oblast and the degree of its implementation are characterized by instability. While the Karaganda region, on the contrary, is characterized by a stable increase in the degree of realization in the period under study.

Next, we calculate the level of tax potential of the analyzed regions for 2015 - 2017 using the GRP-based method. To do this, we will calculate the average weighted tax rate for 14 regions of the Republic of Kazakhstan for 2014-2016, as noted earlier, excluding cities of national importance that have significant amounts of GRP and tax revenues, which leads to a distortion of the average rate for the country. For clarity, consider the calculation for 2016, which relates the total value of tax revenues (KZT3,489.28 billion) and the GRP amount of 14 regions of the Republic of Kazakhstan (KZT31,333 billion). Thus, the weighted average tax rate for 2016 was 11.1%. In 2014 and 2015, the indicator was 11.2% and 10.3%.

To determine the tax potential for the year 2017 for the Almaty region, we will multiply the weighted average tax rate of 2016 (11.1%) by the projected GRP for this region for 2017 (KZT2,004.3 billion). In the same way, it is possible to calculate the tax potential of the Karaganda region for 2017, multiplying the weighted average tax rate in 2016 by the forecast value of the GRP volume of the analyzed area for 2017. The value of the projected GRP indicators for both regions under consideration for 2015 - 2017 is shown in Table 2.

Table 2 – Projected volumes of GRP of Almaty and Karaganda region, billion tenge

Region	**2015**	**2016**	**2017**
Almaty	1 874,7	1 930,9	2 004,3
Karaganda	2 753,3	2 893,2	3 003,2
Note – Calculated by the author on the basis of source data [16, 17]			

As a result of the calculation, we get the value of the tax potential for 2017 for Almaty region equal to 222.48 billion tenge. Let's carry out similar calculations for 2015 and 2016 for Almaty and Karaganda regions. The results of the calculations are presented in Table 3.

Table 3 – Degree of realization of tax potentials of Almaty and Karaganda regions for 2015-2017

Year	**Almaty region**			**Karaganda region**		
	Tax potential, billion tenge	Actual tax revenues, billion tenge	Degree of realization,%	Tax potential, billion tenge	Actual tax revenues, billion tenge	Degree of realization,%
2015	209,97	253,43	120,7	308,37	236,12	76,6
2016	198,88	264,56	133	297,99	259,44	87,1
2017	222,48	318,57	143,2	333,36	340,38	102,1
Note – Calculated by the author on the basis of the data of Tables 2 and the source [18]						

If we compare the values obtained as a result of the calculation in Table 3, it can be noted that the actual volume of tax revenues exceeds the forecasted volume of tax potential in the Almaty region for the entire analyzed period. The excess for three years averaged about 68 billion tenge.

With regard to the Karaganda region, it should be noted that the excess is observed only in 2017, and in previous periods there is an opposite tendency, i.e. the tax potential of the region in question was not fully realized. The excess of the forecasted value over the actual average for two years was approximately 55 billion tenge. This signals that in the Karaganda region there was a reserve of growth in the actual

receipt of tax payments to the budget in the specified amount, which was used in full in the subsequent period.

Thus, the level of regional tax potential largely depends on the chosen methodology for its assessment, which leads to the need to identify the strengths and weaknesses of the methods used to assess the regional tax potential. This information will be presented in the subsequent section of the master's thesis.

The assessment of the regional tax potential based on GRP and RNS showed that in certain cases the regional tax potential of the analyzed regions was not fully realized. Accordingly, the tax authorities face the task of increasing the degree of implementation of the regional tax potential by increasing the amount of tax revenues to the budget.

The most common ways to increase the volume of tax revenues in the revenue side of the budget are as follows:

- introduction of new types of tax;
- raising rates for existing taxes;
- improving tax administration;
- narrowing of the circle of subjects able to use tax incentives;
- direct reduction of the number of tax benefits;
- improving the tax base of the region.

To facilitate the process of assessing the regional tax potential, i.e. in order to make it less time-consuming, it is necessary to collect all the information necessary for analysis in a single document. In order to accurately and reliably assess the tax potential of each administrative-territorial unit, it is necessary to develop a tax passport for them on a regular basis.

A tax passport is a complex document, the use of which will allow us to assess the level of regional tax potential. This document will reflect the characteristics of the tax base of the region, the volume of tax revenues in general and separately for each type of tax in the dynamics. This will provide an opportunity to forecast future tax revenues for the medium term in accordance with the current legislation, as well as taking into account possible changes in it. The development of the study document will also provide an opportunity to model the indicators of the tax base and the future amount of tax revenue on the basis of historical data, as well as by making adjustments and adjustments to certain parameters of the tax base.

First and foremost, the tax passport meets the interests of public authorities in an objective assessment of the current situation in the field of taxation in the country, region, and will provide an opportunity to make decisions that increase the collection of tax payments and fees. In addition, the development of the document under study will ensure the availability of reliable information on the volume of tax revenues, as well as will determine the existing reserves of their growth. The certification of the regions is particularly relevant in the light of the ongoing fiscal policy on the decentralization of the regions of Kazakhstan, which was identified in the Address of the President of the Republic of Kazakhstan [19].

The document also suggests the use of a block-chain system for the administration of VAT refunds. Due to the fact that block-chain is a network that performs transaction binding in a continuous chain of transactions, each of which contains new information, plus previous data [20]. This technology can be used to store information about all taxpayers in the region, pay taxes to them, facilitate the rapid receipt of data on the tax potential of the region and find ways to increase it.

Thus, to date, the methodological toolkit for assessing the tax potential is imperfect. At the same time, it can be expanded and improved by introducing new information technology tools that are innovative for domestic practice. The proposed tax passport and block-chain can be used in aggregate, that is, all the marked information for a tax passport can be stored in a data chain and periodically updated, which will allow timely response to changes in the volume of the region's tax potential.

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УДК 336.22

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АЙМАҚТАРДЫҢ САЛЫҚТЫҚ ӘЛЕУЕТІН БАҒАЛАУДЫҢ ӘДІСТЕМЕЛІК ҚҰРАЛДАРЫ

Аннотация. Осы мақалада авторлар аймақтың салық әлеуетін бағалаудың әдістемелік құралдарын қарастырады. Таңдалған тақырыптың өзектілігі мақалада негізделген. Қолданылатын әдістер: шегеру, индукция және салыстырмалы-салыстырмалы әдістер. Авторлар мерзімдік «салық әлеуетін» анықтауға әртүрлі тәсілдерді талдайды. Осы тұжырымдаманың автордың түсіндірмесі мақалада келтірілген. Одан кейін салық әлеуетін бағалау әдісі қарастырылады. Талданып отырған бірінші әдіс өкілдік салық жүйесінің әдісі болды. Екінші әдіс жалпы өңірлік өнімге негізделген. Ұсынылған бағалау әдістерінің әрекет ету тетіктері қаралды. Осы әдістерді пайдалана отырып, екі аймақтың - Алматы және Қарағанды облыстарының салық

әлеуетін талдау жүргізілді. Бірінші әдіске қатысты Алматы облысының тұрақсыз екендігі атап өтілді. Қарағанды облысында осы көрсеткіш бойынша салық әлеуетін іске асыру дәрежесі артты. Екінші әдіске сәйкес, Алматы облысында жоспарлы құнды асыра пайдалану болды. Қарағандыда бұл 2017 жылы ғана белгіленуі мүмкін. Қорытындылай келе, аймақтың салық әлеуетін арттыру жолдары қарастырылған. Олардың ең тиімдісі - аймақтың салық базасын жақсарту. Ұсыныс ретінде бағалаудың дұрыстығын жақсартуға болатын құралдар сипатталды. Оларға салық төлқұжаты мен блок-тізбектер жүйесі кіреді. Мақаланың нәтижелері талданатын мәселені әрі қарай зерттеу үшін пайдаланылуы мүмкін. Ұсынылған құжаттар жергілікті билік органдары өздерінің салықтық әлеуетін барынша сенімді бағалау үшін пайдаланылуы мүмкін.

Түйін сөздер: салық потенциалы, аймақ, бағалау әдісі, салық төлқұжаты, block-chain.

УДК 336.22

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МЕТОДИЧЕСКИЙ ИНСТРУМЕНТАРИЙ ОЦЕНКИ НАЛОГОВОГО ПОТЕНЦИАЛА РЕГИОНА

Аннотация. В данной статье авторы рассматривают методический инструментарий оценки налогового потенциала региона. В статье была обоснована актуальность выбранной темы. В качестве методов использованы: дедукция, индукция и сравнительно-сопоставительные методы. Авторы анализируют различные подходы к определению термина «налоговый потенциал». В статье представлена авторская трактовка данного понятия. Далее рассматриваются методы оценки налогового потенциала. Первым анализируемым методом был метод репрезентативной налоговой системы. Вторым – метод на основе показателя валового регионального продукта. Были рассмотрены механизмы действия представленных методов оценки. С применением данных методов был проведен анализ налогового потенциала двух регионов – Алматинской и Карагандинской областей. В отношении первого метода было отмечено, что Алматинская область отличается нестабильностью. Карагандинская область по данному показателю имеет рост степени реализации налогового потенциала. По второму методу в Алматинской области отмечалось перевыполнение планового значения. В то время как в Карагандинской это может было зафиксировано только в 2017 году. В заключении приводятся способы повышения налогового потенциала региона. Наиболее эффективным из них считается совершенствование базы налогообложения региона. В качестве предложения были описаны инструменты, которые могут повысить точность оценки. К ним относятся налоговый паспорт и система bloch-chain. Результаты статьи могут быть использованы для дальнейшего исследования анализируемого вопроса. Предложенные инструменты могут быть использованы местными органами власти для более достоверной оценки собственного налогового потенциала.

Ключевые слова: налоговый потенциал, регион, метод оценки, налоговый паспорт, block-chain.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 86 – 89

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INNOVATIVE ECONOMY OF THE COUNTRY: PROBLEMS AND THE WAYS OF THEIR SOLUTIONS

Abstract. The concept of the "innovative elevator" is most successful first, because it manifests itself in a structure that suggests a "bottom-up" development scheme, working on the principle of capital replacement. Secondly, the focus, which is expressed in the continuity of the operation of the entities of venture capital management and minimization of duplication.

In Kazakhstan, in comparison with industrially developed countries, the development of scientific, technical and innovative progress has fundamental features. In developed countries, the annual increase in the funding of basic and applied research is noted at various expense sources, and the accelerated development of innovations. Technological skills and entrepreneurial activity exist all over the world. However, very few economies in the world are able to effectively turn these assets into innovations and economic growth. Further high-quality development of Kazakhstan and its integration into the world economy is facilitated by industrial and innovative development, consistent modernization and sustainable growth in the European Asian Economic Union.

Keywords: innovation policy, economy, science, security, problems, landmark

Introduction. Analysis of investment and innovation potentials of the European Asian Economic Union countries shows that each country has its own peculiarities and national priorities. Each developed country develops systems aimed at increasing the local and international competitiveness of the company. This includes ensuring the flow of know-how between R & D and firms, as well as acquiring knowledge already available and not being used in a given country or sector. From a practical point of view, this should become a real priority for everyone. But, there are problems that are urgent for all European Asian Economic Union member states, these are insufficient scales of innovative activity and low competitiveness of economies.

Methods of research. Three well-known elements of the triangle of knowledge - education, scientific research, innovation - are often underestimated for the development of a successful economy. In addition, the combination and synchronization of these three different industries form the basis for economic success. [3]

In this regard, in the Address of the Head of State to the people of Kazakhstan "Let's build the future together!" An objective analysis of the modern model of the socioeconomic structure of Kazakhstan was conducted. According to the President, it is the quality education that should become the basis of industrialization and innovative development of Kazakhstan. Speaking about the foreign policy of the state, the President of Kazakhstan expressed confidence that Kazakhstan will develop cooperation with other countries. Achieving this goal is possible provided that the scientific, technical, innovation and personnel potentials of the European Asian Economic Union member states are integrated. [1]

The discussion of the results. In the framework of state support of innovations in the Republic of Kazakhstan, development institutes have been established: the National Innovation Fund, the Investment Fund of Kazakhstan, the Development Bank, the Center for Marketing and Analytical Research, the Center for Engineering and Technology Transfer, technology parks and business incubators to promote innovative developments. As the main goal of the European Asian Economic Union interstate economic policy, the heads of the countries of the Community have agreed to carry out coordinated structural

modernization of economies and to ensure, on this basis, the competitiveness of goods and services produced in the European Asian Economic Union space.

Dissemination of innovative activities promoted the development of appropriate organizational forms of infrastructure, which is distinguished by the category of subjects and the relationship between them, contributing to a decrease in transaction costs and risks. In turn, the sustainability and continuity of the "innovative elevator" depend on the degree of diversity and development of the innovation infrastructure [5].

The modern professional qualification of workers of most enterprises in Kazakhstan does not meet the requirements of innovation policy, and the problem lies in the existing acute shortage of specialists who can work with the company at all stages of establishing a venture business. At the stage of development of innovation policy in Kazakhstan, a large number of enterprises are at the stage of preparing a model for managing advanced technologies.

The human component of innovation infrastructure is of particular importancebecause it:

1. Forms an excessive mass of innovative ideas and scientificdiscoveries in the country;

2. Provides management of venture capital, which isan integral part of the category of venture capital.

Information and consulting subsystem of Kazakhstan's innovation infrastructure in the last five years has reached a new quality, becoming an integral part of innovation activity, which has raised the status of information in the system of innovation infrastructure. This, above all, contributed to the increased role of information and the expansion of services. Nevertheless, one of the reasons for the weak assessment of the Kazakhstan venture capital market is its information closeness. As a rule, information becomes widely known provided that the volume of the transaction reflects significant figures. For example, the basis for the analytical study of Kazakhstan in 2013 was not based on information from a number of relatively large market players who refused to participate in the study and did not provide data on their activities, even on confidential terms [1].

Within the framework of this subsystem, a number of serious problems remain unresolved: the infrastructure of service and consulting organizations does not meet the requirements of seed companies by cost criteria, a set of competencies and breadth of coverage. Moreover, the most important areas for innovative companies, such as the protection and commercialization of intellectual property, assistance in creating business plans and conducting market research, are practically undeveloped.

A significant role is played by the subsystem of innovative infrastructure in Kazakhstan. Today, there is no normative and legal framework necessary for the development of venture innovation activity at the state level, which is one of the main problems in the development of the innovation infrastructure, plus no law "works" properly.

To date, the innovative infrastructure subsystems in Kazakhstan are not structured enough, are poorly integrated, and are also closed, which affects the work of the "innovative elevator". Increasing the level of functioning of the "innovative elevator" is the main task, as it will expand the range of opportunities for implementing the policy of innovative development. It is important to note that the Concept of long-term social and economic development of the Republic of Kazakhstan for the period up to 2030 poses a large-scale task for our country - the transition of "the economy from the export-raw material to the innovative socially-oriented type of development", characterized by the creation of conditions for full-fledged innovation activity with the aim of adequately responding to modern inquiries [2].

In our opinion, for the successful development of innovation activities, it is necessary to create an interbank science and innovation engineering center whose main tasks will be:

- Realization of programs of scientific and technical support of innovative productions, including branch and regional programs of innovative character;

- Realization of industrial and economic activities in the field of science through the implementation of programs of scientific and technical support of innovative productions;

-Conducting fairs, exhibitions and other and similar events - a prerequisite for the formation of the market of scientific and technical products;

- rendering of engineering services, organization of technology transfer and others.

To succeed, it is necessary to invest the most important resource - the human resource. Only in this way will the economy be able to better perceive and implement innovations.

An innovative model of the development of our country requires a large expenditure on fundamental science and the training of scientific personnel. The planned innovative way of the country's development, based on the production of new knowledge (know-how) and technological progress, is naturally impossible without innovations in science and education and their reform. These areas in Kazakhstan should become dynamically developing, capable of adequately responding to accelerating world scientific, technical and innovative processes, including globalization and informatization.

Conclusions. The strategy clearly outlines the main directions of state policy in the field of the development of science: its definition as one of the strategic socio-economic priorities; development of research aimed at developing knowledge-intensive, resource-saving and environmentally friendly industries; creation of a system of mechanisms and incentives that promote the practical implementation of scientific achievements; strengthening the material base for scientific research.

Successful solution of these problems requires the availability of qualitative human capital in the field of science. Therefore, state policy includes such areas as the preservation and development of human resources, training and certification of highly qualified specialists, their internship in the best scientific centers of the world, the support of young talented scientists. The main advantage of the proposed approach is that through such a development of the higher education system it is possible to effectively integrate the results of the university, academic and sectoral science of Kazakhstan, as well as the advanced results of the world community's science in the creation, implementation of innovation projects and the development of innovative activities, which is the prerequisite for the creation country of effective innovative economy.

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ЕЛДІҢИННОВАЦИЯЛЫҚЭКОНОМИКАСЫ: ПРОБЛЕМАЛАРЫЖӘНЕОЛАРДЫҢШЕШІМДЕРІНІҢЖОЛДАРЫ

Аннотация.ол даму схемасы «төменнен жоғары» капиталдың алмастыру қағидаты бойынша жұмыс істейтін қамтиды құрылымы, көрінеді, өйткені «инновациялық элеватор» тұжырымдамасы, бірінші кезекте еңтабысты болып табылады. Екіншіден, венчурлық капитал менеджменті субъектілерінің жұмысының үздіксіздігін және қайталануды барынша азайтудың көрінісі болып табылады.

Қазақстанда индустриалды дамыған елдермен салыстырғанда ғылыми, техникалық және инновациялық прогрестің дамуы іргелі ерекшеліктерге ие. Дамыған елдерде әртүрлі шығыс көздерінде және инновацияларды жедел дамытуда негізгі және қолданбалы зерттеулерді қаржыландырудың жылсайынғы өсуі байқалады. Технологиялық дағдылар мен кәсіпкерлік қызмет бүкіл әлемде бар. Дегенмен, әлемдегіөте аз экономикалар бұл активтерді инновацияларға және экономикалық өсуге тиімді түрде айналдыра алады. Қазақстанның одан әрі жоғары сапалы дамуы және оның әлемдік экономикаға интеграциялануы индустриялық-инновациялық даму, Еуразиялық экономикалық қоғамдастықтың дәйекті модернизациясы және орнықты дамуы арқылы жүзеге асырылады.

Түйін сөздер: инновациялық саясат, экономика, ғылым, қауіпсіздік, проблемалар, маңызды.

УДК 338.242.4.

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ИННОВАЦИОННАЯ ЭКОНОМИКАСТРАНЫ: ПРОБЛЕМЫ И ПУТИ ИХ РЕШЕНИЯ

Аннотация. Концепция «инновационного лифта» наиболее успешна во-первых, потому что проявляется в структуре, которая предполагает схему развития «снизу-вверх», работающей по принципу замещения капитала. Во-вторых, направленность, которая выражается в преемственности работы субъектов управления венчурным капиталом и минимизации дублирования.

В Казахстане по сравнению с индустриально развитыми странами развитие научно-технического и инновационного прогресса имеет принципиальные особенности. В развитых странах отмечается за счет разных источников ежегодное увеличение финансирования фундаментальных и прикладных исследований, ускоренное освоение нововведений. Технологические навыки и предпринимательская активность существуют по всему миру. Однако, очень немногие экономики в мире способны эффективно превратить эти активы в инновации и экономический рост. Дальнейшему качественному развитию Казахстана и его интеграции в мировую экономику способствуют индустриально-инновационное развитие, последовательная модернизация и обеспечение устойчивых темпов экономического роста в условияхЕврАзЭС.

Ключевые слова: инновационная политика, экономика, наука, безопасность, проблемы, ориентир.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 90 – 95

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ECOLOGICAL MANAGEMENT AS THE WAY TO RESPONSIBLE BUSINESS OPERATION

Abstract: During an era of globalization and the increasing dependence of business in any sphere on the international markets of raw production, the equipment, spare parts, the accompanying goods and even labor, the firms, first of all large ones, should pay special attention to corporate social responsibility and its components: ecological and social. If the company is less interested in the social part of corporate social responsibility since its improvement doesn't make obvious profit, then the owners of the companies has to be especially strongly interested in ecological component.

Keywords: corporate social responsibility of business, ecological management, environmental protection, reduction of emissions, ISO 14001, standards of ecological management, ecological management at the enterprise, responsible business.

This article shows a place of ecological management in the system of corporate social responsibility of business, defines features and examples of corporate social responsibility in the international business, defines relationship of ecological management systems and quality management systems, investigates features of introduction of ecological management system at the enterprise according to the international standards, defines consequences, positive and negative sides of introduction of ecological management.

In the modern world the role of influence of one person on the environment is minimum, however the problem of influence appears at the level of the state or the certain sphere of business. In the environmental policy the state tries to influence activity of firms, the companies, that is dangerous to the nature. In order to avoid withdrawal of the large companies from responsibility for actions, negative in relation to the environment, the whole ecological legislation has been created, however everything is built so that often it is more favorable and simpler to producers to pay for damage caused to the nature, than to enter new technologies for development of environmental policy and management of the company. The ecological sphere has no special appeal at all among businessmen as modern business is constructed and focused on the obtaining maximum benefit in those spheres of conducting business, where there is a possibility of fast development and stable growth.

As N. Korabayeva notes: "For ensuring sustainable economic and social development and environmental protection at the national and regional levels, deepenings of market reforms and also taking into account a transition period the priority value gets use of economic mechanisms for effective inexhaustible use of natural resources, the conservation of biodiversity, respect for ecological safety, protection of the surrounding environment and ensuring health of the population with an ecological component" [1].

Today to be attractive in terms of investment and to have loyalty from society and the state, business has to be based on socially – responsible behavior of the company. It assumes existence in the companies of a certain ethical, standard device which exists and is expressed in the concept of corporate social responsibility. Corporate social responsibility becomes demanded presently as in our country and around the world, and problems of its realization are relevant in business processes as management of the companies becomes more and more inclined to conducting production in an honest, transparent and responsible way.

At the same time, recently the interest of scientists-economists are involved more and more by social components of development because the social orientation of national economy is the most important knot of the national plan [2].

Corporate social responsibility of business (English — CSR — corporate social responsibility) is rather new scientific and practical concept according to which the organizations consider the interests of all society, conferring on itself responsibility for influence of their activity on customers, suppliers, workers, shareholders, local communities and other interested parties of society in the country of basing, neighboring countries and in the world in general [3].

This responsibility means taking obligations by the firm for observance of society interests. Thus, the taken obligations are beyond the obligation established by the law to observe the legislation and assume that the organizations voluntarily take additional measures for improvement of quality life of workers' and their families and also local community and society in general.

According to A. Kazhenova "CSR implies that companies take care of their positive impact on society while doing business" [4].

First of all corporate social responsibility belongs to multinational corporations and also to the firms which are carrying out foreign economic activity as in the field of sales, involvement of foreign labor, etc., and in the field of purchase of raw materials, materials, the equipment and even receiving consultations of foreign experts.

The concept of corporate social responsibility means interaction of two components: social and environmental efficiency of the enterprise. A number of the reporting instructions and standards has been developed, which serve as the basic principles of social account, audit and reporting. It should be noted that all these standards in most cases have a voluntary nature and are created by various institutions, as by the international organizations (for example, family of ISO 14000 ecological management standards has been created by the International Organization for Standardization), and the private organizations (for example, certification of Green Key hotels) [5].

The concept of ecological management has arisen enough recently and presently there is an active development and a research of this field of knowledge. Theories and practicians of many scientific, social and administrative disciplines are necessary for the solution of various environmental problems and environmental management. So, ecological management is the innovative theory which studying and development is very relevant in the context of a problem of ecological responsibility.

From the middle of the 90th years of the concept of ecological management have gained great value due to the need of implementation of these complex requirements and need of providing proofs to groups of influence. Two types of concepts of ecological management can be distinguished:

a) international formally recognized system of ecological management (SEM) and

b) so-called "feasible" methods of ecological management (FMEM).

The international officially recognized systems of ecological management have two regulating documents today:

- The international existing standard for ecological management the certified ISO 140013 and
- The European existing EMAS4 standard (Environmental Management and Audit Scheme) [6].

The research of references on ecological management demonstrates that since 2001 to this day, this works of Russian scientists have been devoted to this problem: G.V. Belova [7], S. V. Makarov [8], E.A. Polushina, T.A. Trifonova, etc.

In our country works of scientists K.U. Stamkulova, K.O. Shayakhmetova, S.D. Usubaliyeva have been made certain attempts on disclosure of bases of ecological management.

S.D. Usubaliyeva offers her own definitions, "Ecological management is the activity of public authorities and economic subjects mainly directed to observance of mandatory requirements of the nature protection legislation and also to development and realization of the corresponding purposes, projects and programs developed on the basis of the principles of ecoefficiency and ecojustice" [9].

The author reveals the purposes of ecological management. Objects of ecological management. In details describes levels of ecological management. Lists functions of ecological management.

Planning of ecological activity is positive. And here the actual costs for ecological activity it isn't mentioned by the author absolutely.

L.I. Pankrutskaya discloses value of accounting of expenses in the system of ecological management [10].

Proceeding from the above-mentioned, it is possible to give interpretation of this term as the systems of management principles, directed to achievement of the corporate purposes which coincide with the mankind purposes on preservation of the environment.

It is possible to tell that ecological management now is the certain philosophy on business management directed to a responsible attitude to the environment, which is at the level of the empirical knowledge including a set of experience, its analysis and systematization.

The systems of ecological management serve the enterprise for introduction of standard, strategic and operational actions for environment protection and management in the general concept, which whenever possible has to be based on the standardized norms [11].

While production ecological management has functional character (i.e. treats tasks and activity), the systems of ecological management carry institutional (i.e. organizational) character [12].

Production ecological management is:

- systematically planned, realized and controlled ecological line of actions;
- covers all fields of enterprise activity;
- covers contacts with other enterprises vertically and horizontally;
- works actively, and, therefore, strategically
- enters the stability strategy [13].

The accepted definition of ecological management system is based on ISO 14001: "part of the general system of management which covers organizational structures, planned activity, responsibility, methods, technologies, processes and resources for development, realization, estimate and support of environmental protection policy " [14].

The ecological management system is a part of the general comprehensive system of management which includes organizational structures, planned activity, responsibility, methods, technologies, processes and resources for development, realization, assessment and maintenance of policy of environmental protection [15].

On the basis of ecological management, planning the policy of production, resource distribution and ecological responsibility, the enterprise has an opportunity to enter the new markets, to increase the competitiveness on the basis of investors' confidence and society, achieving the main corporate goals in maximizing potential profit, at the same time well influencing both on local, and global ecosystems, promoting realization of the principles of sustainable development, interfering with a condition of irresponsibility.

Introduction of ecological management system represents the complex and long-term project in which typical indicators of design management work.

For introduction of ecological management system at the enterprise there are various reasons. Empirical researches have shown that impact is exerted by both the internal, and external reasons:

- internal reasons (for example, improvement of environmental protection, organizational improvements, economy of resources and expenses, increase in legal safety, improvement of image or increase in trust);
- the external reasons (for example, pressing from head enterprise, from clients or customers concerning carrying out certification) [16].

Different types of expenses are connected with introduction of ecological management system.

Costs of introduction of ecological management system are reflected in monetary assessment:

- consumption of production factors (for example, personnel, investments),
- and also consumption of services of the third parties (for example, consultants) [17].

As the following drawing shows, expenses can be subdivided into personal expenses, consultations and obtaining information.

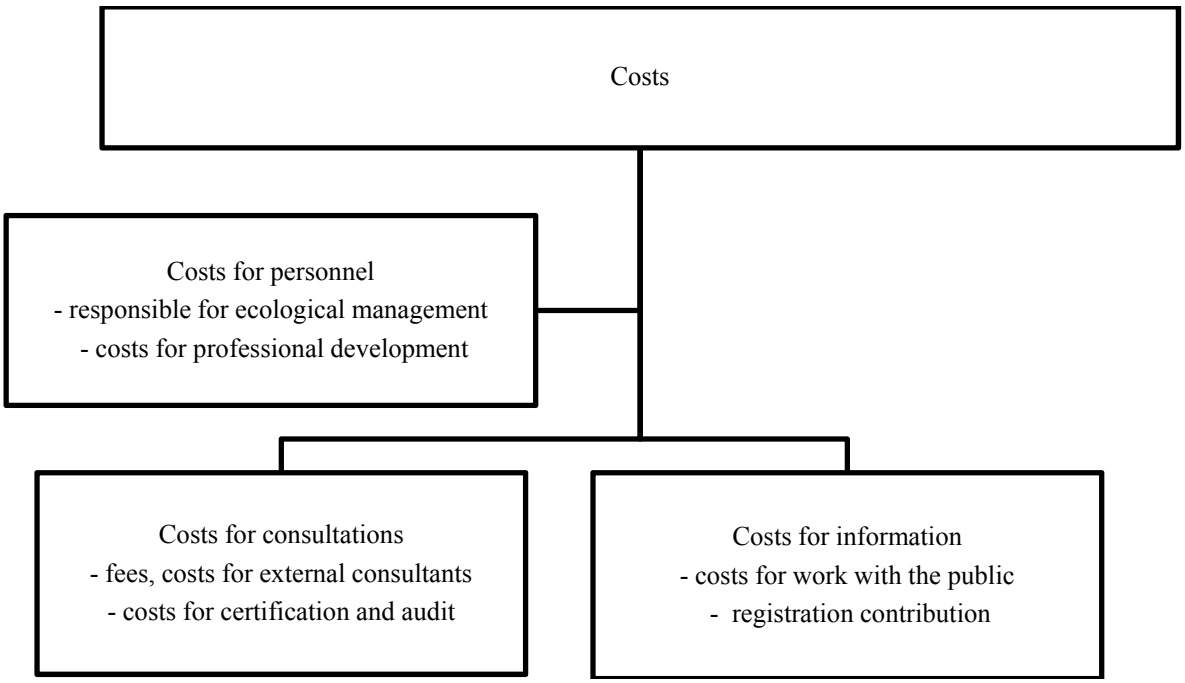

Figure 1 – Costs for introduction of ecological management system

During the planning or introduction of ecological management system it is necessary to concretize types of expenses for a certain enterprise and, whenever possible, to give a quantitative assessment of expenses. At the same time it is necessary to consider that many of these expenses (for example, consulting or information expenses), connected with the procedure of certifications on ISO 14001 (annual observation and three-year repeated certification or the registration periods) are operating costs.

Nowadays traditional tools of the economic analysis don't allow ecological management to define authentically with their help how effective the ecological strategy and how environmental policy influences state of environment.

In particulars, ecological expenses which have to be compensated for maintenance of all complex of natural resources at the level corresponding to the beginning of the reference period - it is still practically excluded from the economic analysis and use of traditional instruments of account.

Carrying out in 1992 to the Conference of the United Nations Organization on the environment and development (summits "Mother Earth" in Rio De Janeiro) became a decisive turning point, at which has been accepted the Agenda on the XXI century on ensuring sustainable development, where the concept of ecological account as the instrument of carrying out consistent policy in this area has been put forward for the first time, which is so necessary for ecological management [18].

Development of this direction assumes development of such important concept as economic obligations of the company. In this regard there is a need of methodical approaches to determination of dependence of company's economic and financial position on ecological condition of the region, determination of the size of nature protection expenses of the company depending on quantity of the consumed natural resources and level of the pollution, which is made by the company.

Successful realization of this strategy in our country is promoted by existence of the Legislative basis of nature protection activity in the Republic of Kazakhstan, "the Ecological Code of RK Article 195. "Order of development and approval of ecological requirements" [19].

Thus ecological management is one of the main latest administrative processes peculiar to established practices of conducting the international business. The companies of the developed countries and also many developing countries try to coordinate the activity with requirements of international treaties in the field of ecology, first of all regarding emissions in the atmosphere, pollution of soils and water resources. It is demanded by the relevant agenda of future development of world economy developed by the UN — the concept of sustainable development and also the concept of lowcarbon economy. Also questions of

environmental protection and ecology in general have been formulated as the main problems of the present in the Millenium Development Goals, created and constantly complemented by the United Nations. Thus, ecological management is an inseparable part of corporate social responsibility of business. CSR is one of the most important activities of Multinational Corporation. And if the company wants to become or hold positions of the partner, supplier or client of the leading and most influential companies in the world, first of all it should focus the attention on improvement of methods of business, introduction of elements of system of environmental control, social responsibility and also the quality management of production and all processes proceeding in the company. Due to these actions the company guarantees itself inclusion in the list of the most desirable partners for cooperation, will raise own profit and a share of the market.

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ЭКОЛОГИЯЛЫҚ МЕНЕДЖМЕНТТІҢ ЖАУАПКЕРШІЛІКТІ БИЗНЕСТІ БАСҚАРУ ЖОЛЫ

Аннотация. Жаһандану дәуірінде шикізатқа, жабдықтарға, қосалқы бөлшектерге, ілеспе өнімдерге және тіпті еңбек күшіне, фирмаларға, әсіресе ірі компанияларға халықаралық нарықтағы кез келген саладағы

кәсіпкерліктің тәуелділігі корпоративтік әлеуметтік жауапкершілікке және оның компоненттеріне: экологиялық және әлеуметтік мәселелерге ерекше назар аудару керек. Егер корпоративтік әлеуметтік жауапкершіліктің әлеуметтік жағы компанияға қызығушылық танытпаса, оны жақсарту айтарлықтай пайда әкелмесе, онда экологиялық компонент компанияның иелері үшін ерекше қызығушылық туғызуы керек.

Мақалада бизнестің корпоративтік әлеуметтік жауапкершілігі жүйесіндегі экологиялық менеджменттің орны көрсетілген, халықаралық бизнестегі корпоративтік әлеуметтік жауапкершіліктің ерекшеліктері мен мысалдары анықталған, қоршаған ортаны басқару жүйелерінің және сапа менеджменті жүйелерінің өзара байланысы және халықаралық стандарттарға сәйкес кәсіпорынның экологиялық менеджмент жүйесін енгізу ерекшеліктері зерттелген, экологиялық менеджментті енгізудің оң және теріс аспектілері белгіленген.

Түйін сөздер: бизнестің корпоративтік әлеуметтік жауапкершілігі, экологиялық менеджмент, қоршаған ортаны қорғау, шығарындыларды азайту, ISO 14001, экологиялық менеджменттің стандарттары, кәсіпорынның экологиялық менеджменті, жауапкершілікті бизнес.

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ЭКОЛОГИЧЕСКИЙ МЕНЕДЖМЕНТ КАК ПУТЬ К ОТВЕТСТВЕННОМУ ВЕДЕНИЮ БИЗНЕСА

Аннотация. В эпоху глобализации и всё большей зависимости предпринимательства в любой сфере от международных рынков сырьевой продукции, оборудования, запасных частей, сопутствующих товаров и даже рабочей силы фирмам, прежде всего крупным, следует уделять особое внимание корпоративной социальной ответственности и её составляющим: экологической и социальной. Если социальная сторона корпоративной социальной ответственности меньше интересует компанию, т. к. её совершенствование не приносит очевидной прибыли, то экологическая составляющая должна интересовать владельцев компании особенно сильно.

В статье показано место экологического менеджмента в системе корпоративной социальной ответственности бизнеса, определены особенности и примеры корпоративной социальной ответственности в международном бизнесе, определено родство систем экологического менеджмента и систем менеджмента качества, исследованы особенности введения системы экологического менеджмента на предприятии в соответствии с международными стандартами, определены последствия, позитивные и негативные стороны введения экологического менеджмента.

Ключевые слова: корпоративная социальная ответственность бизнеса, экологический менеджмент, охрана окружающей среды, уменьшение выбросов, ISO 14001, стандарты экологического менеджмента, экологический менеджмент на предприятии, ответственный бизнес.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 96 – 101

UDC347.5

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INFLUENCE OF INTEGRATION PROCESSES ON THE DEVELOPMENT OF THE LEGAL SYSTEMS OF THE CENTRAL ASIA COUNTRIES

Abstract. Development of the modern legal integration expresses in convergence of legal families, both through development of international law, and through processes of regional integrations and interactions. However, it is necessary to mark that an entity of legal processes of the modern legal integration express, eventually, in convergence and integration at the level of specific legal systems of the states. Process of evolutionary development of law at the real stage, in the entity, is process of convergence of legal systems. The most important legal processes of legal integration are, first of all, harmonization of law, which defines the main direction of deformation of legal systems and also unification (assimilation) of law, legal expansion (or absorption), reception of law, etc. In this article, the processes of a simple integration of the legal systems of the countries of Central Asia in the Eurasian economic space are researched. The model of equivalent cooperation of the people, which reached the high level of consciousness and the civilization, and movable by aspiration to approve social and international peace and harmony of the people, is considered. The scale crisis response measures of the state aimed at restoration of sure rates of economic growth and support of strong social warranties to all population are studied.

Keywords: integration processes, the states of Central Asia, internationalization of the legislation, harmonization of law, legal mechanisms of regulation of integration, unification of law, emulation of law, legal expansion, reception of law, legal annihilation.

In themodernworld, some ideal model of buildingof the legal system of the stateisdeveloped. Each state has its own unique model. 26 - year experience of the Republic of Kazakhstan, since the independence, is based on the public image of sustainable development. An important role in the formation of the legal systems of Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan is played by mentality, socio-economic and political conditions, cultural factors and integration processes. According to A.Kh.Saidov: “it is predetermined by the system of values and target orientation, national traditions and historical conditions, socio-economic and political environment, the established way of life and worldview of people, including religious beliefs, psychology, and norms of behavior” [1, P.39]. Both Kazakh and Uzbek, Kyrgyz, Tajik and Turkmen models of the legal system related to the Romano-Germanic legal family. In Kazakhstan, the Declaration of state sovereignty (independence) was adopted on October 25, 1990; in the Republic of Uzbekistan, in June 1990, and in Kyrgyzstan, in August of the same year. As for the Supreme Laws of the three republics, in Kazakhstan, the first sovereign Constitution was adopted onJanuary, 28, 1993, and two years later, onAugust, 30, 1995, during the national referendum was adopted the current Constitution of the Republic of Kazakhstan. The Constitutional law on October 7, 1998, has been introduced 19 amendments on the presidential term, the term of office of the Houses of Parliament, the Senate and the Majilis, etc.

The Constitution of sovereign Uzbekistan was adopted in 1992. A.Kh. Saidov convinced, that “in contrast to the Soviet basic laws the new Constitution of Uzbekistan does not have the dominance of Eurocentric constitutional regulation, but there is a reasonable account of the rules of civil society, the separation of powers, the system of checks and balances of power inherent in the democratic constitution of the West” [2, P.7].

The Kyrgyz Republic's Constitution was adopted on May 5, 1993. In all of these constitutionsthere were established the constitutional traditions of the international experience and own national legal history. And the historical fact testimonies, that Uzbekistan was the first, which introduced, in March 1990, the presidential form of government. In Kazakhstan, the Law "On the Establishment of the Position of the President" was adopted in December 1990. All three independent states are secular, unitary. Doctor of Law, Professor A.Kh. Saidov notes in this aspect: "The secular criteria can be considered as legal, in the fields, covered within the meaning of the Constitution, as a public, civilian-based real consciousness of the society. The phenomenon of the secular state is based on Islamic culture, showing democracy and pluralism in independent Uzbekistan" [1, P.15].

The Constitution of sovereign Tajikistan was adopted on November 6, 1994. Historical and legal study of the Constitution of Tajikistan allows us to explore the fundamental political, legal and socio-economic changes in the country and to determine the degree of continuity of legal and other provisions of the preceding 70-year period of the Soviet system and the legitimacy of the use of foreign experience.

In the history of Tajikistan five Constitutionswere adopted - in 1929, 1931, 1937, 1978 and 1994. Rigorous analysis of the laws and regulations in the period of adoption of the Declaration of Independence and the Constitution of the Republic of Tajikistan, shows the unique independent path of the development of the Tajik people in the creation of thelaw-abiding, democratic and secular state. After adoption in 1994 of the Constitutionthe several taskswere appeared: design and organization of the activities of new state on the basis of the constitutional principle of separation of powers, with the system of checks and balances, and the development and adoption of new laws on the spirit of national independence and the interests of peoplein market economy. On September 26, 1999, the Supreme Law of Tajikistan has been amended.

A huge contribution to the study of this problem was made by the famous Tajikresearch-scholarsA. Imomov [3], F.T. Takhirov [4] and others.

The Constitution of Turkmenistan was adopted on May 18, 1992. Turkmenistan is the most controversial and interesting at the same time. It is an example of research studying of the problems of building of the democratic society in the post-Soviet countries. At the same time, some international and non-governmental organizations of Turkmenistan referred to the successful transition from totalitarianism to democracy. Elections in the country and the establishment of the political institutions were held in accordance with the official ideology. The first step in the country was canceled the next presidential election. In December 1993, Parliament took the initiative to extend the power of the President until 2002, by the referendum. The current Constitution does not provide, as it necessary,the legal procedure. In addition, the law "On Referendum" regulates the popular consultation, which declares, those not less than two months after the decision by the Parliament to conduct such procedure. In the Constitution there arenumber of progressive moments, that are supposed to guide the course of the political events in the civilized society, to create the conditions for the emergence of political pluralism and to guarantee the rights of the citizens to freedom of expression, the election of political leadership, etc. These progressive moments in the Constitution include provisions of law-abiding state, the direct effect of the constitutional norms, pluralism, and the proclamation of the principle of separation of powers, with the system of checks and balances, the right to private ownership on the means of production, land and other material and intellectual values.

In accordance with the Constitution, the Medzhlisis the legislative body and represents the appropriate branch of government. At the same time, in the hierarchy of Supreme Medzhlis of the state structure is as powerless, unable to influence the other branches of government. In addition to the Medzhlisthere are endowed with the right to make the lawswiththe President, the People's Council, which diminishes the role of Parliament as a legislative body. The number of the deputies of Medzhlis, anyway, is formalized. In particular, it remains largely declarative provision on the right of the Parliament to amend the Constitution (Article 67). The fact, this right of Medzhlis belongs to Halkmaslakhats. The

judicial power in the country doesnot affect the other branches of government, People's Council and the Medzhlis.According to the Constitution, the judicial power does not have the function of the constitutional review. This situation completely formalizes the existence of the third branch of government in the country.

In all of these constitutions,there were established the constitutional traditions of the international experience and ancient legal history. It is well known, that the legal system of any state has been researched in close connection with the national legal system and international law. The Constitutions of sovereign Kazakhstan, Kyrgyzstan, Tajikistan andTurkmenistanhave established the mechanisms of functioning of all parts of the state apparatus, their competence, fixed the democratic foundations of social life, gave the priority to the individual rights and freedoms of the citizens. The main attention was paid to the role of elected bodies of state power, the system of checks and balances in the relationship of all branches of government, the status of local government, strengthening the independence of the judiciary, strengthening of law enforcement powers. All these points are related to the other Central Asian republics [5, P.17].

The legal system expresses the legal infrastructure of the society. Therefore, the legal system is flexible, dynamic, and constantly changed. However, the legal system is quite conservative. Another question, some legal traditions should be preserved. The legal system in the narrow sense of regulations, emerging and applied on the basis of general principles. The value of the legal system is provided by the general legal principles and legal procedures of law-making and enforcement. Legislator in establishing a new legal act must clearly understand: how to act in the different cases, within this legal framework, institutions, branches. This position is trivial, but in practice, and in theory, it is very difficult to cover in each case, all the existing legal system [6, P.58].

Summarizing the different interpretations of the legal system, we can give its most general definition. The legal system, in a broad sense, is the direct reflection of the legal life of the society and the functioning of its institutions: the state bodies, the legal rules by themselves (the core of the legal system), legal institutions, branches of the legislation and other legal phenomena. Law-making is an essential tool in public governance. The legal system, in the narrow sense, is a set of the regulations. The category "legal system" is a consequence of the integration of the positive law, historical and comparative law theory and the sociology of law. The legal system has the following components, elements: the system of legal norms, thelegal system, legal awareness, and the system entities. "Political change and the change of power in Georgiahasve the most impact on Kazakhstan, Tajikistan, Turkmenistan and other Central Asian republics. Actions of the US politicians to change the political system of other countries of the Central Asian states are forcing management to reconsider closest allies. In this situation, the role of Russia as a regional center rises again, especially in the Central Asian states" [2, P.31].

The Concept of Legal Policy of the Republic of Kazakhstan states that "as a result of the discussion of the policy of legal reforms in the society, the progressive development of the legal system appeared on the basis of the Constitution. The Constitution of the Republic of Kazakhstan has the necessary legal capacity, which concluded not only in its legal norms, but also in its legal ideas and principles. Legal ideas of the Constitution should be implemented in the legislative, institutional and other measures aimed at strengthening democratic institutions in Kazakhstan, secular, legal and social state".

According to the Kyrgyz research scholar T.B. Aitmatova, "in the first documents of the independent state laid the formal legal basis of the Declaration on sovereignty- the Declaration on the state independence of the Republic of Kyrgyzstan and Law "On the state sovereignty of the Republic of Kyrgyzstan". They proclaimed the determination of the republic to build a state of law, guaranteed the rights and freedoms of the citizens. The Constitution of Kyrgyz Republic was adopted on May 5, 1993. These rights were fixed in the Supreme Law. These favorable targets remain utopia, if we do not improve and obey the laws, if we do not fight to eradicate crimes, if we do not form at those, who work in government, public administration, political parties, public associations and organizations of the market economy, the citizens, the society, law-abiding statewith high level of the legal culture" [5, P.25].

"The course of the history is irreversible. The historic event, which our ancestors dreamed about, embodied in the life on September 1, 1991, when the Republic of Uzbekistan declared its independence. Peace and stability that prevails in Uzbekistan, progress in the development of market economy, the expansion of the international relations of the country are highly recognized by the world community" [7, P.18].

It is well known that the legal system of any state must be studied in close connection with other national legal systems and international law. In some legal space, they interact, influence to each other, and there are the variety of legal formations, which are based on the general processes, carried forward cooperation in all spheres of public life. The Constitution of the Republic of Uzbekistan of 1992, the Article 109, contained a provision stating that "the Constitutional Court determines the constitutionality of interstate contracts". The general principles and norms of the international law are the most important criteria of the constitutionality of laws and regulations.

This provision we easily find in the Constitutions of the Republic of Kazakhstan and Republic of Kyrgyzstan. The differentis only the name of the government agencies. For example, earlier, according to the Constitution of Kazakhstan of 1993 the Constitutional Court of the countryreally existed and acted. It was later abolished. Now, in accordance with the Supreme Law of the Republic of Kazakhstan, the Constitutional Council was created in 1995 and works effectively. In the Republic of Kyrgyzstan, it is called the Constitutional Assembly. In order to conduct due diligence of the draft amendments to the Constitution of the Kyrgyz Republic and the various suggestions and comments, received by the Decree of the President of the Kyrgyz Republic on January 2, 2003, the expert group was formed.

The current Constitution of sovereign Kyrgyzstan establishes mechanisms of functioning of all parts of the state apparatus, their competence, reinforces the democratic foundations of social life, and gives priority to the individual rights and freedoms of the citizens. Main attention is paid to the role of elected bodies of state power, the system of checks and balances in the relationships of all branches of the government, the status of local government, strengthening the independence of the judiciary, law enforcement powers.

The same provisions fixed the Supreme Laws of Kazakhstan and Uzbekistan, which are legalize the following provisions: the principle of democratic rule of law, citizens have the right to do anything that is not prohibited by law; secured guarantees of the rights and freedoms of the citizens, the right to private property, economic, political and social rights and freedoms of the citizens. In Kyrgyzstan, the adoption of the new Constitution means the move from a presidential to a parliamentary-presidential republic, and in two other independent republics, Kazakhstan and Uzbekistan, this fact marked the transition period from parliamentary-presidential to the super-presidential republic.

We emphasize that the category "legal system" in the scientific literature is relatively new. Its occurrence is related to the development of law. As some legal phenomena (law, legal awareness, regulations, etc.) has been attentively studied, there was the necessity for the concept picture of the entire legal validity. In jurisprudence, the diversity in the definition of the legal systemwas marked. The state is an important, but not the single source of the social development. "The state came under the influence of a number of factors. And their role is not the same for different people. It should be emphasized that their list is not exhaustively defined by economic factors. All this testifies the complexity of the emergence of statehood". The society by itself actively participates and has the dialectical relationship with the state. And opposite, week civil society leads to the strong state. At the same time, they cannot exist independently and complete each other.

The transition period from the Soviet system to the formation of the CIS democratic legal states is characterized by the fact, that currently, analytical framework crossed the scientific theories. As the available analytical data do not fit into the existing patterns of development, the need for synthesis and generalizations leads to a new theory (definition) of the legal system, more adequately summarizes the data of the system analysis.

Further development of the modern society is inconceivable without definite legal order, stable system of the legal relationships, translated into practice the basic legal ideals of equality, freedom and

justice, law-abiding state, the universality of rights and responsibilities, the rights and freedoms of men and citizen, fixed in our Constitution. For nearly two thousand years in jurisprudence, the modern research scholars are interested in the study of the legal system. Its concept, structure, content, role and function in the society, the formation and development, the relationships with other legal phenomena, types of the legal systems have become the subject of studying by S.S. Alekseyev, V.K. Babaev, A.M. Vasilyev, O.A. Gavrilov, Y.P. Eremenko, etc. At various times, they were reflected in the foreign science in the works M.P. Golding, R. David, K. Joffre-Spinosi, J. Carbonie, G. Kelsen, etc.

Cultural aspects of knowledge of the legal phenomena make possible to determine the features of the legislation, the policy of the reforms, the relationships with other cultural phenomena in the legal realities.

The legal system is an institutional concept, the occurrence of which in legal science is not only thelegal reality of the phenomena, but also certain qualitative institution in the science, development of its methodology and conceptual apparatus are quite important. Therefore the primary importance in the genesis of this notion is given to differentiation and integration of the legal knowledge as prerequisites and conditions for the occurrence and development of the theory of the legal system, its importance in the structure in the general theory of law.

In the conclusion, we emphasize that the further development of the national legal systems of independent Central Asian Republics of Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan is the result of new integration processes, strengthening the state independence of these republics on the basis of fundamental changes in the field of socio-economic development in these states.

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ИНТЕГРАЦИЯЛЫҚ ПРОЦЕССТЕРДІҢ ОРТАЛЫҚ АЗИЯ ЕЛДЕРІНІҢ ҚҰҚЫҚТЫҚ ЖҮЙЕСІНЕ ТИГІЗЕТІН ӘСЕРЛЕРІ

Аннотация. Заманауиқұқықтық интеграцияқұқықтық жаңұлардың бір-бірімен жақындау процессі арқылы, халықаралық құқықтың дамып жетіліуі барысында, сонымен қатар осы өмірдегі интеграциялық қарым-қатынастардың күшейуі барысындақалыптасуда.Ескертетін бір жағдай, қазіргі кездегі құқықтық интеграциядағы заңнамалық процесстердің мәні, түп негізінде осы елдердің құқықтық жүйесіне тікелей тәуелді. Құқықтың жетілуінің қазіргі бет бейнесі, шын мәнінде, осы елдердің құқықтық жүйелірінің бір-біріне жақындауын талап етеді. Құқықтық интеграцияның басты заңнамалық процессі, ең әуелі, құқықтың гармонизациясын талап етеді, ал оның негізінде құқық жүйелерінің деформациясы жатыр, сонымен қатар құқық унификациясы, құқық ассимиляциясы, заңнамалық экспансия немесе жойылуы, құқық рецепциясы, ж.т.б. Бұл мақалада Орта Азия елдерінің құқықтық жүйелерінің интеграциясының тереңдеуі көрсетілген, ол қазіргі еуразиялық экономикалық кеңістіктегі қарым-қатынастармен байланысты. Осы қатынастырдың негізінде,өркениетті, өзіндік сананың жоғарғы дәрежесіне қол жеткізген, әлеуметтік және халықаралық бейбітшілікті жүзеге асыруға бағытталған халықтардың теңқұқықтық қарым-қатынасы моделі жатыр. Бұл бағытта мемлекеттердің кең көлемдегі дағдарысқа қарсы іс-шаралары мен экономиканың дамуының және басқа да тұрғын халыққа жасалатын іс-шаралардың бәсендемеуін қамтамасыз ететін механизмдер зерттеледі.

Түйін сөздер: интеграциялық процесстер, Орталық Азия мемлекеттері, заңнамаларды интернационализациялау, құқықтың гармонизациясы,интеграцияны құқықтық реттеу механизмдері, құқық унификациясы, құқық эмуляциясы, заңнамалық экспансия, құқық рецепциясы,құқық аннигиляциясы.

УДК347.5

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ВЛИЯНИЕ ИНТЕГРАЦИОННЫХ ПРОЦЕССОВ НА РАЗВИТИЕ ПРАВОВЫХ СИСТЕМ СТРАН ЦЕНТРАЛЬНОЙ АЗИИ

Аннотация. Развитие современной правовой интеграции выражается в сближении правовых семей, как через развитие международного права, так и через процессы региональных интеграций и взаимодействий. Однако следует отметить, что сущность юридических процессов современной правовой интеграции выражаются, в конечном счете, в сближении и интеграции на уровне конкретных правовых систем государств. Сам процесс эволюционного развития права на настоящем этапе, в своей сущности, это именно процесс сближения правовых систем. Важнейшими юридическими процессами правовой интеграции являются, в первую очередь, гармонизация права, которая определяет основное направление деформации правовых систем, а также унификация (ассимиляция) права, юридическая экспансия (или поглощение), рецепция права и др.В статье исследуются процессы углубления интеграции правовых систем стран Центральной Азии, происходящие в настоящее время в евразийском экономическом пространстве. Рассматривается модель равноправного сотрудничества народов, достигших высокого уровня самосознания и цивилизованности и движимых стремлением утвердить социальный и межнациональный мир и согласие народов. Изучаются масштабные антикризисные меры государства, нацеленные на восстановление уверенных темпов экономического роста и обеспечение прочных социальных гарантий всему населению.

Ключевые слова:интеграционные процессы, государства Центральной Азии, интернационализация законодательства, гармонизация права, правовые механизмы регулирования интеграции, унификация права, эмуляция права, юридическая экспансия, рецепция права, правовая аннигиляция.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 102 – 107

UDK 330.35:332.1:338.432

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DIVERSIFICATION AS A FACTOR IN THE DEVELOPMENT OF INNOVATIVE SECTORS

Abstract. Rapid changes in the world market and accelerated the process of globalisation poses new competitive requirements for all participants. Our country needs to accept the challenges of global production, in which developed countries and transnational corporations, for purposes of their own enrichment, are struggling for resources to maintain the leading position in the global chain of production. This circumstance has led to the current situation, in which developed countries have advanced technologies, while countries rich in mineral resources are lagging behind. In this regard, there is a question about structural adjustment, change the direction of industrial and investment policy that includes a multi-faceted process of diversification. World practice shows that the diversification of the structure of the economy, national governments have exercised the choice of priority sectors. In Kazakhstan these industries are: construction, machinery, light industry and manufacturing, information and biological technology, as well as petrochemical industry. Kazakhstan in its development reached the stage where it is necessary to diversify production at the expense of the accumulated potential. The acceleration of the growth of extractive industries is a key element in the development of the economy in the long term.

Key words: diversification, industry, global chains of added value, non-primary production, strategies for industrial-innovative development.

In Kazakhstan, formed the major signs of "Dutch disease" that occurs when excessive growth of demand for raw materials, accumulating large amounts of investment.

Disproportions in the structure of the economy, a significant share of the primary industries, while exports are accompanied by relatively high inflation, dependence of the stability of the national currency and the exchange rate on the price of the export commodity sectors. Factor in blocking free capital mobility in the manufacturing industry is a steady demand for the products of primary industries as a consequence of their windfall [1].

Companies-monopolists in the commodity sectors of the economy, are not interested in large-scale development of the manufacturing industry, the exceptions are projects to improve the technological parameters for the extraction of raw materials. In addition, the purchase of necessary equipment, spare parts, chemicals and other foreign partners contributes to the development of domestic small and medium-sized businesses in the industry. To date, the development of SMEs is mainly aimed at the retail consumer sphere [2].

Center for macroeconomic analysis and short-term forecasting, Russia has made a rating of countries with diversified exports based on UN data for 4 thousand product groups, the results of which presented the position of Kazakhstan (figure 1) [1].

Analysis of export diversification has shown that Kazakhstan repeatedly lags behind both developed countries and countries with economies in transition.

Setting the task of accelerated diversification requires more active intervention of the state. Only adequate use of the mechanisms of such intervention in the framework of a market economy is able, without violating the competitive environment, to diversify the economy through the accelerated development of non-oil sectors. It is here that the majority of risks of the policy of active diversification.

The development of non-oil sectors, in turn, is associated with innovation to create new products, or increase product quality through the introduction of new technologies, development of new technology, modernization of production, organizational structure, management practices, training of staff.

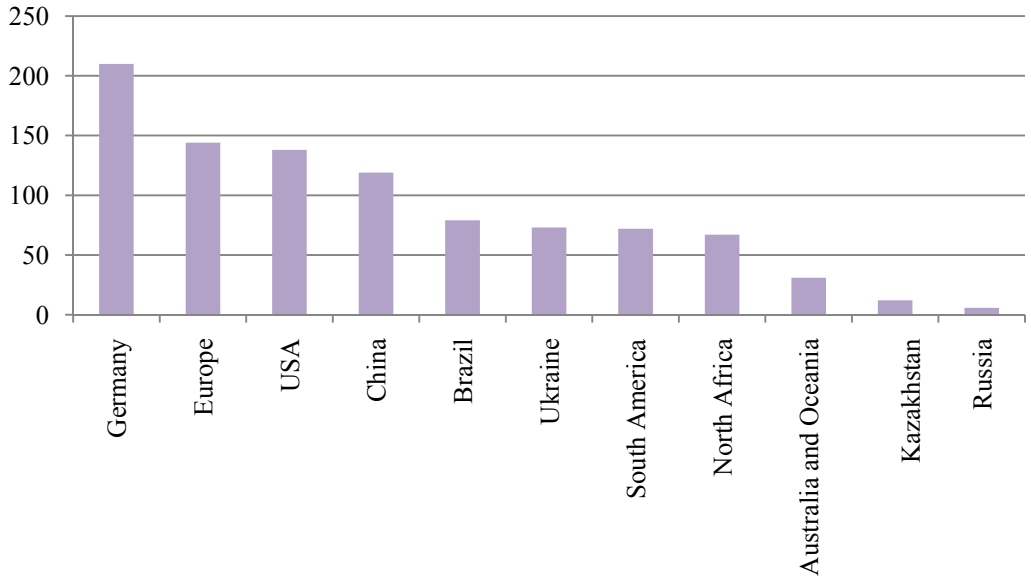

Figure 1 – the level of export diversification

In general, such developing countries as Kazakhstan need to use the opportunities to integrate domestic production into global value chains (GDCCs). An example of successful integration into the WDCC is the countries of South-East Asia (South Korea, Singapore, Taiwan). The presence of large transnational corporations in the domestic sector of the economy facilitates the transfer of technology, the creation of vertically integrated structures that facilitate the involvement of the GDCCs through the mechanisms of outsourcing, procurement of small and medium-sized businesses [3].

As the main mechanisms that are able to have a noticeable stimulating effect on the development of non-primary industries, it is necessary to call the prelude of everything:

• Improvement of tax and customs mechanisms for the withdrawal of natural rent and support for processing industries;

• creation of a system for export sales support;

• development of agricultural production and processing of its products;

• Support for small and medium-sized businesses [4].

Innovative policy in the Republic of Kazakhstan until 2015 was implemented on the basis of the strategy of industrial and innovative development for 2003-2015, the goal of which was to achieve the sustainable development of the country by diversifying the sectors of the economy that contributed to the diversion of raw materials, for the transition in the long term to the service-technological economy.

In the implementation of the Strategy of Industrial and Innovative Development of the Republic of Kazakhstan, three stages were identified [5].

At the first stage, in 2003-2005, the necessary changes were made in the legislation, sectoral development programs, the volume of financing of science, education, training of relevant specialists. Also, development institutions were established through which the state participates in the implementation of the program.

The second phase, which took place in 2006-2010, included the study of private sector initiatives, the search for investors participating in the implementation of selected projects, training of personnel, construction and reconstruction of major and auxiliary facilities.

The third stage, 2011-2015, was the most productive in terms of implementing the Strategy. It was during this period that the development of the introduced capacities in machine building, petrochemistry, information technology and others took place [5].

According to the Law of the Republic of Kazakhstan dated 03.07.2002 N 333-2 "On innovation activity", the goal of the state innovation policy is a balanced production infrastructure that ensures the prevalence in various areas of production and management of a competitive, high- technological products (works, services) [6].

Problems of implementation of innovation policy in Kazakhstan:

- underdevelopment of the infrastructure that ensures interconnection between fundamental research, applied R & D and commercialization of technologies;
- backwardness of cooperation networks "science - education - innovative small and medium business - big business";
- weakness of tools for supporting innovation in the early stages of research (research, experimental and pre-commercial development);
- shortage of qualified personnel in the sphere of innovative entrepreneurship, lack of infrastructure [7].

But, despite all the above problems, this program was implemented.

Thanks to the successful implementation of the State Program for Industrial Innovative Development for 2010-2014, the country has established a stable industry, various sectors of which require further development from the program designed for 2015-2019. The foundations of modern industrial policy were laid, practical tools for supporting industrial development and mechanisms for attracting foreign direct investment were tested in practice.

The industrial development program for 2015-2019 was developed in accordance with the analyzed weak and strong sides, as well as threats and opportunities. The study identified barriers such as insufficient investment activity, lack of qualified professionals, insufficient share of small and medium-sized businesses, and insufficient level of innovation. The program foresees all these barriers by means of such opportunities as improving the quality of production in resource sectors, access to the market of the Customs Union, China, the countries of Central Asia and the Caspian states.

In 2009, amendments and additions were made to the current Law on State Support of Innovative Activity. The law provides for norms that expand the interests of various legal entities, in particular, such development institutions as the JSC "Center for Engineering and Technology Transfer", JSC "Science Foundation" and JSC "KazAgroInnovation", whose main activity is primarily aimed at the development of innovation in various directions.

According to the current Law, the technopark was defined as a legal entity, which was created by any enterprises, associations and organizations in different regions of the country. The draft law stipulates that technoparks will be created only by a decision of the Government on the proposal of an authorized body, coordinated with local executive bodies, since in accordance with the legislation of the Republic of Kazakhstan, the issues of granting land plots are attributed to their competence [8].

The big problem of innovation development is the lack of financial sources: borrowed capital for innovative projects is difficult to attract, since they are inherently high risk, and they do not meet the requirements and conditions of standard lending, enterprises also have difficulty in distinguishing their ¬ innovative means.

To repeat the experience of Dubai, Kazakhstan should take all the steps that Dubai went on 20-25 years ago [9].

They are as follows:

- First, in the discovery of eco-nomics, not only for large investors, but also for small investors who are ready to work on niche projects - from oil production (many small deposits are uninteresting for the largest companies) to construction, real estate, finances, telecommunications;
- Secondly, in the opinion of foreign investors, Kazakhstan should reduce taxes in conditions of a global trend towards more low taxes - this measure is more than necessary;
- Thirdly, it is necessary to redistribute the oil revenues to other sectors, but not through the state budget (as in Saudi Arabia), but through the financial system on market, competitive principles (as in Dubai);
- Fourth, attraction of foreign investments is not only in oil, gas and metallurgy, but in other sectors with a higher share of added value;
- Fifthly, for a reasonable use of oil revenues, it is advisable to develop a plan for state investment of a part of petrodollars;
- Sixthly, it is necessary to finance projects on the development of other sectors of the national economy, in particular: infrastructure (road, railroad, pipeline transport), agriculture, science intensive export products, etc.; education and health, corresponding to the world level; improvement of environmental and demographic situations;

- Seventh, in order to reduce social polarization, a policy of openness of expenditure of these funds is necessary.

Diversification can be conducted with the involvement of trans-national companies. We need to establish a system of integration with Western transnational corporations, and the National Fund can be spent on innovative projects in education, healthcare, science and the social sphere.

The functioning of the mechanism of integration with foreign transnational corporations could in the future play a decisive role in creating the mechanism that would ensure the integration of Kazakhstan's economy into the corporate world economy, which would affect the education of the younger generation. Integration into the corporate world economy presupposes, in addition to knowledge of the foundations of Western market eco- nomics, the knowledge of Western law and the study of technological and technical specialties in those sectors that Kazakhstan will develop on the basis of the technology of Western transnational corporations that will be ready to deploy in the territory of Kazakhstan.

In addition, harmonization is required, and in fact, the introduction of new Western technical standards, which will require the renunciation of Soviet standards and the transition to international technical standards. To study all these issues and to prepare future specialists in these fields, an absolutely new national program of secondary and higher education is needed that would meet the requirements for structural reform of the economy of Kazakhstan on the basis of integration of the corporate Kazakhstan sector into the structure of Western transnational corporations.

Also, investments need to be invested in education, since for the development of the manufacturing sector the main condition is the use of high-tech equipment, the development of personnel, the improvement of social aspects.

At present, there are practically no such high-tech and strategically promising industries in Kazakhstan that are able to ensure the competitiveness of Kazakhstan's eco-economy in the long term (20-30 years), such as biotechnology, nanotechnology, the space industry, and robotics. It is to their development that it is advisable to channel super profits from a favorable oil industry.

The main investments and financial accumulations are concentrated, as a rule, in export-oriented industries. The flow of capital into the development of industries that determine the modern (post-industrial) structure of the economy in Kazakhstan is inadequate. On the contrary, the inefficient structure of the economy, oriented towards the production of products with low added value, is becoming increasingly stronger. It is necessary to develop initiatives "from below," supporting them with budget subsidies, financing through development institutions, through the creation of special zones, through the creation of favorable conditions for the provision of resources, and for taxation.

Another important condition for emerging from depression is the search for mechanisms to expand the zone of competitiveness of tradable sectors. The practice of the housing market has shown that "credit warming up" of demand can not be a component of long-term trade policy. Stimulation of demand should be moderate and controlled. Probably, the best way to increase competitiveness can be a balanced investment policy that creates clear ideas of the participants in the investment process about the dimensions of the domestic market of investment resources and the opportunities for replacing imported or less-quality domestic products from individual segments.

Gradual reduction of direct involvement of the state in commercial projects, in traded industries is inevitable in the long-term perspective. At the same time, in the short term, the withdrawal of state-owned organizations from already begun investment and innovation projects can not be carried out without material and moral losses, both for the state and for its partners from the private sector. To effectively exit from the projects of tradable sectors, it is necessary to create conditions and select the appropriate conjuncture that ensures the continuation of the activities of organizations previously supported by the state in competitive conditions [10].

Having produced a sufficient amount of mineral raw materials, Kazakhstan still does not have an integral bloc of industries that are able to provide materially long-term and comprehensive investment policies. In recent years, practically all the technologically complex part of active material ¬ rial capital stock has been imported. Entire groups of production fixed assets in Kazakhstan either were never produced, or their production is lost today (for example, production of heavy metallurgical and mining equipment).

Not having domestic industries that provide technological renewal of tangible fixed capital, Kazakhstan remains deprived of those technological chains that allow making the means of production economically efficient.

It is necessary to deploy industrial technological "spaces" on which a set of works will be developed to overcome the "investment barrier" both on its own and in cooperation with foreign organizations. To do this, we should use SPK and national companies managed by Samruk-Kazyna.

Technoparks are one of the examples of the development of innovative productions. The model of technoparks operating in Kazakhstan in 2005 was not effective enough. The management of techno parks often lacked a clear program of actions to create physical infrastructure of technological parks and their technological filling, poorly documented documentation, and over-spending of financial resources.

In Kazakhstan, since 2009, a new model of the technopark has been adopted. According to this model, technoparks should make a worthy contribution to building an economy based on high technology innovations.

The work of regional techno-parks now includes the following directions:

1. Development of innovation potential of universities. Within the framework of this direction it is planned:

- Organization of internships and practice for students;
- organization of specialized training classes;
- organization of student business incubators.

2. Technological business incubation:

- provision of consulting services and material and technical facilities on preferential terms;
- examination of proposals, the provision of access to the Internet and information bases.

3. Service and financial services:

- acquisition of innovative technologies, engineering, laboratory complex, educational center, financial services;
- other services not represented or insufficiently represented in the region, requiring special qualification and equipment [8].

To create competitive production, it is required to use the potential of secondary resources, which have a low price and allow to have a cost price lower than that of imported products. For example, for own production of carload wheels, the used wheels are used, which the railway collects. Then you can make a cheap wheeled billet and have a payback Kazakhstan wheel production based on Western technology. But for this it will be necessary to stop the export of wheel scrap.

The presence of a developed network of institutions of development - supporting the structure of the economy is a tactical factor. At present, Kazakhstan has the following institutions of innovative infrastructure: JSC National Innovation Fund, JSC Science Foundation, JSC Center for Engineering and Technology Transfer, JSC KazAgroInnovation, JSC Kazakhstan Center for Housing Modernization and Development communal economy ".

Center for Engineering and Technology Transfer; National Analytical Center; JSC "Export-Credit Insurance Corporation" KazExportGarant "; Investment portal "Kazinvest"; Union of Chambers of Commerce and Industry; Business Development Fund "Damu".

When forming new principles for the activity of development institutions, it is necessary to take into account mistakes in the policy of supporting Kazakh producers. The role of supporting structures is growing due to the globalization and development of the business environment in Kazakhstan.

With the correct regulation of activities and management, the availability of financial support, development institutions are able to accumulate sufficient potential for promoting Kazakhstani exports, creating the basis for competitive production.

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ДИВИДИФИКАЦИЯ ИННОВАЦИЯЛЫҚ СЕКТОРЛАРДЫ ДАМЫТУ ФАКТОРЫ

Аннотация. Әлемдік нарықтың конъюнктурасындағы жылдам өзгерістер және жаһандану үдерісін жеделдету барлық қатысушыларға жаңа бәсекеге қабілетті талаптар қояды. Біздің еліміз жаһандық өндірістің қиындықтарын қабылдауы керек, онда дамыған елдер мен трансұлттық корпорациялар өздерінің байыту мақсаттарын көздей отырып, әлемдік өндіріс тізбесінде көшбасшылық ұстанымын сақтап қалу үшін ресурстар үшін күресуде. Бұл жағдай дамыған елдерде озық технологияларға ие қазіргі жағдайға алып келді, ал минералдық ресурстарға бай елдер артта қалып отыр. Осыған байланысты құрылымдық қайта құру, индустриалды және инвестициялық саясат бағыттарын өзгерту туралы мәселе бар, бұл көпжақты диверсификация процесін қамтиды. Әлемдік тәжірибе көрсеткендей, экономиканың құрылымын әртараптандыру арқылы үкімет басым секторларды таңдайды. Қазақстанда мұндай салалар құрылыс, машина жасау, жеңіл және өндірістік, ақпараттық және биологиялық технологиялар, мұнай-химия саласы болып табылады. Қазақстан өзінің дамуында жинақталған әлеует есебінен өндірісті әртараптандыруға қол жеткізу қажет болған кез келді. Шикізаттық емес салалардың өсуін жеделдету - ұзақ мерзімді перспективада елдің экономикасын дамытудағы басты элемент.

Түйін сөздер: әртараптандыру, индустрия, қосылған құнның жаһандық тізбегі, шикізаттық емес өндіріс, индустриялық-инновациялық даму стратегиясы.

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ДИВЕРСИФИКАЦИЯ КАК ФАКТОР В РАЗВИТИИ ИННОВАЦИОННЫХ СЕКТОРОВ ЭКОНОМИКИ

Аннтотация: Быстрые изменения в конъюнктуре мирового рынка и ускорившийся процесс глобализации предъявляет новые конкурентные требования для всех участников. Нашей стране необходимо принять вызовы глобального производства, в которых развитые страны и транснациональные корпорации, преследуя цели собственного обогащения, борются за ресурсы, чтобы сохранить ведущее место в мировой цепочке производства. Данное обстоятельство привело к сложившейся ситуации, в которой передовыми технологиями обладают развитые страны, а страны богатые недрами являются отстающими. В связи с этим имеет место вопрос о структурной перестройке, изменении направлений промышленной и инвестиционной политики, всего того, что включает в себя многогранный процесс диверсификации. Мировая практика показывает, что при диверсификации структуры экономики правительства стран осуществляли выбор приоритетных отраслей. В Казахстане такими отраслями являются: строительство, машиностроение, легкая и обрабатывающая промышленность, информационные и биологические технологии, а также нефтехимическая индустрия. Казахстан в своем развитии подошел к рубежу, где необходимо добиться диверсификации производства за счет накопленного потенциала. Ускорение роста недобывающих отраслей является ключевым элементом развития экономики страны в долгосрочной перспективе.

Ключевые слова: диверсификация, промышленность, глобальные цепочки добавленной стоимости, не первичное производство, стратегии индустриально-инновационного развития.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 108 – 111

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HUMAN CAPITAL IN THE CONDITIONS OF MODERNIZATION OF ECONOMICS

Abstract. In Kazakhstan, modernization is seen as a factor of economic growth for improving the social and economic system of society and improving the welfare of the people. The effectiveness of economic development is largely determined by the human capital accumulated and realized in the country. So, according to the authors, in modern conditions knowledge and qualifications are important factors of economic growth and social progress of society. The main wealth of any society is made up of people; therefore, the issue of studying the problems of the efficiency of the use of the main productive forces realized in the modern conditions in the form of human capital is topical. As we see, in Kazakhstan, along with the above-mentioned types of modernization, political modernization and spiritual modernization have become a necessary component of the modernization of a new type, ensuring the success of the nation.

Keywords: human capital, modernization, policy, competitiveness, training, potential.

Introduction. Human capital as a product of production is the knowledge, skills that a person acquires in the process of training and labor activity, and like any other kind of capital, has the ability to accumulate a rule, the process of accumulating human capital has a longer character than the process of accumulation of physical capital. The President of the Republic of Kazakhstan N.A. Nazarbayev in his annual address stressed the importance of the formation and development of human capital, which is the main national wealth for stable development and entry into the ranks of the world's competitive countries. Turning to history, you can learn that the concept of human capital dates back to early times. The economic condition of our country is growing every day. And the contribution of innovations to this development cannot be overestimated.

Clearly aware of the need to develop human capital through innovation, the importance of investing human capital, the Head of State N.A. Nazarbayev in his Address in 2010 emphasized that the main thrust of the "Strategic Plan 2020" is anactive investment in the future to improve the competitiveness of human capital. At the same time, the Leader of the Nation indicated that the priority is the education of Kazakhstanis of the new pharmacy and the establishment of Kazakhstan as a country with developed, competitive human capital.

Methodsofresearch. The president gives clear indicators of the potential of the people of Kazakhstan. Therearefiveofthem:

1) a quality educational system;
2) the health of the nation;
3) development of all-Kazakhstan culture;
4) revision of social packages of civil servants;
5) increased attention to citizens with disabilities.

The total national stock of human capital and the rate at which it is built up are extremely important for the level and pace of the country's economic development. First of all, because human capital determines the ability of a country's economy to perceive and use technical innovations. For a rapid

economic growth, investment in human capital must be accompanied by a correct state development strategy, including the rational use of human capital. One of the tools that affect the qualitative growth of human capital in society is education.

Results. The state should take care that the educational policy creates conditions for the implementation of profitable investments. To increase the return on investment in education, the following measures are necessary:

1) the formation of requirements for the content of educational training in areas (specialties), taking into account the country's economic development strategy;

2) monitoring needs in professions for assessing the demand for professions using different methods;

3) the formation of a state order for training specialists taking into account the personnel situation in the labor market;

4) assistance in the employment of graduates;

5) use of marketing tools for forecasting the dynamics of changing labor market needs and shaping the demand for workers of various professional groups in the interests of thesustainable economic development of the country;

6) formation of the system of continuous education, which allows to constantly improve the level of skills, acquire new abilities, remain competitive in the labor market with changes in the sphere of activity, and also increase mobility between types of classes.

Itisnecessarytodeveloppersonneltoensurethe "digitalproduction" of MMC: analysts, IT specialists, managementofhigherqualifications, workingaccordingtointernationalstandards.

The impact of increments in different levels of education depends on the level of economic development of countries, and for developed countries (OECD members) the development of higher (tertiary) education is critical for growth. It is also revealed that education gives additional indirect benefits, in particular, by stimulating investments in physical capital, the country's own technological development and adaptation of technologies developed in other countries.

In the conditions of growing competition in the global market of knowledge, technologies, labor resources, the role of the educational system is growing. Reforms in the educational system currently underway in many countries are a response to the challenges of globalization and many dynamically developing economies that are already demonstrating achievements in the development of the knowledge economy will soon exacerbate competition in the development of human capital. In these conditions, the national competitive advantages can be provided not only on the basis of constant support of the educational sphere and concentration of funds, but also the creation of a system of measures aimed at increasing the competitiveness of Kazakhstani education.

In the work of A.G. Mukhamedzhanova "HumancapitalofKazakhstan: formation, state, use", it is given thefollowingdefinitionofhumancapital:

- Firstly, human capital is the self-growth of a person's ability to create greater value than was originally advanced to a person;

- Secondly, human capital is a category of social reproduction, which has a cyclic form.

- Thirdly, human capitalisan objectiveeconomicrelation, occupying a central placein the system of economic relations of society, affectingthepaceanddirectionofscientificandtechnologicalprogress, theefficiencyoftheproductionandreproductionprocess, is a leadingfactorineconomicgrowth [6].

Academician A.K. Koshanov defines two approaches to the study of human capital: "a narrow understanding of his essence as a cost of money, including wages, investments in human capital, and a more extensive definition of this concept, taking into account many economic and social aspects. These differences are caused by a different approach to the definition of the essence of the category "human capital", which in structure is an educational, intellectual, scientific, entrepreneurial potential, which characterizes the richest content "[7].

Prospects of the state policy in the sphere of Kazakhstan education are related to the ongoing global processes in the world economy, which is reflected in the national educational system, which should train highly qualified personnel both for the current needs of the economy and for the knowledge economy [1].

The most important directions of development of theinnovative potential of higher education institutions and their role in the implementation of the State Program of Forced Industrial-Innovation include the following:

- training highly qualified specialists with knowledge in the field of science-intensive technologies, innovation, innovation management, research activities;
- participation of higher education institutions in the development of innovative projects and in the conduct of scientific research;
- Creation on the basis of higher educational institutions of innovative research centers as the most important structural links forming an innovative infrastructure;
- participation of higher educational institutions in the development of state programs for the innovative development of the economy and social sectors of the country;
- participation of higher education institutions in the development of skills of managers and specialists in intellectual work of leading enterprises and organizations of the country;
- Creation on the basis of highereducation alinstitutions of researchschools for the training of youngscientistsonspecificscientificlines, etc.

Conclusions. The level of training of specialists is becoming one of the most important factors determining the degree of economic competitiveness and the country's integration into the world economic system. The quality of human capital will be one of the most important factors of economic development in the long term.

In conclusion, we would like to say that human capital must be viewed as capital formed as a result of investments and having targeted use in social production or civil life, and also as a fund for certain knowledge, skills, entrepreneurial opportunities, health and motivations that are the main factor of the public production and economic growth.

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ЭКОНОМИКАНЫ ЖАҢҒЫРТУ ЖАҒДАЙЫНДА АДАМ КАПИТАЛЫ

Аннотация. Қазақстанда жаңғырту қоғамның әлеуметтік-экономикалық жүйесін жетілдіру және халықтың әл-ауқатын жақсарту үшін экономикалық өсу факторы ретінде қарастырылады. Экономикалық дамудың тиімділігі негізінен елде жинақталған және жүзеге асырылатын адам капиталы арқылы

айқындалады. Мәселен, авторлардың пікірі бойынша, қазіргі жағдайда білім мен біліктілік экономикалық өсімнің және қоғамның әлеуметтік жетістігінің маңызды факторы болып табылады. Кез-келген қоғамның басты байлығы адамнан тұрады, сондықтан қазіргі заманғы шарттарда адам капиталы түрінде жүзеге асырылатын негізгі өндірістік күштерді қолдану тиімділігінің мәселелерін зерттеу мәселесі өзекті болып табылады. Жоғарыда көрсетілгендей жаңғырту, саяси жаңғырту және рухани жаңғырту сияқты ұлтаралық жетістіктерді қамтамасыз ете отырып, Қазақстанда жаңа типті жаңғыртудың қажетті құрамдас бөлігі болды.

Түйін сөздер: адам капиталы, жаңғырту, саясат, бәсекеге қабілеттілік, оқыту, әлеует

УДК 001.895

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ЧЕЛОВЕЧЕСКИЙ КАПИТАЛ В УСЛОВИЯХ МОДЕРНИЗАЦИИ ЭКОНОМИКИ

Аннотация. В Казахстане модернизация рассматривается как фактор экономического роста для совершенствования социально-экономической системы общества и повышения благосостояния народа. Эффективность развития экономики во многом определяется накопленным и реализованным в стране человеческим капиталом. Так, по мнению авторов, в современных условиях знания и квалификация являются важными факторами экономического роста и социального прогресса общества. Главное богатство любого общества составляют люди, поэтому вопрос изучения проблем эффективности использования основных производительных сил, реализующихся в современных условиях в форме человеческого капитала, является актуальным. Как видим, в Казахстане наряду с выше названными видами модернизации стали осуществляются политическая модернизация и духовная модернизация, как необходимый компонент модернизации нового типа, обеспечивающий успех нации.

Ключевые слова: человеческий капитал, модернизация, политика, конкурентоспособность, подготовка, потенциал.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 112 – 120

UDC 331.108.26

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PECULIARITIES OF INNOVATIVE DEVELOPMENT OF THE PERSONNEL POTENTIAL OF FOREIGN OIL COMPANIES AND APPLICATION OF THEIR EXPERIENCE IN KAZAKHSTAN

Abstract. In this article considered an innovative development of the human resources potential of oil companies of foreign countries and indicators of innovative development of human resources in foreign oil companies and their application in Kazakhstan are presented. Also, the concept of the dual system of personnel training and the importance of its implementation on the basis of colleges and universities of the state are disclosed. The concept of innovative development of personnel potential and providing them with oil and gas industry enterprises is proposed, based on the cluster approach to the training of engineering personnel in the educational and scientific production process and innovation, where the university plays a coordinating role among all stakeholders. Due to this, competitiveness is ensured: graduates of universities, products created by graduates of the university, as well as enterprises and universities themselves. Also, the article mentions the practice of mentoring, which is considered an integral part of professional development, since the support of an experienced mentor can be useful in a career which allows trainees to adopt the skills and experience of management, develop their own managerial abilities.

Key words: personnel, personnel potential, innovation, dual training, oil companies, oil and gas industry, personnel reserve, professional mobility, career, training, innovative process, nationalization of cadres.

The innovative development of the personnel potential of domestic oil companies is based on the system of values of their people. Not so long ago, the main motive for the employee to work was the desire to make a contribution to building the country's communist system, but such high motives are replaced today by a desire for material gain. In domestic companies, the category "professionalism" is formed very blurry, so the level of wages, as a rule, depends on the rarity of specialization. In the period of modernization of the Kazakh economy, technical and technological renovation of production, the country especially needs high-quality personnel with ambitiousness, determination, initiative and creativity. Therefore, the innovative development of human resources in the oil and gas industry should give unquestionable priority. The need for specialized, problem-oriented education arises with the complication of the processes of developing production and the use of complex science-intensive products. The "technology" of training specialists meeting the requirements of consumers and capable of solving complex problems in various spheres of production activity is guaranteed assurance of a set of competencies and quality of training on the basis of intra-university quality assurance and quality assurance systems.

From the revealed features of innovative development of human resources capacity of foreign practice allows to give recommendations on application of their experience in Kazakhstan oil companies (table 1).

In particular, if we look at individual indicators, the experience of Japan is recommended for the Kazakhstani oil companies in terms of professional mobility. In the Japanese model, the moral qualities and loyalty to the enterprise are of paramount importance. Therefore, many Japanese enterprises take into account, first and foremost, the professionally and socially important qualities of the employee, allowing him to adapt to the conditions of the enterprise relatively easily, to show creative activity, readiness for constant training in and out of the workplace high professional mobility. The system of labor

remuneration and promotion used in the companies of Japan in accordance with the high age of the year presupposes a strong dependence of the reward on the length of service in one enterprise and its continuity. For example, a Japanese worker aged 30-34 years, who changed his place could receive only 75% of the salary of his colleague of the same age who works in the same company continuously from the moment of graduation. With age, the difference in pay increases: after changing jobs at the age of 35-39 years, only 71% could count, and 40-49 years - 59% of the wages of his peer, who continued to work in the same company all the time. Such a system of labor remuneration economically stimulates the employee's dedication and is connected with the system of lifelong hiring. Therefore, in the Japanese model, the professional knowledge and skills of employees are formed in the course of professional activity in the enterprise, i.e. enterprises are guided by the training of all potential employees, regardless of the existing profession and qualifications [1].

Table 1 - Indicators of innovative development of personnel potential in foreign oil and gas companies and their application in Kazakhstan

Indicators	USA	of the Japan	of the Russian Federation	Republic of Kazakhstan
Professional mobility	Positive phenomenon, the preference is given to specialists passing from one specialty to another, and the company.	A negative phenomenon, a high evaluation of the dedication of one company, sometimes a specialty, a multiple generation of the family	Average phenomenon in a large territory of Russia	Regarding oil companies, the application of the Japanese experience is recommended
Training of young specialists for the personnel reserve	Evaluation of young (27-33 years) employees and determination of their career growth.	Company employees' children	Training at the expense of the company - motivation, reduction of staff turnover.	Internship in foreign countries under special programs for determining professions. It is recommended to apply the experience of the US and RF
Knowledge	Development based on strategic needs. Continuing education. Training in the direction of the work of other functions		Orientation on the development of knowledge for current needs Training only in the direction of work	
Career	Individual career planning of each manager, specialist and employee, consisting in the reserve for promotion, taking into account the firm's capabilities and the business qualities of the applicant.	There is a system of "lifelong hiring". Employees are often tested for general intelligence, education, personal attitudes and character traits. Personal prosperity depends on the prosperity of the company.	Specific career development programs are developed for all levels of staff, taking business into account. Creation of a career planning system based on internal rotation	Career development is carried out in accordance with the requirements of a separate structural unit and does not take into account the needs of the business.
Directivity in the training of personnel	Training of personnel for the production of high-tech and science-intensive products and focus on fundamental and applied sciences	-	-	There is an advanced experience for Kazakhstan of the company operating in the country LLP "TCO", "KPO". US experience is recommended
Involvement of the company's personnel in the innovation process	Method "Work out"	Kaizen system	Crowdsourcing technology	Does not have a specific technology or system. It is recommended to apply the experience of the US and Russia
Power distance	Not pronounced	Not expressed	High level	
Note - Compiled by the author				

If we consider the indicator of involvement of personnel in the innovation process, then in Kazakh oil companies there is no specific technology or system for using this indicator. Therefore, in our opinion, it is recommended to apply the experience of the US and Russia, i.e. It is necessary to introduce some elements of crowdsourcing with enough serious motivation of the idea generators. It is necessary to launch a unified corporate portal where the company's employees can leave their rationalization proposals and the authors of the claimed innovative ideas will have the opportunity of career and material growth in the company. That is, so-called social elevators will be introduced, which will become a good platform for the exchange of views of employees and one of the tools of business synergy, the promotion of corporate philosophy. We believe that encouraging a collective search for advanced solutions in the company will yield results and good results. As a result, the company will become a real team of creative people, united around the same goal - increasing the value of a group of companies [2].

KPO individually tailored to the needs of each employee in their career advancement, offering them specialized development programs. The most common method of training in the company is training courses, the purpose of which is to give employees the necessary professional qualifications within the framework of the world standard. The next stage of training and development is the opportunity to participate in international certified programs. Since the KPO strategy is based on the introduction of recognized international techniques and technologies, its employees need not only professional skills and skills for servicing new equipment. Also, each specialist must constantly improve their knowledge, which are mandatory for successful work in this industry at the international level [3].

Ensuring the quality of education and training of competitive specialists of the required level of quality for companies in the oil and gas industry, enterprises with innovative strategy requires the fulfilment of a number of conditions and compliance with a set of criteria that are not currently formulated in a sufficiently definite and unambiguous manner and therefore allow for a wide variety of interpretations when using this term. The quality of training, the quality of training a specialist in a university includes the notion of social importance, prestige, the demand for a profession, and for the holder of a "quality" education - compliance with the requirements of a set of characteristics reflecting his personal, social and professional competencies. The main trend in the world educational space is currently the development of innovative engineering education aimed at the formation of specialists in the field of technology and technology, not only a body of professional knowledge and skills, but also special competencies focused on the ability to apply them in practice, in real conditions, when creating science-intensive new competitive products.

For higher education institutions, the provision of quality engineering staff based on an integrated quality management system of training is also a means of ensuring the university's competitiveness, its sustainable development.

The solution of the problem of graduate training, the formation of human resources and the provision of enterprises and organizations requires unity of approaches and principles of training specialists that are competitive in the domestic and international labour markets and their joint implementation with all interested parties.

The analysis of foreign practice makes it possible to note, as one of the effective solutions, the development of a dual system of training engineering personnel used in a number of countries (Germany, Switzerland, Russia) [4]. The dual system of education implies the simultaneous receipt of professional training without interruption from production and training in the specialty at the university. Kazakhstan is currently studying the experience of dual training, creating a legislative and regulatory framework for the development of dual (cooperative) education: the Law of the Republic of Kazakhstan "On Education", the State Program for the Development of Education in the Republic of Kazakhstan for 2011-2020. According to JSC data According to the data of the Republican Scientific and Methodological Centre for the Development of Technical and Vocational Education and Qualification, 24 experimental sites have been set up to introduce a dual system based on colleges in all 16 regions [5]. The recommended concept of innovative development of personnel potential and providing them with oil and gas industry enterprises can be based on a cluster approach to the training of engineering personnel in the educational and scientific-production process and innovation activities. Here the university plays a coordinating role among all the parties concerned. Thanks to this, competitiveness is ensured: graduates of universities, products created by graduates of the university, as well as enterprises and universities themselves.

The main principles of training specialists, their involvement in oil companies are [6]:

- Comprehensiveness - the training of graduates and the subsequent updating of the competencies of specialists by the resources of all stakeholders together: the state, the university, employers, students;
- the demand - the preparation of graduates who meet the needs of the state, employers, society, labor market;
- the responsibility for the quality of the graduates' preparation is borne by all the participants of the formed system in accordance with the accepted obligations;
- permanence - continuous professional development, retraining and certification;
- balance of interests - mutual obligations of interested parties: state, university, employers, students.

At the same time, the role of educational institutions, which should be assigned to the central position, should become a qualitatively different one, since knowledge of educational institutions, including higher education, vocational and technical universities, provides targeted pre-university training, as well as direct training, the implementation of educational and educational work, the formation of social and personal competencies of specialists, conducting research work with the involvement of students. This will ensure that future specialists develop creative skills, creative thinking, readiness for innovation and other competences [7].

Occupying a central position, universities will analyse employers' applications, target targeted training of specialists, conduct competitive selection taking into account the interests of employers, support postgraduate support for graduates, including certification, advanced training.

With this approach, students and graduates of educational institutions will actively and consciously participate in obtaining education, forming competencies, attestation, certification, advanced training, and acquisition of additional professions.

On the part of employers, active vocational guidance work should be carried out among schoolchildren, using appropriate information resources, thus ensuring a contingent of students for the educational institution and for further employment. Thus, this scheme allows to provide targeted training of specialists, in addition, it is possible to organize training of specialists for local production, which provides competitive positions of universities at the regional level, since they can comprehensively study the needs of their region in the specialists of relevant local employers, students acquire the opportunity to practice at employers' enterprises, which strengthens ties with graduates already at the stage of training. Educational institutions can get the opportunity to organize guest lectures or lecture cycles by experienced workers of enterprises. On the other hand, for educational institutions the use of this approach will solve problems with the search for places of practice and the employment of graduates.

This approach will provide universities with the opportunity to create flexible training programs for specialists at all levels, in turn, students can determine at their discretion training programs, including pre-university, postgraduate training, based on the need to develop and apply certain competencies [8, 9].

Thus, in each of the stages of the development of the consortium of companies KPO BV, Chevron's valuable asset, which owns 18% of the company's shares, has the highest professionalism of employees able to work in the future, with an accuracy to determine the time and place of application of forces to obtain maximum effect. KPO is the largest employer in the region: out of almost four thousand employees of the company, the majority are citizens of Kazakhstan. The basis for successful development in the company is the human factor. KPO uses its own intensive training and development program, the purpose of which is to motivate employees to grow professionally, and increase their role in the company. The responsible employee is given the opportunity to fulfil a wider range of duties requiring independent decisions. A system has been built that guarantees the promotion of talented and motivated employees to positions of responsibility. Professional growth and innovative development involves intensive training of company employees.

The structure of the system of formation and innovative development of the personnel potential of oil companies based on the cluster approach is presented in Figure 1.

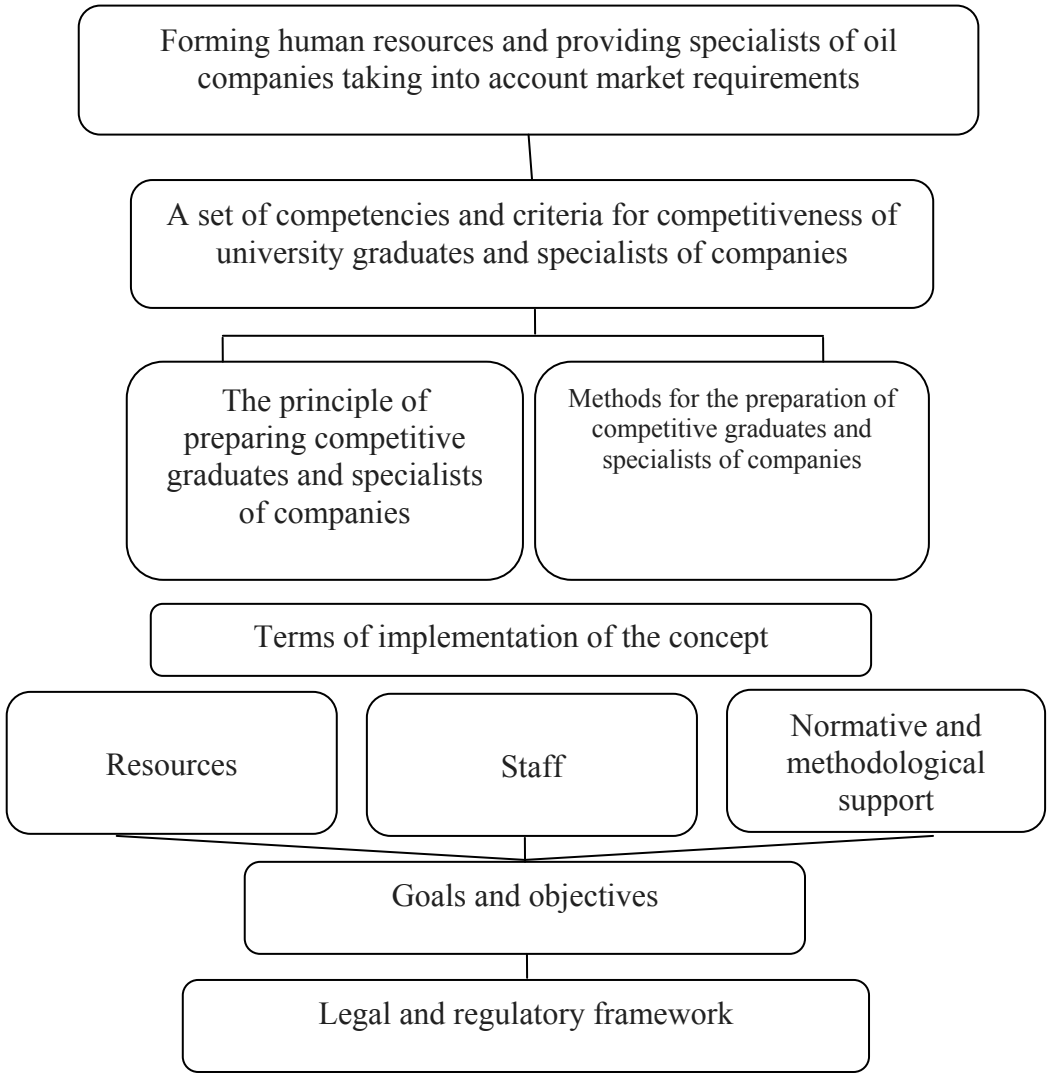

Figure 1 - Structure of the system of educational, scientific and production process for the formation of a dual model of training Note: compiled by the author

This system of formation and development of the personnel potential of oil companies is based on the following fundamental principles:

1. Competitive specialist - competitive products - competitive enterprise - competitive higher education institution - competitive education.

2. Joint training coordinated by the university and postgraduate support and maintenance of competitiveness of graduates and specialists of the enterprise during professional activity - professional cycle by all stakeholders - participants of the system.

3. Training specialists in the interests of all categories of "consumers" of specialists - the state, employers, trainees in accordance with the developed and agreed educational standards and curricula.

4. The responsibility of the university for the quality of training, satisfying employers and the competitiveness of the graduate and specialist of the enterprise at all stages of his professional activity.

5. Mutually beneficial relations of all participants of the system in the process of preparing graduates and accompanying the company's specialists during the entire professional cycle on the basis of obligations assumed, responsibilities and resources [10].

At the heart of the system that realizes the concept:

- Mission, goals and objectives of the system of training human resources and providing personnel with companies with an innovative development strategy;

- Requirements for the totality of competencies of graduates of university and specialists of enterprises, corresponding to the needs of employers;

- Indicators and criteria for the competitiveness of graduates and specialists of enterprises;

- Methods of formation and development of personnel potential - competitive graduates and specialists of enterprises in the educational and research and production innovation cluster;

- Methods for assessing competencies and competitiveness of graduates and enterprise specialists;

- Methods for assessing the effectiveness and effectiveness of the formation of human resources in the educational and research and production innovation cluster;

- a complex of strategic, tactical and normative-methodical management of educational-scientific-industrial innovation cluster in the interests of forming competitive graduates of higher education institutions and development of company specialists during all professional activities;

- Methodology for forecasting and assessing the competitiveness of university graduates and enterprise specialists;

- a method for assessing the degree of readiness and determining the need for and the appropriateness of the participation of organizations and enterprises in the educational, scientific and industrial innovation cluster [11].

The appointment of such a system, formed in accordance with the proposed concept, is the formation and development of the personnel potential of oil companies on the basis of the training of graduates of universities and the constant educational and methodological support of enterprise specialists during all subsequent professional activities to ensure that their competencies meet the requirements of employers and maintain their competitiveness in the market labour.

The goal can be achieved by combining the material, intellectual and information and other necessary resources of the university, employers' organizations, trainees and the state in the educational and research and production innovation cluster (ERPC).

The innovative nature of the educational, research and production innovation cluster consists both in the orientation of the formed human resources potential of companies in the oil and gas industry for innovative activities, and in the use of innovative methods of approaches to cluster activities.

Synergetic effect from the addition of the potential of the participants of the ERPC:

- Stability of formation, maintenance and reproduction of personnel potential of the enterprises with required competences;

- maintaining the competitiveness and relevance of university graduates and enterprise specialists throughout their professional activities on the basis of an integrated approach and coordinated by the university participation of the state, employers, specialists of enterprises [12].

To ensure the effectiveness of the activities of the ERPC on the recommended model, it is necessary to develop requirements for the totality of competencies of graduates of universities and specialists of enterprises taking into account the needs of enterprises belonging to the cluster. Cluster management requires the development of a set of normative management documents that includes documented requirements for processes, indicators and criteria for their effectiveness and effectiveness, as well as methods for their evaluation [13].

Thus, innovative development of oil companies should have innovative solutions in the system of updating its personnel. If we do not take effective measures, we can hardly expect a "breakthrough" innovative development of human resources potential in the matter of attracting young scientific personnel to the real economy and the oil industry of the Republic of Kazakhstan. The high level of competitiveness of the oil and gas industry increasingly depends on the ability of the personnel potential of oil companies to continuously generate and effectively apply in practice all new knowledge and the most up-to-date innovative technologies.

Separately, one must say about the practice of mentoring, which is considered an integral part of professional development. Responsibility for his personal development is always borne by the employee

himself. But at the same time, the support of an experienced mentor can be useful in a career, allows trainees to adopt the skills and experience of management, develop their own managerial abilities.

Every year students of higher educational institutions practice at KPO. Later, those who showed themselves competent professionals, it becomes possible to become full-time employees of the enterprise. A systematic approach is used in working with young people, and the company consciously relies on them. So, special attention in the personnel policy of the oil companies is paid to the creation and upbringing of the personnel reserve from young workers and specialists. To this end, companies should actively cooperate with educational institutions that train workers in professions and specialties in demand in the industry: contracts for cooperation should be concluded, practice for students on the basis of enterprises should be organized, lectures in educational institutions should be held, a reserve base should be established and selection of candidates. For example, Chevron provides the best students with access to professional development programs, prepares professionals for the oil and gas industry in Kazakhstan, which will determine its further development in the near future. In addition, to date, with the sponsorship of Chevron, a number of departments and institutes of KazNTU have received new laboratory equipment and computer classes with specialized computer software. The Resource Center of the student division of the Society of Petroleum Engineers (SPE) was also equipped and opened.

Chevron closely cooperates with the world's leading technical educational institutions, including universities in Canada, Great Britain, Australia, Thailand, Indonesia, India, South Africa and Venezuela, as well as with the best technical universities in the United States. Within the framework of the Chevron program, it assists universities in the implementation of new curricula, in improving the material and technical base, and also allocates grants and scholarships to the best students. The program of applied research of the Eurasian Fund, aimed at the wide dissemination of economic education, was supported. In this direction, close cooperation has been established with universities - the Atyrau University and the Institute of Oil and Gas.

A collective approach to the development of personnel ensures a high rate of nationalization of personnel. The nationalization of cadres is an important structural link in the creation of the economic legacy of oil companies. Its goal is to maximize employment opportunities for local people and invest in the professional development of Kazakhstan employees of the company. In oil companies, a career development system for prospective local employees is being developed and implemented to the level of managers [14].

The model of nationalization of personnel is closely linked with the main strategy of oil companies. At the heart of the training of local staff is not only the development of professional knowledge and technical skills, but also the general management capabilities, and the personal experience of each particular specialist, his ability to make responsible decisions. The very process of transition of the most gifted national cadres into the category of future potential managers responsible for business has its own philosophy based on the fact that the process of nationalization is not just a "mechanical" replacement of foreign specialists in Kazakhstan. It is an effective professional growth, the maximum realization of the abilities of local personnel. Success in this business in the future will depend not only on the company's economic success, but also on its reputation [15].

The International Consortium of KPO has prepared a detailed program on the nationalization of personnel, which was developed jointly with the Plenipotentiary of the Republic of Kazakhstan. The goal of the KPO Program on the nationalization of personnel is to ensure the appropriate level of professional training so that competent and qualified Kazakhstani personnel can successfully work in the positions that are currently occupied by foreign specialists.

In Kazakhstan, they will not come to a common solution: to use foreign experience or accumulate their own. Of course, this issue is controversial. There is no doubt only the realization that foreign experience was formed on the country mentality and traditions, so it requires careful study. Of course, Kazakhstani companies have their own experience in innovative development of human resources. But we

see that the main features of the domestic model are remnants of the Soviet system, which are no longer relevant in modern companies, so it is no accident that such companies implement the principles of human resource development, borrowed mostly from America and Japan.

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УДК 331.108.26

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ШЕТЕЛДІК МҰНАЙ КОМПАНИЯЛАРЫНЫҢ КАДРЛЫҚ ӘЛЕУЕТІНІҢ ИННОВАЦИЯЛЫҚ ДАМУ ЕРЕКШЕЛІКТЕРІ ЖӘНЕ ОЛАРДЫҢ ТӘЖІРИБЕСІН ҚАЗАҚСТАНДА ПАЙДАЛАНУ

Аннотация. Бұл мақалада авторлар шетелдік мұнай компанияларының кадр әлеуетінің инновациялық дамуын қарастырған, яғни шетелдік мұнай компанияларындағы адами ресурстарын инновациялық дамыту көрсеткіштері және оларды Қазақстанда қолдану. Сондай-ақ, кадрлар даярлаудың дуалды жүйесінің тұжырымдамасы және оны еліміздің колледждері мен жоғарғы оқу орындары базасында жүзеге асырудың маңыздылығы ашылады. Сонымен қатар, инновациялық қызметке және оқу-ғылыми-өндіріс процесінде инженерлік кадрларды даярлауға кластерлік тәсілге негізделген кадр әлеуетін инновациялық дамыту тұжырымдамасы және онымен мұнай-газ саласындағы кәсіпорындарын қамтамасыз ету концепциясы ұсынылған. Мұнда барлық мүдделі тараптар арасында үйлестіруші рөлді жоғарғы оқу орны атқарады. Нәтижесінде, осының арқасында бәсекеге қабілеттілік қамтамасыз етіледі: университеттің түлектері, олардың өнімдері, сонымен қатар кәсіпорындар мен жоғарғы оқу орындарының өздері құрған өнімдері. Сондай-ақ, мақалада тәлімгерлік тәжірибесі туралы айтылады, ол кәсіби дамудың ажырамас бөлігі болып

табылады, өйткені тәжірибелі тәлімгердің қолдауы мансапта пайдалы болуы мүмкін, тәжірибеден өту дағдылары мен басқару тәжірибесін игеруге, өздерінің басқару қабілетін дамытуға мүмкіндік береді.

Түйін сөздер: кадр, кадрлық әлеует, инновация, дуалдық оқыту, мұнай компаниялары, мұнай газ саласы, кадрлық резерв, кәсіби ұтқырлық, мансап, кадрларды даярлау, инновациялық үдеріс, кадрларды ұлттандыру.

УДК 331.108.26

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ОСОБЕННОСТИ ИННОВАЦИОННОГО РАЗВИТИЯ КАДРОВОГО ПОТЕНЦИАЛА ЗАРУБЕЖНЫХ НЕФТЯНЫХ КОМПАНИЙ И ПРИМЕНЕНИЯ ИХ ОПЫТА В КАЗАХСТАНЕ

Аннотация. В данной статье рассматривается инновационное развитие кадрового потенциала нефтяных компаний зарубежных стран, представлены, по мнению авторов, показатели инновационного развития кадрового потенциала в зарубежных нефтяных компаниях и их применение в Казахстане. Также раскрывается понятие дуальной системы обучения кадров и важность его внедрения на базе колледжей и вузов государства. Предлагается концепция инновационного развития кадрового потенциала и обеспечения им предприятий нефтегазовой отрасли, основанная на кластерном подходе к подготовке инженерных кадров в учебно-научно-производственном процессе и инновационной деятельности, где координирующую роль между всеми заинтересованными сторонами играет вуз. Благодаря этому обеспечивается конкурентоспособность: выпускников вузов, продукции, создаваемой выпускниками вуза, а также собственно предприятий и вузов. Также в статье отмечается практика наставничества, которая считается неотъемлемой составляющей профессионального развития, так как поддержка опытного наставника может оказаться полезной в карьере, позволяет стажирующимся сотрудникам перенять навыки и опыт руководства, развить собственные управленческие способности.

Ключевые слова: кадр, кадровый потеницал, инновация, дуальное обучение, нефтяные компании, нефтегазовая отрасль, кадровый резерв, профессиональная мобильность, карьера, подготовка кадров, инновационный процесс, национализация кадров.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 121 – 126

UDK 316.472.3

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CORPORATE SOCIAL RESPONSIBILITY IN MANAGEMENT SYSTEMS OF KAZAKHSTAN COMPANIES

Abstract. To realize the strategic goal of our country's entry into the thirty most competitive countries of the world, (lets)pay attention to the latest modern processes. In this regard, representatives of Kazakhstan's business need to ensure security, the requirements of information openness of corporate social responsibility in accordance with global competitiveness and world trends. The importance of corporate social responsibility since the last century and with each period is being updated.

Corporate social responsibility in the practice of the Republic of Kazakhstan is a new phenomenon and is considered (to be)young. For 25 years of independence of our country, the government implemented measures and programs to improve entrepreneurship and create favorable conditions for them. In this regard, (we need) the urgent issue of the need for in-depth consideration of important issues (in order to implement)the implementation of corporate social responsibility of companies.

Keywords: Corporate social responsibility, social responsibility of business, social responsibility of domestic business, social responsibility of foreign companies, key performance indicators.

Introduction. The social responsibility of business is one of the fundamental values of a civilized economy, politics and society. The basic principle of business is to make a living. It is widely practiced that entrepreneurs can participate in public life of the population, as they are able to do it.

However, this is known to be a good result if it is done on a voluntary basis, rather than under the compulsion of the authorities. Therefore, international organizations and associations urge all countries and large transnational companies to work and produce goods and services within the framework of sustainable development.

Kazakhstani business is obliged to participate in the process of sustainable development in the era of global integration, and in this context it is important to establish harmony between society, the state and business, to prevent social imbalances and to take care of the environment.

The main section. The global economic crisis has revived the pressing problems for business, and now the biggest challenge is to build confidence in the company and preserve the image. In this regard, the importance and relevance of corporate social responsibility for companies is determined. Kazakhstan companies pay attention to this phenomenon and organize activities to use social responsibility within their services.

For domestic business, its cooperation with civil society and the state still requires a number of improvements. The study "Corporate Social Responsibility in Kazakhstan: situation, problems and perspectives" developed by the Sang Research Center for the Eurasia Central Asia Foundation is the largest study in the field of corporate social responsibility of Kazakhstan. This research covered 189 Kazakhstani, foreign and joint venture companies from different sectors of business and small and large enterprises [1].

According to the study, the domestic business community understands corporate social responsibility in the following areas: introduction of a social package/programs at the enterprise (83%), charity (59%), personnel development and training (54%), participation in regional development programs (52%) [1].

According to the results of this research, the most significant components of corporate social responsibility are the subjects of entrepreneurial activity of the country:

- For small businesses: charitable assistance, participation in regional development programs;
- For medium-sized enterprises: development and training of personnel, charity;
- For large business: training and development of personnel, charity. For large enterprises, it is also important to implement environmental projects (and to) establish responsible relations with suppliers and consumers [1].

In addition, according to the analytical review of corporate social responsibility in the extractive sector prepared by Kazakhstan and Norwegian experts in 2011-2012, one of the key issues of social responsibility in Kazakhstan is the lack of understanding of the concept of social responsibility. The second important issue is that, despite compulsory payments from companies, including the amount of social payments, regional government agencies often issue unequal orders for financing for companies. Such requirements force companies to spend on various projects, and this situation leads to the third problem. It is difficult for corporations to introduce corporate social responsibility into their development strategies. Corporate social responsibility should strictly correspond to the basic business of the company and in the implementation of social projects should be strictly monitored and tracked in the reporting format [2].

World practice shows that many large companies within their services actively develop and implement social responsibility policies and strategies. And the states that are striving for progress, contribute to the promotion and support of this policy.

A number of Kazakhstani companies adopted normative documents in the field of social responsibility within their development strategies. These may include policies or codes of corporate social responsibility. It is worth mentioning the experience of national companies in the strategy or policy in this field. A number of large companies working in Kazakhstan's industry, banking and financial sectors have adopted normative documents for the implementation of the principles of social responsibility, an action plan within the framework of their activities (Table 1).

Table 1 - List of national companies that have adopted regulatory documents in the field of corporate social responsibility

Company name	Normative document in the field of corporate social responsibility	Approval date
“Samruk-Energo” JSC	Corporate Social Responsibility Strategy	Based on the decision of the Board of Directors (Protocol No. 47 of 11.05.2011)
JSC “Kazakhtelecom”	Corporate Social Responsibility Strategy for 2012-2020	Based on the decision of the Board of Directors (Appendix 3 to Protocol No. 2) dated 10.02.2012
JSC «Tauken-Samruk NMSC»	Corporate Social Responsibility Strategy for 2014-2018	Based on the decision of the Board of Directors (Protocol No. 13/13 of 27.12.2013)
JSC «Development Bank of Kazakhstan»	Corporate Social Responsibility Strategy for 2014-2023	Based on the decision of the Board of Directors (Appendix 2 to Protocol No.179-2016-03) dated 19.02.2016
JSC NC «KazMunayGas»	Code of Corporate Social Responsibility	Based on the decision of the Board of Directors (Protocol No. 12/2012 of 10.12.2012)
JSC «KazTransOil»	Code of Corporate Social Responsibility	Based on the decision of the Board of Directors (Protocol No. 3/2010 of 10.03.2012)
JSC Enterprise Development Fund “Damu”	Corporate Social Responsibility Policies	Based on the decision of the Board of Directors (Appendix 6 to Protocol No. 46) dated 27.09.2013
JSC «NAC « Kazatomprom»	Corporate Social Responsibility Policies	Based on the decision of the Board of Directors (Protocol No. 5/11 of 03.06.2011)
JSC «Kazpost»	Corporate Social Responsibility Policies	Based on the decision of the Board of Directors (Appendix 30 to Protocol No. 14/10) dated 10.12.2010
Note: the data was compiled by the author on the basis of [3], [4], [5], [6], [7], [8], [9], [10], [11]		

The review of the companies shows that the corporate strategy of social responsibility, the policy or the process of adoption of the code begins in 2010. Regulatory documents of the companies include the content of corporate governance, organization and control of the company's activities in the field of corporate social responsibility. In particular, all documents define the basic principles and main directions of corporate social responsibility.

However, corporate social responsibility strategies, approved by companies in terms of their content structure, still require a number of improvements. In particular, the analysis of the current situation in the strategies of corporate social responsibility of Kazakhstan companies, information on the complex of planned activities and control over the main directions are not fully disclosed. These documents often correspond to a policy or code form. At the same time, some companies consider the social responsibility strategy as an annex to their development strategy.

The initiators of the exchange of views and experience on the effective development and solution of the model of social responsibility of business are the National Chamber of Entrepreneurs "Atameken", the United Nations Development Program in Kazakhstan [12]. In order to improve and develop the social responsibility of business representatives in the Republic of Kazakhstan, aligning it with international standards and requirements, creating favorable conditions for business and civil society, a draft of the National Concept of Corporate Social Responsibility for 2014 was developed.

This National Concept project is a new mechanism and action plan for the promotion and development of social responsibility of all international organizations, government agencies, small and medium-sized enterprises and transnational corporations, as well as non-governmental organizations and social partnerships and other interested legal and natural persons. This draft national concept is a process of coordination in the government of Kazakhstan.

To determine the basis for the application of corporate social responsibility in the country, it is necessary to take into account the characteristics of the models of social responsibility development in different countries and to note the tendencies of the modern development of these models.

There was held a comparative analysis of the most common and effective models of social responsibility in the world in order to improve the tools of public policy to create and develop a model of corporate social responsibility in Kazakhstan. Among them: the United States, the United Kingdom, the Russian Federation, Asian countries (Japan, Singapore, China) and continental Europe.

It will be more correct to base on the experience of the Asian continents on the state regulation of corporate social responsibility, protection and preservation of the environment. The principles and mechanisms of the American model of charity or philanthropy allow us to regularly organize the activities of domestic enterprises in this field. We consider the experience of the countries of continental Europe as the regulatory regulation of the Company's services, as well as the establishment of mutually beneficial cooperation with interested parties. The communication policy of corporate social responsibility in Kazakhstan should be consistent and relevant, taking into account modern information technologies and development trends. In this regard, it is difficult to find favorable ? for Kazakhstan from foreign experience. It requires a comprehensive analysis of the model of each country. For this reason, we recommend (to use)using the experience of each country in developing a set of measures aimed at achieving efficiency.

It is also important to pay attention to the experience of a number of leading foreign companies regarding the principles of social responsibility at internal enterprises. We consider the example of large international organizations that differ in their experience and model for improving business in this area.

- *Energy Resources of Australia Ltd. (ERA) company:*

The Company focuses on a wide range of activities in the field of social responsibility. In particular, the experience of the company uniting this industry on a variety of issues (environmental, social, medical assistance, etc.) will improve the systematics and control of social responsibility. There is also an active work of the Australian company with the local population, that is, the experience of improving the welfare of the local population, promoting healthy lifestyles and promoting social and economic development in the region where the company operates. The company has established partnerships with the Association which focuses on positive attitudes and health problems with the local community. In addition, this

society is in good communication with local business representatives and, as a result, affects the socio-economic situation of the local population. In this regard, we recommend that you rely on the company's experience in creating an effective community platform [13].

- *Росатом state corporation:*

In the process of corporate social responsibility, the corporation is characterized by a high level of accountability in the context of sustainable development. The company holds prestigious positions at international competitions annually. The company's annual report for 2015 included 16 Russian awards and 24 awards in international competitions. The company's reporting system is mainly based on interactions and dialogue with stakeholders. The company's reports provide inquiries and reviews with feedback from stakeholders. Public consultations are also being prepared for reporting. In order to establish an effective dialogue with stakeholders, the Company holds public consultations on cooperation. We call for a focus on the company's best practices in identifying and organizing channels of communication with stakeholders and applying them in the best practice [14].

- *Sumitomo Corporation Group corporation:*

The Japanese corporation is distinguished by the experience of effective organization of social investments in the organization of activities on social responsibility. Social projects implemented by the Company are carried out in accordance with the needs of local communities. The company pays special attention to quality management and socially responsible business management. The Corporate Social Responsibility Initiative and the Supply Chain Management Guide were adopted by the Corporation. It is best to turn to the company's experience in identifying socially responsible partners while working with partners [15].

- *AkzoNobel NV company:*

Dutch AkzoNobel NV considers the strategy of supply chain management. The goal of this strategy is to create more value than the minimum amount of resources and costs for the supply chain. It means:

1. Providing consumers with high-quality products and energy-efficient solutions;
2. more efficient use of resources and reduction of greenhouse gas emissions;
3. the positive impact of the company's product on the final consumer segment of the society;
4. Paying attention to the end segment of consumers for business means creating values through growth and profitability.

In the field of supply chain management, the company pays much attention to the development of sustainable development. Among world companies in this area of practice it is worth paying attention to the experience of AkzoNobel NV [16].

- *The Fujitsu Group company (manufacturer of information and communication technology products, service provider).*

The commitment of the Fujitsu Group on Social Responsibility consists of five main areas for achieving the medium-term goals of sustainable development until 2020:

1. Security through modern technology;
2. environmental protection;
3. diversification and attractiveness;
4. development of human resources in the context of the contribution of the community and the world;
5. communication and cooperation with stakeholders.

The key performance indicators (KPI) were developed in a three-tier system in accordance with the Company's medium-term strategic directions. They are evaluated as "goals achieved", "all goals are not fully achieved, some problems remain open", "goals are not achieved". These goals will be met annually in the current year, the goals for the next year and the medium-term 2020 target. We offer the experience of the Japanese company Fujitsu Group in planning corporate social responsibility and developing key performance indicators [16].

To assess and determine the effectiveness of the Company's activities in the field of sustainable development and social responsibility, many companies have their managers and employees corresponding to performance indicators or key performance indicators (KPI).

To prepare key performance indicators (KPIs), you need to pay attention to the financial, operational, environmental and social aspects of the company. To achieve the organization's strategic goals it is

necessary to create a list of KPIs for critical areas of sustainable development. These figures should also correspond to the corporate strategy of the company, corresponding to the goals and objectives of the strategy. Corporate social responsibility and sustainable development will be coordinated with the system of motivation and compensation of managers and employees of the company. Indicators of the KPI in the field of sustainable development should be measured and should be prepared for short-term and long-term results. These figures should be focused on the interests of stakeholders and the market.

Thus, to ensure the competitiveness of domestic business structures on the international market, the experience of foreign countries and foreign companies in this field was analyzed. An example of this practice is a set of recommendations that are suitable for use in internal business environments.

Corporate social responsibility is an integral part of the long-term strategy of sustainable development which is a necessary condition for increasing the national reputation and competitiveness of the country's economy, increasing the investment and export reputation of enterprises, reducing social risks and corruption, as well as environmental security and regional development.

It is important that representatives of the Republic of Kazakhstan and Kazakhstani businesses have a reputation in the international market and work in accordance with modern trends in order to ensure international competitiveness in the context of global integration.

Conclusion. As a result of the responses of domestic and foreign small, medium and large enterprises that participated in a special study on the introduction of corporate social responsibility in Kazakhstan, we come to the following conclusions regarding the phenomena of corporate social responsibility among Kazakhstan companies:

- The phenomenon of social responsibility in Kazakhstan is widely used by foreign or joint, national and transnational companies. There is still uncertainty about this phenomenon among domestic enterprises.
- The practice of corporate social responsibility in the country is often characteristic of large-scale entrepreneurship. Small and medium-sized enterprises are still not fully aware of this phenomenon or do not have much experience in its implementation.
- Kazakhstani companies adopted normative documents in the field of corporate social responsibility, and responsible social responsibility bodies are formed between the managerial and organizational structure. However, these measures still require a number of improvements.

In addition, the article examines the practice of the future decision-making process in world companies as well as the applied and rational options for managing corporate social responsibility, organizing and planning a corporate social responsibility strategy, assessing its effectiveness and interaction with stakeholders. We noted that these advanced methods are effective for domestic enterprises to improve their efficiency in the field of social responsibility.

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ҚАЗАҚСТАНДЫҚ КОМПАНИЯЛАРДЫҢ БАСҚАРУ ЖҮЙЕСІНДЕГІ КОРПОРАТИВТІК ӘЛЕУМЕТТІК ЖАУАПКЕРШІЛІК

Аннотация. Еліміздің әлемнің бәсекеге қабілетті озық отыз мемлекеті қатарына кіру стратегиялық мақсатын жүзеге асыру үшін заманауи үрдістерге назар аудару маңызды. Осы тұрғыда Қазақстандық бизнес өкілдерінің жаһандық бәсекеге қабілеттілігі әлемде туындап жатқан үрдістерге, халықаралық талаптарды сақтауды және ашық ақпараттандыру шараларын қамтамасыз етуі қажет. Корпоративтік әлеуметтік жауапкершілік маңызы өткен ғасырдан бері талқыланып, әр кезең сайын бірқатар жаңартуларды басынан кешіріп келеді.

Қазақстан Республикасы тәжірибесінде корпоративтік әлеуметтік жауапкершілік жас, әрі жаңа құбылыс саналады. Тәуелсіздігіміздің 25 жылы ішінде елімізде кәсіпкерлікті жетілдіру және қолайлы жағдайлар жасау үшін мемлекет тарапынан бірқатар іс-шаралар мен бағдарламалар орындалып келді. Осыған орай, кәсіпорындардың әлеуметтік жауапкершілігін кеңінен жүзеге асыру бойынша мемлекеттік қолдаумен байланысты негізгі мәселелерді одан да тереңірек қарастыру қажеттігі туындайды.

Түйін сөздер: корпоративтік әлеуметтік жауапкершілік, бизнестің әлеуметтік жауапкершілігі, корпоративтік әлеуметтік жауапкершілік, отандық бизнестің әлеуметтік жауапкершілігі, шетелдік компаниялардың корпоративтік әлеуметтік жауапкершілігі, қызметтің негізгі көрсеткіштері

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КОРПОРАТИВНАЯ СОЦИАЛЬНАЯ ОТВЕТСТВЕННОСТЬ В СИСТЕМЕ УПРАВЛЕНИЯ КАЗАХСТАНСКИХ КОМПАНИЙ

Аннотация. Для реализации стратегической цели вхождения нашего государства в тридцатку наиболее конкурентоспособных стран мира важно обратить внимание на последние современные процессы. В этой связи представителям казахстанского бизнеса необходимо обеспечить сохранение международных требований, мероприятия информационной открытости корпоративную социальную ответственность в соответствии с глобальной конкурентоспособностью и мировыми тенденциями. Важность корпоративной социальной ответственности рассматривается с прошлого столетия и с каждым периодом обновляется.

Корпоративная социальная ответственность на практике Республики Казахстан является новым явлением и считается молодой. За 26 лет независимости нашей страны, государством реализован ряд мероприятий и программ для совершенствования предпринимательства и создания им благоприятных условий. В этой связи, актуальным становится вопрос о необходимости глубокого рассмотрения основных вопросов реализации социальной корпоративной ответственности компаний.

Ключевые слова: корпоративная социальная ответственность, социальная ответственность бизнеса, социальная ответственность отечественного бизнеса, социальная ответственность зарубежных компаний, ключевые показатели деятельности.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 127 – 130

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SORPTION MATERIALS BASED ON ZEOLITE AND CHITOSANE FOR THE DISCHARGE OF IONS OF TOXIC METALS

Annotation. The authors of the article studied the influence of various factors on the sorption of Cu^{2+} and Pb^{2+} ions. And also the optimal values of sorption parameters are determined: sorbent mass - 1g per 100 cm3 solution for copper and lead, T = 298K

In the course of studying the sorption of Cr6 + ions, it was determined that the modification of the sorbent increases the recovery rate, which increases to 100%.

New composite materials based on zeolite and chitosan have been obtained. Their sorption characteristics (extraction, adsorption, equilibrium time) with respect to heavy metal ions (Cr^{6+}, Cu^{2+}, Pb^{2+}) in aqueous solutions are determined. To study the physicochemical and sorption properties of materials, the following methods were used: atomic absorption spectroscopy (spectrophotometer "Shimadzu 6200" and spectrophotometer SPECORD 200 Analytic Jena, Germany).

Keywords: sorption, heavy metals, zeolite, chitosan, Cr (VI), Cu (II), Pb (II).

Introduction. It is known that heavy metals, as well as their salts, enter the human body from the environment - with inhaled air, tap water, food. It is generally believed that there is no element of the chemical table of Mendeleyev, which is harmful to humans if it does not exceed a certain number. But this amount for some of them, including heavy metals, is very insignificant. But, unfortunately, now more and more people suffer from the fact that heavy metals that enter the body in multiple amounts exceed the permissible norm. Cleaning the body of metal ions is one of the important environmental problems in modern life. Consequently, sorption methods of purification of the body are considered effective as a solution to this problem, so the search for modern available sorbents is an urgent topic for research. One of the available sorbents are natural sorbents, and modification with various substances makes it possible to increase their efficiency.

Methods of research. The purpose of this work is to create a polymer composition-sorbent, which has a high sorption capacity for ions of heavy metals.

The process of sorption of heavy metals, as well as the influence on the process of such factors as the concentration of the modifier in the sorbent composition, temperature, mass of the sorbent was studied.

Objects of the research: Zeolite (Chankanai deposit), Chitosan, Unithiol. When studying the adsorption kinetics from physiological solutions of heavy metals in concentrations above permissible standards for the human body, the following salts were used: $CuCl^2 * 5H^2O$, $K2Cr^2O^7$, Pb (NO^3).

The discussion of the results. Copper influences the function of endocrine glands and is a catalyst for cellular oxidative processes. It accumulates in the liver and in the cellular nuclei of tissues. Causes hemolysis and acute kidney failure.

Hexavalent chromium Cr (VI) is highly toxic - this intracellular reduction to the third valence underlies critical toxic effects. Cumulated in the liver, lungs and kidneys, and is excreted mainly by excretion through the kidneys.

Lead is cumulated mainly in the bones, brain and liver. Penetrates into the body by contact - through the skin and respiratory tract or through the digestive system.

Investigation of the effect of the modifier concentration in the sorbent composition. Five grams were placed 1 g of sorbent and filled 100 cm^3 of solutions containing Pb^{2+}, Cu^{2+} ions at concentrations of 12-36 ini / ml at room temperature (25 ± 5) ºC until equilibrium was established.

The adsorption value for all the sorbents was calculated by the equation:

$$A = \frac{c_{ini} - c_{res}}{m} * V,$$

where Cini and Cres are, respectively, the initial and residual sorbate concentration, initial / cm^3; V is the volume of the sorbate solution, cm3; m is the sorbent mass, g.

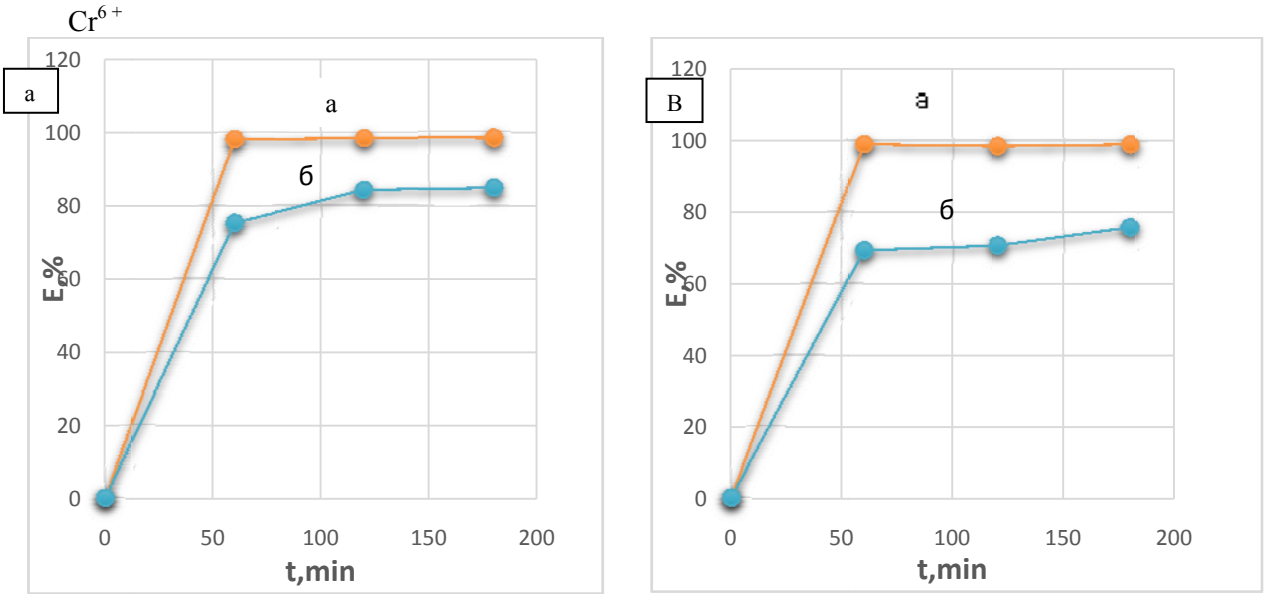
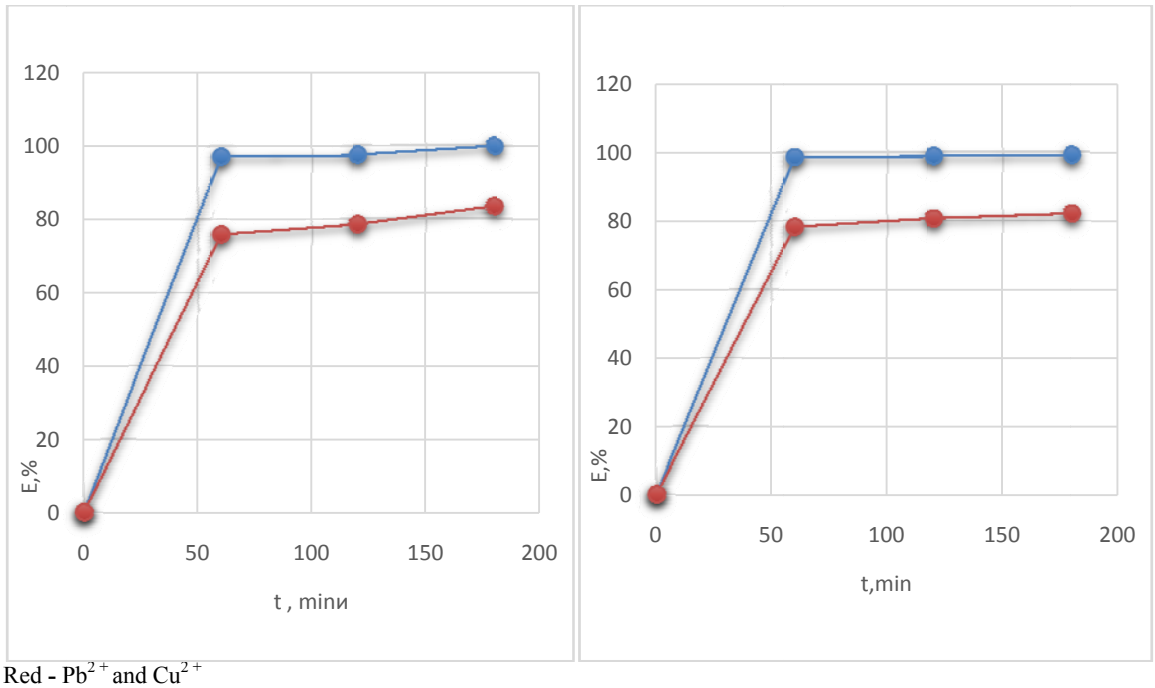


Figure 1 - Dependence of the degree of extraction of ions Pb^{2+} (a) and Cu^{2+} (b) by chitosan, modified unithiol (a) and initial chitosan (b) against time (T = 298K, pH = 6, Cini = 36 ini / ml)



Red - Pb^{2+} and Cu^{2+}
Blue - Pb^{2+}

Figure 2 - Dependence of the degree of extraction of Pb^{2+} and Cu^{2+} ions by a sorbent modified with unitiol of concentrations of 1 mg / ml versus time (T = 298 K, pH = 6, Cini = 36 ini / ml)

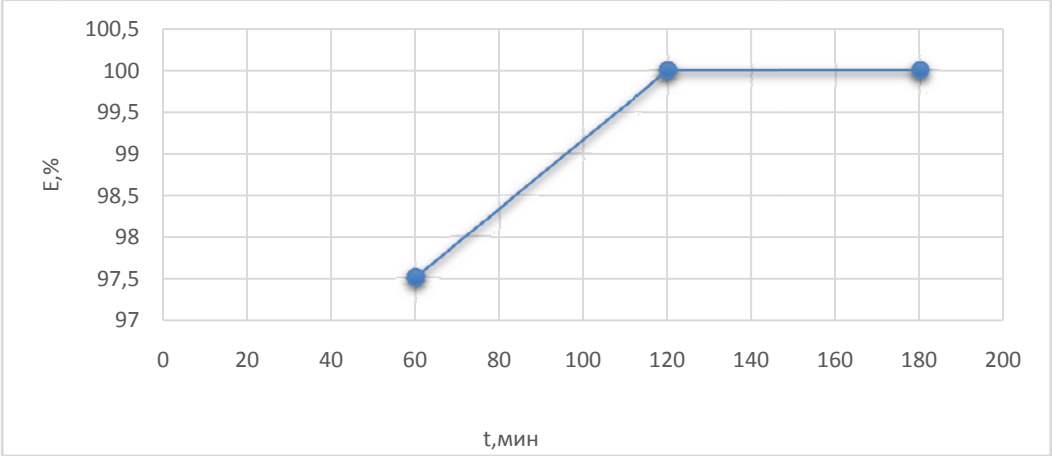


Figure 3 - Dependence of the degree of extraction of Cr^{6+} ions by a sorbent modified with unitiol of concentrations of 1 mg / ml versus time (T = 298 K, pH = 6, Cini = 2 ini / ml)

The initial and residual concentrations of cadmium and lead were determined by the AAS method using a Shimadzu 6200 atomic absorption spectrophotometer. The results were processed using the ORIGIN 5 software.

The study of the change in the sorption capacity of the sorbent from sorbate concentration was carried out for a period of time necessary for the onset of Investigation of the effect of temperature on the sorption process. Five grams were placed on 1 g of sorbent and filled with 100 cm^3 of solutions containing ions of Pb^{2+}, Cu^{2+} concentrations of 100-500 initial / ml at temperatures of 298, 309.6 K. The temperature regime was created and regulated by means of a thermostat. The processing of the results was carried out in the same way as in §1.

Investigation of the effect of sorbent mass on the sorption process. The experiment was carried out in the same way as in item 1 with the use of sorbents of 0.1 mass; 0.5; 1 g, modified with 1mg / ml of unithiol.

Influence of the concentration of the modifier (unitiol) on the process of sorption of ions Cu^{2+}, Pb^{2+},

Study of the sorption of Cr^{6+} ions. Sorption of Cr^{6+} ions was carried out from solutions of $K^2Cr^2O^7$ concentration of 2 ini / ml-8 ini / ml with sorbent containing 1 mg / ml unitiol. 1 g of sorbent was poured into 100 cm^3 of a salt solution and aliquots were taken at regular intervals. The initial and residual metal concentrations were measured on a spectrophotometer SPECORD 200 Analytic Jena, Germany.

Conclusions. The optimal concentration of the modifier (Unitiol) in the sorbent composition was determined, which was 1 mg / ml

Modification of the sorbent Unitiol increases the sorption activity of chitosan zeolite with respect to Cu^{2+} and Pb^{2+} ions, the recovery rate of which increases to (96 ± 4). The effect of various factors on the sorption of Cu^{2+} and Pb^{2+} ions was studied. Optimum values of sorption parameters are determined: sorbent mass - 1g per 100 cm^3 solution for copper and lead, T = 298K

In the course of studying the sorption of Cr^{6+} ions, it was determined that the modification of the sorbent increases the recovery rate, which increases to 100%.

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ТОКСИКАЛЫҚ МЕТАЛДАРДЫҢ ИОН ЖӘНЕ ТИІСТІК МЕТАЛДАРДЫҢ ТОҚТАТУҒА АРНАЛҒАН ЗОЛОТЕЛЬ ЖӘНЕ ЧИТОСАНҒА НЕГІЗДІ ТЫЙЫМДАР

Аннотация. Авторлар иондарының Cu^{2+} және Pb^{2+} туралы сорбция процесінің әр түрлі факторлардың әсерін зерттеді. Сондай-ақ сорбциялық параметрлерін оңтайлы маңызы: сорбент бұқаралық - мыс пен қорғасын 1D na100sm3 шешім, T = 298K.

Ол 100% арттырады сорбент өндіру, түрлендіру дәрежесі арттырады, зерттеу сорбциялық Cr^{6+} иондарының барысында анықталды.

Цеолиттен және хитозана негізделген жаңа композициялық материалдар алу. су ерітінділеріндегі ауыр металл иондарының қатысты өз сорбциялық сипаттамалары (өндірудің дәрежесі, адсорбция тепе уақыты) (Cr^{6+}, Cu^{2+}, Pb^{2+}) арқылы анықталған. атомдық-абсорбциялық спектроскопия (спектрофотометр «Shimadzu 6200» және спектрофотометр 200 Specord Аналитикалық Jena, Германия): пайдаланылған материалдардың физикалық-химиялық және сорбциялық қасиеттерін зерттеу үшін келесі әдістері.

Түйін сөздер: сорбция, ауыр металдар, цеолит, хитозан, Cr (VI), Cu (II), Pb (II).

УДК 54.058

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СОРБЦИОННЫЕ МАТЕРИАЛЫ НА ОСНОВЕ ЦЕОЛИТА И ХИТОЗАНА ДЛЯ ОБЕЗВРЕЖИВАНИЯ ИОНОВ ТОКСИЧНЫХ МЕТАЛЛОВ

Аннотация. Авторами статьи изучено влияние различных факторов на процесс сорбции ионов Cu^{2+} и Pb^{2+}. А так же определены оптимальные значения параметров проведения сорбции: масса сорбента – 1г на100см^3 раствора для меди и свинца, T =298K.

В ходе исследования сорбции ионов Cr^{6+} было определено, что модифицирование сорбента увеличивает степень извлечения, которое повышается до 100%.

Получены новые композиционные материалы на основе цеолита и хитозана. Определены их сорбционные характеристики (степень извлечения, адсорбция, равновесное время) по отношению к ионам тяжелых металлов (Cr^{6+}, Cu^{2+}, Pb^{2+}) в водных растворах. Для изучения физико-химических и сорбционных свойств материалов использованы следующие методы: атомно-абсорбционная спектроскопия (спектрофотометр «Shimadzu 6200» и спектрофотометр SPECORD 200 Analytic Jena, Германия).

Ключевые слова: сорбция, тяжелые металлы, цеолит, хитозан, Cr(VI), Cu (II), Pb (II).

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 131 – 134

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NEED OF USING OF INFORMATION TECHNOLOGY IN INNER AUDIT IN THE BANKS OF THE SECOND LEVEL

Abstract. The article considers a set of issues that validity the need to introduce modern technologies into the practice of bank's internal audit. A research was conducted among employees of the internal audit service of banks to assess the current state of internal audit in the second-tier banks of the Republic of Kazakhstan. An analysis of the results of the survey was carried out with the help of the R-program.

Keywords: R-program, IT-audit, internal audit.

The increase in the dynamics of the development of banking business generates new risks. And today, it is necessary to use all modern control mechanisms, to minimize them, one of which is internal audit. Internal audit has already become an integral part of most financial institutions, in all developed countries of the world.

For many companies, information and information technology are the most valuable and most incomprehensible asset. Successful companies understand the benefits of information technology and use them to increase their value. These companies are understand the risks, associated with these technologies, and skillfully manage them.

Today, internal audit services are constantly confronted with the growing and continuous development of new technologies, that are rampantly penetrating into corporations and organizations, as well as into our personal lives. "Big Data", cloud computing, the use of mobile devices, social networks - these are some of the latest trends in technologies that blur the boundaries and transform the very essence of business. Technologies become more deeply integrated, into an increasing number of elements of corporate business processes, piercing them from the bottom up and from top to bottom. And while they accelerate and simplify the exchange of information and assets, they entail new risks associated with such acceleration and simplification. Realization of these risks leads to the loss of assets, to the leakage of confidential information, to the shutdown of business due to the inoperability of computer systems.

Numerous works of authors were devoted to the study of the quality of innovations, their economic aspects, various methods of analyzing innovations were reflected in M. Pomerko's scientific works, opinions and recommendations, he revealed the essence of information technologies as an element of audit [1], A.V. Davydova considered questions the impact of new technologies on the work of internal audit of financial organizations [2], A.Kuzupeev in his work "Transformation of the organizational structure of internal audit departments" analyzing trend of current day to save, in the future, the term of information technology auditor treats, as an expert close to information systems specialist functions (classical IT) and auditor [3]. However, the content and main tasks of the audit discussed in the above works are not limited to justifying the reliability of the financial balance sheet. The task of internal audit for today is the use in all audit procedures of advanced information technology (IT).

The need for continuous improvement of internal audit, including improving the quality and speed of work, predetermines the introduction and using of modern information technologies.

According to this, cannot be do not agree,with the opinion of a number of authors who argue that the introductions of information technology, automation of processes are seen as an essential element in increasing the effectiveness of every organization. In their opinion, managers who cannot assess the potential of modern technologies, organize their work with electronic tools, are doomed to lose. It is important to give priority to employees who understand what a software can give, to improve activities

efficiency. The process approach allows them to make decisions quickly and act effectively. The introduction of more sophisticated computer systems leads to the rational use of working time and the effective organization of labor [4, p.20]

Nowadays, the interest in IT is growing every day, as well as with interest in assessing the effectiveness of IT use, and this is due to the following factors:

- nowadays IT issues - is one of the main discussed problems for second-tier banks. Banks increasingly understand that to fully and objectively consider the disclosure of audit results requires the involvement of IT and advanced analytics systems that allow obtaining the most complete information about the transactions and transactions of the bank. Traditional tools are more difficult to achieve such goals, so banks, even those that are not fully utilized by IT, begin to use and develop new directions within their structures with the involvement of relevant specialists in the field of advanced data analytics (BigData). Transformation of the traditional approach to conducting internal banking audit using IT-world trend: now the era of the information revolution and the transition to the digital environment. Banks realize that the main thing in this process is not to miss the moment and start a digital transformation, which will allow getting an additional tools of development in the short term.

- the growth of new digital directions within internal audit implies significant investments in equipment, software (software) and high qualified specialists. Accordingly, the integration of the company's business processes with IT requires a set of activities aimed at getting independent opinion on how the company can successfully transform and develop in the digitalization conditions of business. To monitor the compliance of the objectives of the company and its IT strategy, as well as reasonability of investing in IT, it requires to attract of the IT-audit's function.

Given the economic situation in the country, banks pay close attention to IT costs, including internal audit.

As practice shows, to make IT-audits and audits with IT component, audit department should have specialists with the necessary level of IT competencies. It is impossible to conduct high-quality IT audit projects with only the employees of the audit department who do not possess (or have only superficial ideas about the specifics of IT), the required level of knowledge and work experience. It is have to have the availability of relevant specialists. It's good when an employee in audit department has already worked as an IT auditor comes to this job, while having experience in IT / IB.

For the IT auditor, its need to know the basics of building of information bank’s systems and mechanisms for their deployment, key processes of operating activities of IT departments and their relationship with the internal audit department. Best practices of building IT in the internal audit of the bank, which can be used as a methodology for assessing the sufficiency of key IT functions and used to further improve and optimize audit procedures. The basics of information security, as well as key hacking techniques and methods of protection against them, are also very important in the work of bank auditors. Accordingly, for the IT-auditor, one of the main criteria is to develop and learn something new in banking technologies.

The attraction of IT specialists from the IT departments of the bank to IT audits is due to the growing number of new technologies used and the complexity of the information systems they operate and implement. Also, for example, for carrying out special projects of internal audit on cyber security of the bank, which may include testing of the information systems and services of the bank for resistance to external negative influences, various testing is required, in particular, penetration testing requires the presence in the deportation of internal audit in highly specialized specialists (IT auditors) who possess the necessary technical skills and practical experience not only in the field of IT and banking system IU. It should also be noted that there is a requirement of regulators to conduct audits with an IT component (testing ITGC) with the participation of external auditors.

For example, according to the results of our survey, among the internal auditors of second-tier banks, showed that 61.54% of the auditors of the internal audit service are expected to introduce new information technologies into audit procedures, especially when assessing the risks of banking activities. Respondents noted that the problem of the development of internal audit in second-tier banks is the lack of certified auditors and the introduction of new technologies in audit procedures (Figure 1).

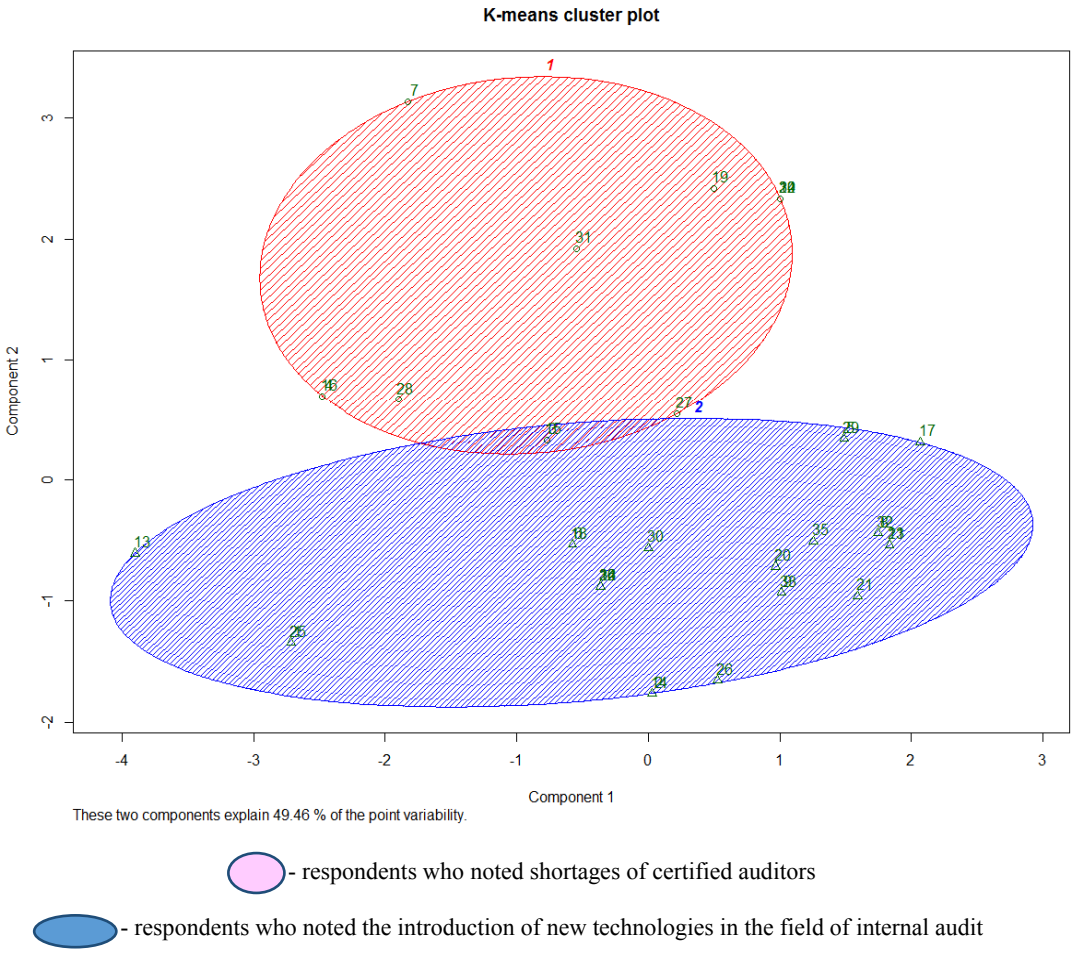

Figure 1 - the result of a study among the internal auditors of the Republic of Kazakhstan

According to the figure, it can be seen that the interviewed auditors of the internal audit services of banks most need changes in the field of IT audit, and they noted the lack of certified internal auditors as problematic issues. But, technologies do not stop in their development, generating new risks and challenges, and requirements for the knowledge of auditors will also develop. The head of the internal audit department more and more must develop his knowledge and competence in the field of information technology. Progressive technologies will require from it all the best, all the more, although, in our opinion, not necessarily to have deeply detailed understanding, but rather good mastery of the main issues of information technology, key IT risks, or knowledge, where to find the necessary information.

It should be noted that internal audit procedures are based on the international methodology for assessing banking risks, introduced by the Basel Committee on Banking Supervision. Auditors should have high professional training, access to the software installed in the bank and make full use of international achievements in the field of internal audit. In our opinion, the use of modern methods, technologies and information systems by the Bank's internal audit service when planning and conducting audits allows:

- focus on the most important aspects of banking;
- improve the effectiveness of the audit;
- reduce the time for inspections and the costs of their conduct;
- provide weighted recommendations and business advice

In the opinion of O.V. Kurnykina, the computerization of banking activities and the changes in technological processes that occur on the basis of it determine ways the areas of modernization of internal audit based on the use of information technologies and electronica's procedures of control in the audit [3, p.146-147]

In our opinion, information technologies make it possible to automate internal audit's manual processes, relieve qualified auditors from routine work, speed up all procedures significantly, including making the process of verification and decision making effective, and providing structured and important information for successful bank management. Thus, improving the quality of internal audit directly depends on the ability to use advanced IT in conducting audits.

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НЕОБХОДИМОСТЬ ПРИМЕНЕНИЯ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ ВО ВНУТРЕННЕМ АУДИТЕ В БАНКАХ ВТОРОГО УРОВНЯ

Аннотация. В статье рассматривается комплекс вопросов, обосновывающих необходимость внедрения современных технологий в практику внутреннего аудита банка. Были проведены исследования среди сотрудников службы внутреннего аудита банков по оценке текущего состояния внутреннего аудита в банках второго уровня РК. Анализ результатов анкетирования проводился с помощью R- программы.

Ключевые слова: банки второго уровня, внутренний аудит банка, ИТ-аудит, R- программа.

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ЕКІНШІ ДЕҢГЕЙЛІ БАНКТЕРДІҢ ІШКІ АУДИТІНДЕ АҚПАРАТТЫҚ ТЕХНОЛОГИЯЛЫ ҚОЛДАНУ ҚАЖЕТТІЛІГІ

Аннотация. Мақалада банктің ішкі аудитіне заманауи технологияларды енгізу қажеттілігін негіздейтін бірқатар мәселелер қаралды. Қазақстан Республикасының екінші деңгейдегі банктерінде ішкі аудиттің ағымдағы жағдайын бағалау үшін банктердің ішкі аудит қызметінің қызметкерлері арасында сауалнама жүргізілді. Сауалнама нәтижелерін талдау R-бағдарламасының көмегімен жүргізілді.

Түйін сөздер: екінші деңгейлі банктер, банктің ішкі аудиті, АТ-аудит, R- бағдарлама.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 135 – 138

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IMPROVEMENT OF THE COMPENSATION SYSTEM FOR EMPLOYEES AT THE ENTERPRISE

Abstract. According to the authors, the system of remuneration of labor in any organization should be aimed at encouraging the productivity, creativity, efficiency and initiative of employees, all those qualities that lead to effective work and achievement of the organization's strategic goals. Connecting the material interests of employees with the goals of the organization allows the latter to attract and retain qualified personnel, control and manage labor costs, maintaining the optimal number of employees. All of these goals are served by intrafirm systems of labor remuneration, incentives and motivation of personnel, which should be developed in the organization. The creation of a system of payment and labor incentives for any organization is a very specific and complex process, requiring a professional understanding of the essence of labor motivation, knowledge and experience in the development and application of personnel remuneration methods.

Keywords: remuneration, potential, intellect, innovation, motivation, remuneration.

Introduction. In a market economy, the employee-enterprise relationship is centered on the exchange of the employee's labor results on the totality of all types of remuneration that are provided by the enterprise. In accordance with modern concepts within the system of rewards that are used by the enterprise, there is a division into external and internal rewards. External remunerations are controlled and distributed by the enterprise: these are cash payments, bonuses and social benefits that are used by the enterprise to stimulate the effective work of its employees, this is the socio-psychological atmosphere and management style that are presented in the organizational culture of the enterprise, in short, all external incentives and conditions labor in the broadest sense of the word. External rewards can and should be managed, they can be changed, designed and modeled.

Internal satisfaction of the worker does not directly depend on the organization, this is the psychological state of the working personality, the emergence of which depends on many factors associated with the motivational structure of the individual, with his psychological characteristics and attitudes, and not only with the system of external remuneration. From the enterprise only conditions under which the working person can receive internal satisfaction from work depend.

Monetary compensation is crucial in labor motivation, and the meaning of monetary compensation for an employee is not limited to compensating for the time, energy, and intellect spent by an employee when achieving the organization's goals. The monetary compensation, or more precisely the forms of its receipt, as well as relative and absolute sizes, are perceived by the employee as evidence of its value for the organization, affect the employee's self-esteem, directly speak of his social status. The money received by the employee is also a measure of personal and professional self-realization [1].

Motivation of employees was and is one of the important issues for managers of any company. The most important incentive, of course, is material gain. To increase the level of staff motivation, it is possible to apply the so-called compensation package consisting of the actual wages and social benefits

provided to employees (payment of insurance, food, transportation and other expenses). And both the first and the second components of the reward should be reviewed annually, compared with the benefits offered by other enterprises. For example, you can apply the following types of financial incentives: - individual one-time awards for special merits; - revision of wages based on the results of the evaluation of the employee's work for the year; - corporate award for the year (its size depends on the results of the work of the enterprise, while the calculation of the remuneration for each employee in accordance with its rank, apply different coefficients); - social package. It is also recommended to apply the bonus system (for combining professions and positions, for the complexity and timeliness of the work performed, for working in harmful working conditions, for working at night, for managing the team, for professional skills, personal allowance). However, this approach can cause some problems. If the bonus is paid regularly, it will be perceived by employees as an integral part of wages. In this case, the deprivation of the premium will be equivalent to a reduction in wages. An inefficient remuneration system can cause employees dissatisfaction and lead to negative consequences for the organization in the form of demotivation of employees, a decline in productivity, high staff turnover, the tension between employees. An effective remuneration system raises the productivity of employees, directs their activities to the right direction for the organization. Of course, we must understand that although material compensation plays a fundamental role in motivating employees, it is not the only way to encourage employees. This can also be the provision of time off, promotion, recognition of the team, comfortable working conditions, etc. What kind of recommendations can be made to improve wages? It is important not to turn labor payment into a simple social payment that does not depend on the employee's contribution. It is necessary to strive to ensure that tariffs and, if possible, all wages, be adjusted for a rise in prices if not 1: 1, then in the proportion that maximizes the demand for the company's products while raising prices. Lagging of the growth rate of wages from the rate of price growth leads, first of all, to a narrowing of consumer demand and to a further decline in output, which is compensated for by a new price increase. The indexation of wages, as much as possible compensating for the increase in prices, allows to maintain the stimulating role of wages. At the same time, taking all measures to preserve the stimulating function of wages, it is necessary to do everything possible to ensure that even the slightest exclusion of an employee from the labor process is compensated not in the form of wages, but in the form of guarantee and compensation payments, usually set lower than the tariff payment. Any reduction in the individual result of labor must be accompanied by a decrease in wages. Guarantees and indemnifications can, within certain limits, compensate for this reduction, if it occurred not through the fault of employees. If the funds received by the employee are clearly divided into paid for work and paid by way of compensation, then with an improvement in their performance, employees can claim additional payment in the amount of the difference between payment for work and payment for replaceable compensation payments. It is necessary to strengthen the social security of the working people. In wages, it is expressed, first of all, in that the level of payment ensures the normal reproduction of the labor force of the corresponding qualification. Social security also consists in ensuring that all opportunities for the growth of individual wages are provided by increasing the personal results of labor. Also important elements of improving labor remuneration - is the rationing of labor. It allows you to establish a correspondence between the amount of labor costs and the amount of its payment in specific conditions. Another way to improve pay is bonuses. The incentive systems developed at enterprises can be aimed at stimulating output growth or limiting this growth (regressive bonus systems). But in any case, bonuses should be paid to employees when the established standard of labor is reached or exceeded, with a high rate of work. Thus, there are three main options for improving the remuneration of employees: - on the basis of a significant increase in the incentive effect of tariff payment; - on the basis of an increase in the incentive effect of non-tariff payments (bonuses, fees for overfullfilment of norms, allowances, distribution by KTU of the non-tariff part of the collective payment fund); - on the basis of strengthening the stimulating role of the mechanism of education and distribution of wage funds by business units. Work on the improvement of labor

remuneration in the first variant consists in raising the level of the standardization of labor, using the higher tariff rates (salaries), canceling artificial bonus systems and additional payments, supporting the increased level of labor standardization with measures to increase the level of organization of labor, production, management of labor discipline. The second option is objectively necessary where there is no reason to revise the tariff payment terms for any reason. This option is typical for industries with a low level of production organization and uneven load of employees during the month. In this case, the main form of remuneration for increased work results are over-tariffs (premiums, bonuses, earnings). The third option of improving the organization of wages is preferable if it is aimed at stimulating the given final results. The greatest effect it can give when labor is characterized by wide interchange ability, collective responsibility and a sufficiently free and mobile division of labor.

Thus, the stimulation of workers' labor plays an important role in the development of the country's economy. At present, personnel issues are underestimated. It should be taken into account that experts from the highest qualification will contribute to the exit from the crisis. Their main task is not only to improve the management of human resources, but also to develop new motivational models that promote fair pay, the distribution of social benefits, and career planning for employees. The development and practical application of new motivational systems directly in organizations (enterprises) make it possible to attract new highly qualified specialists, able to manage both small and large teams, mostly focusing on individual motivation in accordance with the quantity and quality of the worker's work. Personal, collective and public interests have the opposite direction.

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КӘСІПОРЫНДАҒЫ ЖҰМЫСШЫЛАРДЫҢ КОМПАНИЯСЫ ЖҮЙЕСІН ЖЕТІЛДІ

Аннотация. Авторлардың пікірінше, кез-келген ұйымдағы еңбекақы төлеу жүйесі қызметкерлердің өнімділігін, шығармашылықты, тиімділігін және бастамашылығын ынталандыруға, тиімді жұмысқа және ұйымның стратегиялық мақсаттарына қол жеткізуге мүмкіндік беретін барлық қасиеттерге бағытталуы тиіс. Қызметкерлердің материалдық мүдделерін ұйымның мақсаттарымен байланыстыра отырып, соңғы білікті қызметкерлерді тартуға және ұстауға, еңбек шығындарын бақылауға және басқаруға, қызметкерлердің оңтайлы санын ұстауға мүмкіндік береді. Осы мақсаттардың барлығы ұйымда әзірленуі тиіс қызметкерлерді еңбекақы төлеу, ынталандыру және ынталандыру жүйелерін қамтиды. Кез-келген ұйым үшін еңбекақы төлеу және еңбекке ынталандыру жүйесін құру еңбекке ынталандырудың, білімді және кадрлық сыйақы әдістерін әзірлеу мен қолдану тәжірибесін білуді талап ететін өте нақты және күрделі процесс болып табылады.

Түйін сөздер: сыйақы, әлеует, интеллект, инновация, ынталандыру, сыйақы

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СОВЕРШЕНСТВОВАНИЕ СИСТЕМЫ ВОЗНАГРАЖДЕНИЯ РАБОТНИКОВ НА ПРЕДПРИЯТИИ

Аннотация. По мнению авторов, система вознаграждения труда в любой организации должна быть направлена на то, чтобы поощрять производительность, творчество, исполнительность и инициативу работников, все те качества, которые приводят к эффективному труду и достижению стратегических целей организации. Соединение материальных интересов работников с целями организации позволяют последней привлекать и удерживать квалифицированный персонал, контролировать и управлять затратами на рабочую силу, выдерживая оптимальное количество работников. Всем этим целям и служат внутрифирменные системы оплаты труда, стимулирования и мотивации персонала, которые должны разрабатываться в организации. Создание системы оплаты и стимулирования труда для любой организации - очень специфический и сложный процесс, требующий профессионального понимания сущности трудовой мотивации, знаний и опыта разработки и применения методов вознаграждения персонала.

Ключевые слова: вознаграждение, потенциал, интеллект, инновации, мотивация, оплата труда

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 139 – 143

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APPROACHES TO ESTIMATION OF SUSTAINABLE DEVELOPMENT OF RURAL AREAS OF AKMOLIN AREA

Abstract. The development and strengthening of rural areas for Kazakhstan is one of the basic components of economic prosperity and for any state, primarily due to the fact that a sustainable level of development of rural areas is a guarantee of the state's food independence. The authors presented a technique that is a method of aggregation, which is carried out by bringing particular indicators into generalized ways such as summation and grouping. Each stage is considered in detail. So, system-functional connections have a great variety and dynamism, and each group of functions, like systemic education is not closed, and there are also connections between its elements, they are external links of a higher level of formalization. The methodical approach proposed by the authors to the determination of indicators of multifunctional development of the agricultural sector of the territory can not claim to evaluate the whole aggregate of functions of agriculture from the standpoint of its influence on various aspects of the development of rural territorial formations.

Keywords: methods, approaches, agriculture, sustainable development, means, functions

Introduction. Methodology. The theme of the research was based on the current knowledge of the native material and resources of the world's largest scientists in the field of science. Fundamental methods of research - this is a method of deduction and induction, and a specific or complex approach that is effectively applied in the field of logistics.

Results. In countries with developed market economies since the early 90's.there were increasing questions about the systematization of quantitative and qualitative consideration of the socioeconomic situation in rural areas. A universal typology, comparable internationally and presented in the "Rural Indicators" project, was developed by the Organization for Economic Cooperation and Development. Within the framework of this project, for the first time at the international level, a regional system for collecting and presenting subnational data was created.

In addition, there are various systems of evaluation characteristics of the territory. In particular, I.M. Mayergoiz proposes to include in the system of regional assessment a system of indicators reflecting: the economic and geographical position of the region (in relation to elements of social production, to mineral deposits, economic centers, etc.); territorial structure of natural resources; characteristics of the population (rates of change, age and sex composition, urban population share, population density, etc.); structure of industrial production.

S.N. Bobylev proposes several approaches to assess the state and development of the territory at the regional level, which differ in the structure and principles of construction. At the same time, he considers it expedient to select and aggregate the indicators in such a way as to give a quantitative description of the identified problems, relying on the database of official Russian statistics for the regions.

Summarizing existing assessment characteristics of the territory, it should be noted that the state and development of rural areas should be viewed from the point of multifunctional development of agriculture. In this case, there is a system of direct and reverse links, which are structured as follows: sectors conditions determine the efficiency of the use of all factors of production and, in general, the development of rural areas, and hence the economic growth rates that initiate the development of the external socio-economic environment of agriculture in the given territory.

The peculiarity of the conditions for the development of the agrarian sector of rural areas obliges us to study the whole aggregate of functions of agriculture and the trends in their development: agro-food; agro-raw materials; economic; social; eco-landscape; cultural; integrating; basic.

The state of the multifunctional ecological-social-economic system of a certain rural area is inseparable from the level of multifunctional development of agriculture, this means the need for detailed study of each of the functions of agriculture.

An acceptable methodological basis for substantiating the essence of the criterion for assessing the impact of a set of agricultural functions that determine the state of a multifunctional ecological, socio-economic system of a rural area and its quantitative characteristics are functional-structural and system-target approaches based on the evaluation of certain different functions that determine those or Other conditions for the development of rural areas at a certain time interval.

Our theoretical analysis of the system of functions of agriculture has shown that each of them possesses features of manifestation, that is, the realization of a part of these functions has a directly expressed explicit result, others are latent in nature and require a temporary lag for revealing the effect. In this case, the functions of agriculture are considered from the perspective of the consequences of the relevant activity.

Each of the functions of agriculture has a complex internal structure, both from the point of view of the mission and objectives of agriculture, and from the point of view of influence on the development of rural areas and is a relatively independent object of systemic research of the whole aggregate of functions. The substantive characteristics of the functions of agriculture made it possible to structure them into three fairly homogeneous groups: productive and economic, territorial-resource and socio-economic, determined by the main directions of development of individual subsystems of ecological, socio-economic systems in rural areas.

The first group, production and economic functions, includes agro-food, agro-raw materials and integrating. The territorial-resource group includes ecological-landscape and cultural functions. The socio-economic group of functions combines basic, economic and social functions.

Such structuring is expedient, in our opinion, because the functions that are included in each of these groups have a conceptual unity and pronounced synergetic connections, unlike the links with the functions of other groups in terms of the emergence of the emergence effect from their realization, both for individual subjects , and society. System-functional relations have great variety and dynamism. Each group of functions as a systemic formation is not closed, in addition to the connections between its elements there are also external relations, which we regard as links of a higher level of formalization.

In addition, the manifestation of the functions of agriculture is frontier. The frontierapproach to the study of problems of multifunctional development of the territory's agriculture is manifested in the fact that this territory is a concrete model of the space-time continuum. Each rural area represents an integral system with its spatial architectonics, which is not confined to relations with the use of material factors of production, but also includes attitudes toward man, his social connections developing in time.

The approaches we proposed unite the semantic, expert and calculated aspects of the category "function of agriculture". The proposed methodology allows to formalize these aspects, which means that the study of each of the functions of agriculture is carried out through an analysis of the values of the relevant indicators characterizing the state of both the external and internal environment.

The first stage is the selection of indicators whose values are related to the quantitative assessment of certain groups of functions that determine the role of agriculture in the development of a certain subsystem of rural areas. Selection is carried out on the basis of the theoretical and methodological analysis of groups of functions of agriculture.

Each indicator or several indicators characterize a certain group of functions of agriculture. The choice of indicators and data collection is carried out within the same stage and depends on the possibility of obtaining the necessary statistical information. At this stage, it is possible to perform intermediate calculations of those indicators that can be obtained by calculation based on available statistical data.

The second stage is connected with the general presentation of the indicators of multifunctional development of the territory's agriculture, which is visualized in the form of a scheme containing information on the system of interrelations of indicators and reflecting the conceptual content of all the functions of agriculture that are reflected in the indicator.

Each function of agriculture, based on the characteristics of its manifestation, can be described by a system of indicators. Thus, the production and economic functions in the agri-food sector are characterized by such an indicator as the personal consumption of the main types of food vital to man.

At the third stage, points are calculated for each of the indicators, during which they are rationed, which consists in bringing the indicators measured in different units (percentages, coefficients, monetary terms or physical units, scores, etc.) to dimensionless quantities .Therangeoftheseindicatorsvariesfrom 0 to 1.

Rationing is carried out by referring the difference between the indicator for a given year and the minimum indicator for the period under study to the difference between the maximum and minimum indicators of the time lag studied. The normalization process has a general form, clearly presented in the form of formulas 1 and 2 of this paper.

$$\frac{a_{ij}-a_{\min j}}{a_{\max j}-a_{\min j}}, \quad (1)$$

$$1-\frac{a_{ij}-a_{\min j}}{a_{\max j}-a_{\min j}}, \quad (2)$$

The transformation is carried out according to the formula (1), if the large values of the indicators correspond to the positive impact on the development of the rural area; the transformation (2) is carried out if the smaller values correspond to the negative influence.

The result of the calculations is a set of indices for each of the indicators reflecting the impact of agricultural functions on the development of rural areas for each year, the value of which is in the range from 1 to 0, where 1 is the best value, 0 is the worst.

At the fourth stage, the indicators (aggregate indices) are aggregated in the final indicator. The final indicator is the arithmetic average of the aggregate indices calculated in the third stage. The indicator of multifunctional development of the territory's agriculture is calculated by the formula 3 below.

$$I_j = \sum_1^i ai \frac{x_{ij}-x_{\min j}}{x_{\max j}-x_{\min j}}, \quad (3)$$

wherexij is the value of the i-th indicator for the j-th year; xmin j is the minimum value of the i-th indicator for the j-th year; xmax j - maximum value of the i-th indicator for the j-th year; αi - the weighting coefficient reflects the "weight" (significance) of each cumulative index reflecting the influence of an individual function in the formation of the indicator of the multifunctional development of the territory's agriculture, is determined expertly, αi> 0.

$$\sum_{i=1}^{u} ai = 1$$

At the fifth stage, the results of the ranking of aggregate indices are summarized by years.

At the sixth stage, based on the preliminary analysis, the ranking results are evaluated and the degree of influence of certain functions of agriculture on the state of the ecological and socio-economic system of rural areas is revealed.

At the seventh stage, the results of the influence of individual functions of agriculture are summarized and projected onto the state of the ecological and socio-economic system of rural areas over the years,

identifying those that require activation through the development and implementation of a system of institutional, economic, socio-demographic and environmental measures, ensuring sustainable development of rural areas. The methodological approach proposed by us to the determination of indicators for the multifunctional development of the agricultural sector of the territory cannot claim to evaluate the whole aggregate of functions of agriculture from the standpoint of its influence on different aspects of the development of rural territorial formations. But it reflects the vector of long-term development of rural areas asecologically and sociallyeconomic systems in the context of the interconnected system of agricultural functions: agro-food; agro-raw materials; economic; social; eco-landscape; culture and logical; integrating and basic. In the process of substantiating our methodological approach, we abstracted from the less significant functions of agriculture from the point of view of direct or indirect influence on the conditions of development of rural areas.

Summarizing the above, it should be noted that this technique allows:

- to give a quantitative description of the impact of certain functions of agriculture on the development of rural areas;
- consider the impact of individual agricultural functions on the development of rural areas in the dynamics;
- to justify complex conditions for sustainable development of rural areas;
- use the data obtained to form a system of measures to ensure sustainable development of rural areas, which can be used in the process of making managerial decisions both at the regional and national levels.

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АҚМОЛЫНЫҢ АЙЫЛЫҚ САЛАСЫНДАҒЫ ТҰРАҚТЫ ДАМУДЫҢ ӘДІСТЕМЕСІНЕ ӘДІСТЕМЕЛІК БАҒЫТТАР METHODOLOGICAL

Аннотация. Қазақстан үшін ауылдық елдімекендерді дамыту және нығайту ауылдық аумақтарды дамыту тұрақты деңгейі мемлекеттің азық-түлік егемендігі кілті болып табылады, бұл шын мәнінде байланысты ең алдымен, экономикалық әл-ауқатын негізгі компоненттерінің бірі және кез келген мемлекет үшін болып табылады. Авторлар мұндай Сонымен мен топтау сияқты әдістері жалпыланған ішінара көрсеткіштерін тарту арқылы жүзеге асырылады біріктіру әдісі әдістемесін, ұсынды. Әрбір кезең толығырақ қарастырылады. Осылайша, жүйелі функционалдық осылымдары оның компоненттері арасындағы байланыстар, сондай-ақ бар, онда, олар сырт қышектеулер жоғары деңгейін қалыптандыру болып, мұндай емес тұйық жүйесін қалыптастыру сияқты, үлкен әртүрлі мен серпінділігін бар, мен функцияларын әрбір тобы.

Түйін сөздер: әдістер, тәсілдер, ауылшаруашылығы, орнықты даму, құралдар, функциялар.

УДК 332.14 (574)

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МЕТОДИЧЕСКИЕ ПОДХОДЫ К ОЦЕНКЕ УСТОЙЧИВОГО РАЗВИТИЯ СЕЛЬСКИХ ТЕРРИТОРИЙ АКМОЛИНСКОЙ ОБЛАСТИ

Аннотация. Развитие и укрепление сельских территорий для Казахстана является одной из базовых составляющих экономического благополучия и для любого государства, в первую очередь в связи с тем, что устойчивый уровень развития сельских территорий является залогом продовольственной независимости государства. Авторами представлена методика, которая представляет собой способ агрегирования, которая осуществляется посредством сведения частных показателей в обобщенные такими способами, как суммирование и группировка.Рассмотрены каждый из этапов, подробно. Так, системно-функциональные связи обладают большим многообразием и динамизмом, а каждая группа функций, как системное образование незамкнута, при этом существуют еще исвязи между ее элементами, они являют внешними связями более высокого уровня формализации.Предложенный авторамиметодический подход к определению индикаторов многофункционального развития сельского хозяйства территории не может претендовать на оценку всей совокупности функций сельского хозяйства с позиций его влияния на разные аспекты развития сельских территориальных образований.

Ключевые слова: методы, подходы, сельское хозяйство, устойчивое развитие, средства, функции

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 144 – 152

UDC 631.67

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IMPROVING EFFICIENCY OF THE STATE SUPPORT OF RICE PLANTING – BASELINE FOR THE STRATEGY OF AGRO-INDUSTRIAL COMPLEX DEVELOPMENT IN KAZAKHSTAN

Abstract. This article reviews problems of the state regulation and financial support in the domain of rice planting in Kyzylorda oblast, indicates relevant actions for improving state regulation of the rice planting domain and agro-industrial production, and suggests measures on improving the state regulation measures. Active participation in the domain of agro-industrial production occurs by means of execution of the state program "Employment Road Map-2020". Despite labor consuming level of the agrarian sphere, execution of this state program enabled the government to reduce unemployment of population despite the crisis taking place in the country. Researches of the state support of agrarian production in the majority of developed countries demonstrate that economic return of the invested finances does not always provide for efficiency of the financial business activities of the functioning organizational legal forms of business. Therefore, classification of the state regulation is important assisting in execution of its functions, also in conducting their control.

Key words: state regulation, financial support, functions and principles of state regulation, agrarian market, agro formation of rice planting, cooperation, grain subcomplex, export and import of grain, strategy of development of the state support, state programs and projects, world trade organization, innovations program, agro-business, crops of rice alfalfa crop rotation.

According to the strategy of development of Kazakhstan "Kazakhstan 2050", the main goal of the agricultural production is to increase seeding areas of agricultural products and achievement of high harvest indicators for increasing production of the agrarian products, by implementing innovative technologies when it is expected to increase the export potentials, to create national competitive brands which provide for ecological compatibility of the product [1].

For the fulfillment of the development of agro-industrial complex, the country adopted the State program of development of this sphere for the period of 2013-2020 (Agro Business 2020), which identifies the strategy of devilment of the state support of the agrarian production for providing competitiveness of the national manufacturers within the frame of Eurasian Economic Community and World Trade Organization [2].

Based on these strategic objectives, development of rice planting as one of the grain subcomplexes of agro-industrial complex, shall be performed based on modernization of this branch with consideration of the rational system of keeping agrarian production for improving competitiveness of agro formations and for increased demands for the rice products.

Kyzylorda oblast is the main region of the country, which produces rice, with concentrated large areas of engineering planned lands with drainage lines, inner and inter-farm irrigating systems, production potential and human resources which assist in improving efficiency and competitiveness of rice planting at the world market of grains and grain products.

In the world structure of agrarian production, rice planting is at the second position as per the area of seeding after wheat, also the first position on harvest level and gross collection. However, 90% of the rice seeding is concentrated in the counties of South East Asia and at the Pacific Ocean islands which are the

main producers of this product. In comparison with other agricultural crops, rice planting requires usage of irrigated lands so this crop stays in water during vegetation period. At the same time state regulation in the agro business system due to entrance of Kazakhstan into the World Trade Organization may considerably be reduced, and therefore the first priority for the state shall be efficiency of financial support of the rice planting and provision of high payoff from invested funds, not speaking about competitiveness of the rice planting industry in the terms of open internal agrarian market.

Majority of economic scientists say that agro-industrial production, including subcomplex of rice planting, requires regular state support, as the disparity of the prices for the industrial goods and agricultural products does not allow to renew the material-technical base of agro formations due to low prices and high expenses of the produced products. At the same time, some economists think that entrance of Kazakhstan into the World Trade Organization in future may reduce possibilities of state support, lowering competitiveness of the national rural manufacturers. By agreeing with the points of the first and second supporters of the scientific approach of state support in the agrarian sphere, we believe that entrance of Kazakhstan into the World Trade Organization at the beginning may create conditions for financial assistance, which is being done at the moment. In further, the state will observe requirements of this international organization. Therefore the first priority of the state regulation is to improve the efficiency of state support and objective usage of the invested resources.

1. Experience of the market.

Experience of the market relations development in the country shows that Kazakhstan today is at the level of countries with relatively high level of development based on the rating as per stages of the economic development. Index of the global competitiveness of Kazakhstan during 2008-2014 shows that the county has made certain changes in the rates of development of national economy, and Index of the global competitiveness for 2014-2015 shows that Kazakhstan is at the stage of transition from 2nd to the 3rd stage, which denotes transition from the efficient development to the stage of innovative development. In regards to this matter, during the last 7 years position of Kazakhstan in the Index of global competitiveness went up by 22 items due to the improvement of the positions in such factors as “infrastructure”, “efficiency of the products market”, “institutes”, “technological preparedness” [3].

Acceptance of the innovative development program and assistance in technological modernization in the RoK allowed to provide for consolidation of the position of country in “technological preparedness”, this resulted in consolidation of the position at the 21st position in 2014 in comparison with an 82nd position in 2009. As per “institutes” position, Kazakhstan is at 57th position among 148 countries, being ahead of such countries as Brazil, Russian Federation, certain countries of Eastern Europe and CIS countries. Also considering anti-corruption efforts it should be noted that the attention of Kazakhstani rating in the Index of the global competitiveness during 2013-2014 was mainly concentrated on the quality of “infrastructure” when the Republic went up by 19 positions rapidly, occupying a the 62nd position in comparison with the position in 2009.

As per information from the World Economic Forum, in “Market size” category, Kazakhstan is on 52nd position against the 55th position in 2009. At the same time in “macroeconomic environment” position, in 2014 the Republic was at loss of its positions by 2 and went down to the 27th position against the 25th position. In “Healthcare and primary education” position, the Republic showed low rate by losing 11 positions and occupying 96th position. Nowadays primary education is problematic for the country and requires improvement, including in rural areas, where almost half of country’s population is concentrated. Another problem is human resources issue which becomes a very important issue in the rural areas. Lack of qualified staff in rural areas affects and impedes the development of rice planting, not speaking of social aspects and services for rural population. Also the quality of education of the agrarian specialists got worse with an outflow of rural population to big cities.

Positive moment for Kazakhstan is improvement of the position on “Competitive ability of the companies”, where it went up by 11 positions to 91st position. The level of this indicator has been affected by limitation of quantity and low development of the sectoral cluster. Despite of the certain financial support by state and allocation of large financial resources for the development of agrarian production, the level of returns from the invested finances is not high. The same situation has been noted in the sphere of

rice planting in Aral Sea region of Kazakhstan. Often improper use and misuse of state funds designated for the development of rice planting may be observed. Setting up a state audit under the structure of the control financial system under the terms of the absence of principal requirements to those structures causes worsening of the efficiency of state regulation and development of corruption at the areas. Therefore when assessing state regulation and financial support of the agro formations, international organizations shall strengthen requirements to monitoring of execution of the liabilities, to conducting external control of the accepted state programs, not speaking of final results of executing agrarian policy in the rural areas. Also, criteria for assessing development of all national economy shall be changed including agrarian production, otherwise macroeconomic indicator of the GDP doesn't completely reflect changes in the structure of the national economy. On the other hand this indicator does not consider current inflation processes in the national economy of the country, rational and proper use of financial resources.

As per "Development of the financial market" category, Kazakhstan improved positions by 19 items, occupying 98th position in 2014. This improvement relates to activation of the "Business Road Map 2020" program through the second-tier banks and "Damu" Business Development Fund. At the same time innovations for Kazakhstan are the most difficult and slowing down factors. As per "Innovative potential" category, Kazakhstan occupies 85th position by improving its position by 16 items. Development of agro-industrial complex of the country improved position of Kazakhstan in the rating of World Economic Forum. Impact of development of the agrarian production caused positive influence on such factors as level of competitiveness, "Efficiency of labor market" and "Size of market".

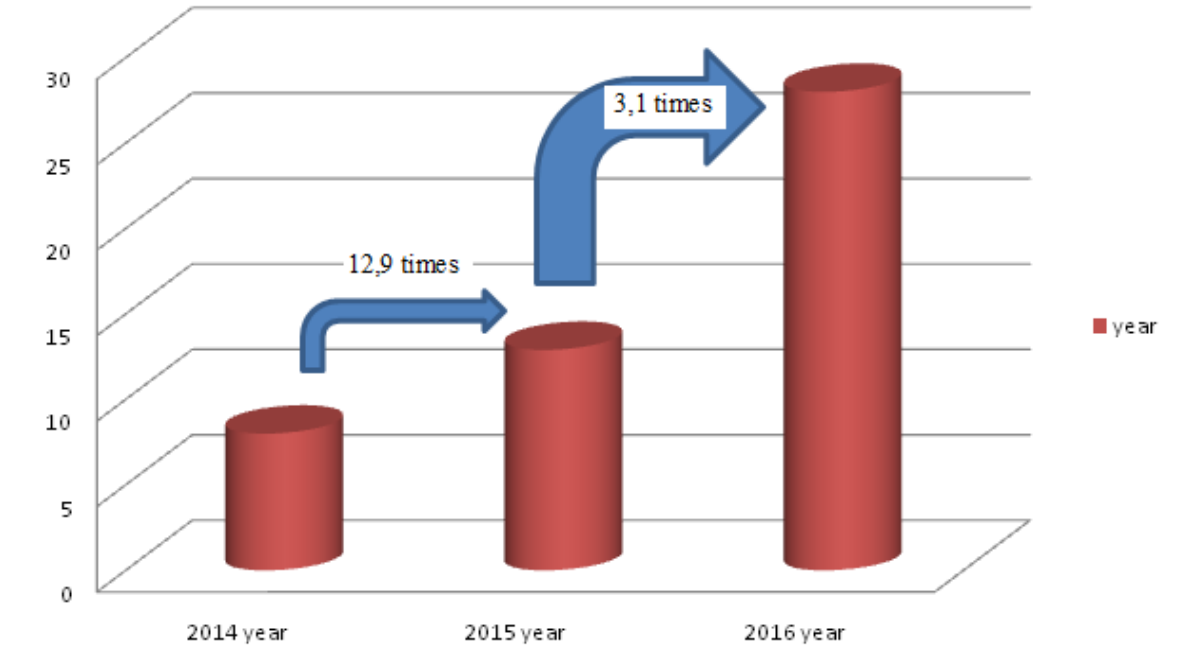

Figure 1 - Dynamics of growth of investments in fixed capital of agriculture in Kyzylorda oblast

At the same time the portion of contribution from agriculture sector in GDP has been gone down in the condition of increase of the quantity of occupied personnel, number of which reached over 23 mln. people in 2014, i.e. 26% of all active population of the country. It shows that agrarian sector of the economy is considered as labor consuming under low provision with innovative technologies.

Active participation in the domain of agro-industrial production occurs by means of execution of the state program "Employment Road Map-2020". Despite of labor consuming level of the agrarian sphere, execution of this state program enabled the government to reduce unemployment of population despite of the crisis taking place in the country.

In the structure of employed population of Kazakhstan, there is a great portion of self-employment – 33.3% or over 2,7 mln. people. The main part of self-employed people lives in rural areas and works on their personal farms, incomes from which are enough only to survive in our severe market conditions. Also, non-employed people are covered with the system of social protection and support. Therefore, enlarging rice planting agro formations establish a base for stable financial development of the cooperated forms of business and solution of the vital social problems of local population, assists in the development of the additional branch of cattle breeding, other sub-branches and spheres of processing agricultural products.

The second important aspect of assessing financial support of the agrarian sphere of the economy is the return of the invested finances which is more rational and effectively reflects the economic essence of the state regulation of rice planting. Researches of the state support of agrarian production in the majority of developed countries demonstrate that economic return of the invested finances does not always provide for efficiency of the financial business activities of the functioning organizational legal forms of business. Therefore, classification of the state regulation is important assisting in the execution of its functions, also in conducting their control.

According to A.Alibekova, classification of the state support ensures timely performance of the functions by state, on the other side it reflects principal approaches without which it is impossible to talk about rationality, scientific character, efficiency, complexity and consistency, not speaking of the economic return of the invested finances.

In this aspect she mentions such functions of the state regulation as general organization and legal regulation of the state support of agrarian sphere of economy; planning of the state support of agrarian sector of economy; provision of human resources for the rural business; informational marketing support; supporting agricultural production; supporting foreign economy activities of the agricultural companies; controlling efficiency of the state support of the agrarian sphere of economy [4].

In our opinion, this list of the state regulation functions does not completely reflect state regulation as there is no function of a partnership between state and private business, i.e. no public-private partnership. Transition of Kazakhstan to the new stage of development of the national economy requires consolidation of the partnership between the state and business structures, as identified in strategic goals of the country. Along with it, functions of the state include support to innovative industrial development of the rice planting, as the state partially finances expenses of the business environment of agrarian economy.

As per opinion of some economic scientists, innovative support of the agrarian sphere is included into support of the production sphere, therefore there is no need to separately review innovative function of the state regulation. In this aspect, we denote an independent function of innovative support of the business environment in rural areas, as innovative activity of the business structures includes not only production process but also reflecting social sides of production and social economic programs of rural territories. Besides, innovative support of the rural manufacturers should be considered as a separate function making it possible to closely control investments into the sphere of rice planting or of whole agrarian production.

2. State regulation of rice planting.

State regulation of rice planting shall have not only production nature, but also it must reflect social economic aspects of rural territories. In this regards, first of all, it is required to follow the guidelines of state support implementation, which shall include motivation and timely fulfillment of functions by state bodies at any level in vertical as well as in horizontal direction in accordance with their functions. These functions shall work smoothly, as a unified combined tool based on requirements of economic mechanism of the business structures of agrarian market. For example, function of the administrative measures shall provide for stability of the legislative base, protection of competing environment, protecting rights of ownership and possibilities of free acceptance of economic solutions. Despite openness of market economy and economic freedom of the formations of rice planting or market agents, administrative tools of state regulation shall be followed by means of relevant actions, as prohibitions, permits and constraining. Presently the state applies this tool of regulation to achieve social goals in rural territories. Unfortunately, there is still no integrity of the functional value of this tool. On the other hand, in recent

years efficiency of the administrative actions went down, caused by the moratorium for inspection of the small and medium business enterprises.

If speaking about economic tools of impact to the certain aspects of business process, various methods to impact on the agro-industrial production should be used by stimulating development of the agro business, enlarging forms of business based on the formation of the combined capital of agricultural enterprises and addressing social and structural aspects of economic mechanism of business.

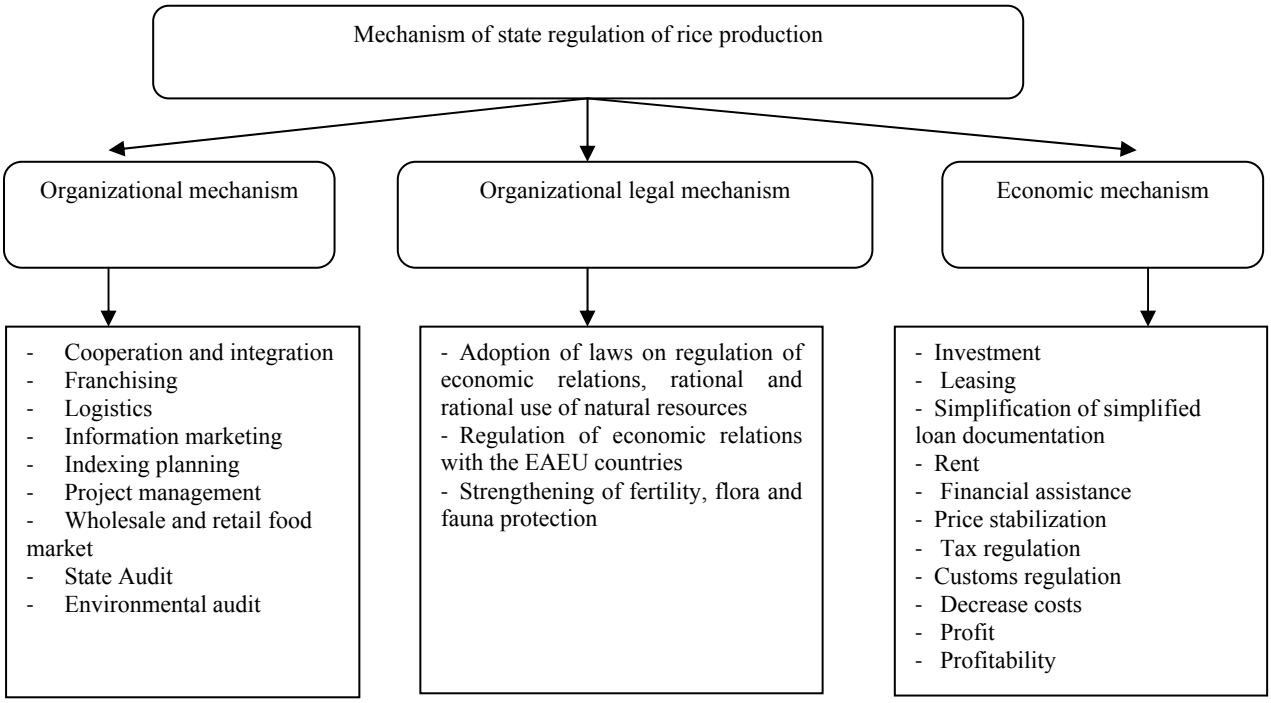

Figure 1 - Mechanism of state regulation of rice production

State regulation by means of institutional tools characterizes methods of impact using organizational institutional forms. Unfortunately today the role of institutional tools in implementation of the state agrarian policy of the agricultural manufacturers has not been considered yet at the national and regional levels causing reduction of efficiency of the state regulation and support of rural manufactures in regions. This is reasoned by the absence of complexity and consistency in implementation of the agrarian policy which does not fully cover occurring changes in the market of the county. At the same time, there is the low return of the human resources capacity in the agrarian sphere of the economy which causes incomplete usage of the existing possibilities in regions and in the country in whole.

3. Efficiency of the state support in the rice planting.

One of the considerable functions of the state regulation and supporting rural manufacturers is control over the efficiency of the state support in the rice planting. There is no doubt that the state spends a lot of funds to support various organizational legal forms of business, but at the same time, the level of return of invested funds is low. Secondly, it is impossible to reach rationality of previous functions without proper control of financial support, otherwise, as the practice shows, billions of the budget funds have been used improperly.

Earlier Kazakhstan was in the second position in regards to the cultivation of the crops after Russia, when the area of grain crops was 30% of all seeding area of the former USSR. In 1990 GDP of the agrarian sector of the economy of Kazakhstan was15 bln. 386 rubles in prices of 1983, which was equal to 38-40% of GDP of that period. All this shows that large agro-industrial production of that period allowed to develop not only grain crop production but also additional branches of agriculture as cattle breeding of meat or dairy and meat direction. As the result of the balanced development of the agricultural branches,

production resources of the former state farms and collective farms were used with the maximum efficiency.

Nowadays in the world grain cropping occupies almost half of all crop lands, and during 2012-2013 the amount of world crop trade was 314,4 mln. tons with a tendency to grow. The largest producers of grain in the world are USA (419,8 mln.t), India (246,8 mln. tons), Russia (97.1 mln. t). Kazakhstan is among 7 world exporters of grain. As per the flour our country is at the leading position in the world. It should be noted that comparing to other exporters Kazakhstan is the only one country that does not have an exit to the sea, therefore construction of the "West Europe – West China" Highroad, which runs through the rice planting Aral Sea region of Kazakhstan, opens big perspectives for further development of rice planting and for improving export potentials of the rice planting business.

As per the information from the RoK Statistics Committee, during the last decade the grains cropping area has been expanded up to 16256,7 th. hectares, but as per the structure cropping grains went down to 76,7% against 79,5%. In 2013 profitability of the crops production was 52-65%. In spite of natural climatic conditions, for the last twenty years, Kazakhstan has been increasing gross collection of the grain crops.

The largest partner of Kazakhstan at the grain market of far abroad countries is Iran, which imported 2,7 mln. tons of Kazakhstan crops, or in average annually 538 thousand tons since 2009 to 2013. Along with it, for this period Iran purchased 1,7 th. tons of flour. For further expansion of export of crops, Kazakhstan built a grain terminal at the Iran port Amirabad with up to 700 th. tons per year capacity. Besides during the last years, Kazakhstan has increased export of grains to Turkey and exported grains to China for the first time. At that many countries, which import grains, focus on their quality first of all [5].

For the last years, most representatives of the state structures have discussed enlarging of functioning organizational legal forms of business in the sphere of agro-industrial production of the country. Positive moment in this section is the changes in the organizational legal aspect, i.e. changes of approaches to creating cooperative societies, including in the rice planting sphere. There is no doubt that cooperation in rice planting and generally in the agro-industrial production facilitates possibilities of the structures of the agro business environment of the country. On the other side, in opinion of UNESCO researchers, in the terms of rational and efficient usage of the cropping areas, Kazakhstan may successfully feed 1 bln. of population of the world which makes it possible to resolve problems of food safety on the world market. Today as per demographic statistics, about 7 bln. people live in the planet, over 1 billion of which do not have enough food, and they starve. By 2050 the number of population of the Earth may reach 9 billion of people, which already requires the rational and efficient use of agricultural lands and drinking water.

Presently, in Kazakhstan 82% or 225,5 mln. hectares of agricultural lands are in use. Therefore enlarging agro formations in the rice planting and generally in the agro-industrial production of the county will allow efficient use of existing production possibilities of the rural territories, optimization of main and additional branches of agrarian production, saving irrigation water and increase of export potential of the country at the world agrarian market [6].

The Message of our President to the population of Kazakhstan "Third modernization of Kazakhstan: global competitiveness" states that there is a need to improve the efficiency of using and increase areas of irrigated lands within further 5-year period up to two millions of hectares [7].

For fulfillment of this Message in accordance with the Order of RoK Government and the adopted state program of agro-industrial complex development till 2021 in the region of irrigated land of Kyzylorda oblast, it is planned to implement three projects aimed at restoring and development of water infrastructure of the irrigated lands of the region. Within the framework of the second phase of the project "Improvement of irrigation and drainage systems", it is planned to restore 15 thousand hectares of irrigated lands in Zhalagash Rayon. Also, 144 thousand hectares of land in the oblast will be included in the third stage, which includes restoration of 29 thousand hectares of irrigated lands. During this year the oblast budget allocated 386 mln. tenge to perform certification of the water facilities under this project. Generally, it is planned to repair almost 23 th. km of water collection and drainage systems, 64 thousand hydro technical facilities. Besides, within this project, it is planned to build a water storage facility in Shieli Rayon to store 600 mln. m3 of irrigation water. Feasibility study of this project is at the stage of

completion. The area of water storage will be 45 th. hectares. During low water period, this water facility will be able to supply water to 63 th. hectares of irrigated lands of Syrdariya and Zhalagash Rayons at the center of rice planting Aral Sea region of Kazakhstan.

State regulation of the rice planting sphere of Kyzylorda oblast will allow to improve efficiency of irrigated lands use, as in next 4-year period it is also planned to build three hydro structures along the Syrdariya River stream. Restoration of the Taipakkol-Kandyaral lake system, reconstruction of Besaryk and Zhidely water storage in the south Zhanakorgan region, main left-bank channel of Kyzylorda and others are also projected. There will be four channels in Kazaly, Zhalagash and Shieli Rayons cleaned in order to provide rice planting agro formations with irrigation water during this year. 8 sets of pumps were purchased for rural regions, where irrigation water doesn't run free, estimate documentation was prepared for repair of Bayan and Kokish channels in Aral Rayon. As it is obvious from regulation measures and support of the rice planting sphere, implemented by the state, development of rice planting is the part of the Aral Sea Regional Development allowing to increase export potentials of rice planting [8].

Experience of the state regulation of previous years demonstrated that the efficiency of implemented agrarian policy in rice planting in Aral Sea Region was not always provided. At the end of 90s of the last century in Akkum aul of Zhalagash region as per order of ex-Canadian oil company "Petrokazakhstan Kumkol resources" JSC, the Bulgarian party performed engineering planning works at the area of 1800 hectares. However, failure to use these areas of leveled lands further caused damages and resulted in withdrawal of these lands from use. Finally, large financial investments didn't give any results. At that none of the state structures took responsibility for wasting budget funds and funds from EBRD. Currently, use of these lands requires additional investments, which creates difficulties for rice planting agro formations. Therefore the state shall increase accountability of the state officials for results of any projects implementation, involve external auditors to control fulfillment of production tasks in order to increase the efficiency of funds use, allocated by the state, as well as funds from EBRD and other investors.

Cooperation.

Cooperation is one of the main principles of development of large organizational legal forms of business. When setting cooperative societies, all possibilities for motivation shall be considered in order to combine small business units into large business units, where production capacities will be used more effectively, social goals will be addressed successfully, not speaking about the development of infrastructures in rural areas. However, it should be noted that mechanisms of formation of the cooperative societies do not completely meet the interests and preferences of the participants of the cooperative actions. Specifically state regulation of the rice planting sphere shall cover production of crops with consideration of the Law of RoK "About grain", and financial support shall provide for mechanism of the fulfillment of this Law through relevant tools of state support.

If speaking of the efficiency of the state support of rice planting, it is required to mention an infrastructure and a mechanism of any state program or project implementation, where large financial resources are accumulated. For this purpose such institutional structures as "Kazagro" national holding were established in Kazakhstan which include: "Product Contract Corporation" National Company JSC, "Mal onumderi corporaciyasy" JSC, "Kazagrofinance" JSC, "Agrarian Credit Corporation" JSC, "Fund of Financial Support to Agriculture" JSC, KazAgrogarant JSC, Kazagromarketing JSC. Activities of this holding cover the issues of the state policy implementation in the areas of provision of products, loaning, insurance of rice planting and other branches of agriculture, development of the markets of agricultural products, development of rural territories and etc. Branches of those institutional state supports structures operate in regions to provide for financial crediting operations to the rice planting enterprises.

However, there are shortages in the organizational economic, legal and technological and other aspects of business in the region which could be resolved at the level of legislative and executive authorities, considerably causing negative impact to the development of rice planting and to consolidation of the rice planting spheres.

Rice planting requires diversification of the rice planting firms, which will provide agricultural branches with development options covering full production cycle of manufacture, processing and sales of products not only of rice planting sphere, but cattle breeding sphere as well. At present day public-private

partnership forms must be developed in the sphere of rice planting subject to all possibilities of agro formations functioning, systematic approach of keeping agrarian production in the rice planting must be exercised, irrigating water saving and application of modern innovative approaches must be stimulated in large business enterprises.

On the other side, state regulation of the rice planting sphere shall create conditions needed for rational and efficient usage of the irrigated lands based on the qualitative improvement of the fertility by applying innovative technologies, modern storage of agricultural units, new sorts of rice ad crops of rice and crop rotation, not speaking of complete and non-waste technology on reprocessing rice based on usage of the cluster approach. Execution of these key objectives will allow to improve the efficiency of the rice planting, to increase export potential of rice planting agro formations, also to stabilize financial results of agro formation activities, to use wider leasing and implement logistics into this sphere of the economy of the region.

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КҮРІШӨНДІРІСІН МЕМЛЕКЕТТІК ҚОЛДАУ ТИІМДІЛІГІН АРТТЫРУ – ҚАЗАҚСТАННЫҢ АГРОӨНЕРКӘСІПТІК КЕШЕНІНІҢ ДАМУ СТРАТЕГИЯСЫНЫҢ НЕГІЗІ

Аннотация. Мақалада Қызылорда облысының күрішшаруашылығы сферасын қаржылық қолдау және мемлекеттік реттеу мәселелері және оларды жетілдіру жолдары қарастырылды. Агроөнеркәсіптік өндіріс саласындағы белсенді қатысу «Жұмыспен қамтудың жол картасы-2020» мемлекеттік бағдарламасын орындау арқылы жүзеге асырылады. Аграрлық саланың еңбекке жұмсайтын деңгейіне қарамастан, осы мемлекеттік бағдарламаның орындалуы елде дағдарысқа қарамастан, халықтың жұмыссыздық деңгейін төмендетуге мүмкіндік берді. Көптеген дамыған елдерде аграрлық өндірісті мемлекеттік қолдаудың зерттеулері инвестицияланған қаржының экономикалық қайтарымы әрқашан бизнес қызметін ұйымдастыру-құқықтық формаларының қаржылық бизнесінің тиімділігін қамтамасыз етпейтінін көрсетеді. Демек, мемлекеттік реттеуді жіктеу оның функцияларын орындауда маңызды рөл атқарады, сондай-ақ олардың бақылауында.

Түйін сөздер: мемлекеттік реттеу, қаржылық қолдау, мемлекеттік реттеу принциптері мен қызметтері, кооперация, аграрлы нарық, астық кешені, мемлекеттік қолдау стратегиясының дамуы, мемлекеттік бағдарламалар және жобалар, астық импорты және экспорты, дүниежүзілік сауда ұйымы, инновациялық бағдарлама, агробизнес, күріш және жоңышқа өсіру мәдениеті.

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ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ ГОСУДАРСТВЕННОЙ ПОДДЕРЖКИ РИСОВОДСТВА – ОСНОВА СТРАТЕГИИ РАЗВИТИЯ АГРОПРОМЫШЛЕННОГО КОМПЛЕКСА КАЗАХСТАНА

Аннотация: В статье рассматриваются проблемы государственного регулирования и финансовой поддержки в сфере рисоводства Кызылординской области, приводятся соответствующие меры для улучшения государственного регулирования сферы рисоводства и агропромышленного производства, предлагаются пути совершенствования государственного регулирования. Активное участие в области агропромышленного производства происходит путем реализации государственной программы «Дорожная карта занятости-2020». Несмотря на трудоемкий уровень аграрной сферы, выполнение этой государственной программы позволило государству снизить уровень безработицы населения, несмотря на кризис, происходящий в стране. Исследования государственной поддержки аграрного производства в большинстве развитых стран показывают, что экономическая отдача вложенных средств не всегда обеспечивает эффективность финансовой деятельности действующих организационно-правовых форм бизнеса. Поэтому классификация государственного регулирования играет важную роль в выполнении его функций, а также в контроле.

Ключевые слова: Государственное регулирования, финансовая поддержка, функции и принципы государственного регулирования, аграрный рынок, агроформирования рисоводства, кооперация, зерновой подкомплекс, экспорт и импорт зерна, стратегия развития государственной поддержки, государственные программы и проекты, всемирная торговая организация, программа инноваций, агробизнес, культуры рисово-люцернового севооборота.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 153 – 158

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PLACE OF THE INTERNAL CONTROL IN MANAGEMENT SYSTEM AND THE FORM OF ITS ORGANIZATION

Abstract. The article discusses the concept of the internal control system, its object, subjects, and elements of the internal control system. There is a place of the internal control system in the organizational structure of the company and lists the steps of forming a system for small businesses. The tendency of the wide introduction of international accounting standards, changes in the legislation of the Republic of Kazakhstan, make transformations in management inevitable, while requiring improvement in the organization of accounting and control.

The lack of scientifically sound recommendations on the organization of the internal control system requires an in-depth study of this issue, which determines the relevance of the topic of the article. In this regard, the proposed organizational basis for the formation of an internal control system acquires scientific and practical importance, and is adequate to the needs of a modern enterprise.

Key words: control, internal control system, elements of the internal control system, the form of internal control, co-sourcing.

Introduction. In any enterprise, the role and importance of control are also significant, as accounting, management, economic analysis of economic activity. The normal activity of an economic entity is absolutely impossible if there is no properly organized control in it [14], which is intended not only to disclose errors or abuses, but also to consider the expediency of the operations being performed. "Control-objectively necessary component of the economic mechanism for any mode of production" [10].

At present, more and more enterprises pay special attention to internal control, since it is an important element of a well-functioning management mechanism. The issue of checking the internal control system was considered in Kazakhstan's auditing standards, and therefore "auditors began to pay more attention to internal control issues of customers" [14].

Methods of research. In the economic literature, there is no unambiguous concept of control in general and internal control in particular. Given this fact, let us consider some theoretical issues related to control. In French, "control" means checking something. In a large economic dictionary, control is defined as "a system of observations and verification of the conformity of the process of functioning of a managed object to the management decisions taken, the identification of the results of administrative influences on the managed object" [9].

Among the types of control, internal control takes a special place. Internal control penetrates deep into the management functions, organizational activities of the enterprise, provides information on the quality of management activities, presents management with analysis data, estimates, recommendations, advice, and financial forecasts about the sites being inspected.

The system of internal control is given various definitions by researchers and practitioners. Internal control is a system of measures organized by the management of an enterprise and carried out at the enterprise with a view to the most effective performance by all employees of their duties in the performance of economic transactions. Internal control determines the legality of these operations and their economic feasibility for the enterprise.

Internal control, according to foreign scientists, "is a control that is carried out by checking and assessing the adequacy and effectiveness of other types of control" [3].

A.K. Makalskaya believes that "the internal control system includes a proper accounting system, a control environment and separate controls. The work of internal control services can be referred to individual controls". V.D. Andreev defines internal control as a system of "control procedures, organization plan and management methods of the object in order to effectively conduct business, protect assets, prevent errors, accurate accounting entries and timely submission of financial information" [4]. V.V. Burtsev considers internal control from two positions: "The concept of internal control can be interpreted in a broad sense as a system (included in the organization's management system), consisting of a number of elements. Internal control in a rather narrow sense is one of the stages of the management process [11].

According to the information of the Ministry of Finance of Kazakhstan [2], internal control is a process aimed at obtaining sufficient confidence that an economic entity provides:

a) the efficiency and effectiveness of its activities, including the achievement of financial and operational indicators, the safety of assets;

b) reliability and timeliness of accounting (financial) and other reporting;

c) compliance with the applicable law, including in the case of committing economic life and keeping records.

A.M. Bogomolov and N.A. Goloshchapov note: "Intraeconomic monitoring includes not only accounting, but all financial and economic activities of structural units and enterprises in general" [8]. We adhere to this point of view.

According to Yu. A. Mishin, the subject of internal control is production and economic activity [13]. Burtsev writes that "the subject of internal control is the presence, condition and (or) the effect of a managed link in the organization's management system" [12].

Objects of internal control are property, liabilities related to production, economic relations, "i.e. the whole complex of cause-effect relationships and relationships arising as a result of the activity of the economic entity.

As subjects of internal control, authors identify "accounting, financial, other functional services of enterprises and associations within the established competence" [6] or "employee or participant (owner) of the organization performing control actions in the performance of the duties assigned to it, or only on the basis of the relevant rights "[12].

The objectives of the organization of internal control at the enterprise are: information support of the management system for obtaining the possibility of making effective decisions; ensuring the effective functioning of the organization, its sustainability and maximum development in conditions of multifaceted competition; ensuring compliance with the management policies of each employee of the enterprise; ensuring the safety of the property of the enterprise and the effective use of its resources and potentials; timely adaptation of the enterprise to changes in the internal and external environment.

Discussion. In order to increase the efficiency of the management process in the enterprise, it is necessary to implement control procedures at each stage. At the planning stage, the following control functions are implemented: an assessment of the rationality of possible options for planned decisions; the compliance of planned decisions with the adopted installations and the intended targets, as well as with the overall strategy. At the stages of organizing and regulating the implementation of management decisions, control of the correctness of the process of implementing the planned decisions to achieve the necessary results. At the accounting stage, control must be provided: for the presence and movement of property; rational use of production resources in accordance with approved norms, regulations and estimates; status of issued and received obligations; feasibility and legitimacy of economic operations of the organization, etc. At the analysis stage, information on the results of the management decisions is evaluated on the basis of its decomposition into various components and their correlation among themselves.

Thus, the internal control of the organization is:

- an integral element of each stage of the management process;
- "isolated" stage, providing information transparency for the quality of the management process at all other stages [12].

Internal control includes a certain set of elements that are determined by the nature of management of affairs and integrated with the mechanism of the functioning of the enterprise into a single whole. Foreign

authors distinguish three components in the internal control structure: a control of environment; accounting system of the company; control of procedures [3, 5]. Domestic economists add two more elements: information support and technology control [12].

According to the information of the Ministry of Finance of Kazakhstan [2], the main elements of internal control are:

a) environment control, which is a set of principles and standards of the economic entity that determine a common understanding of internal control and the requirements for internal control at the level of the economic entity as a whole;

b) risk assessment, which is a process of identifying and analyzing the combination of probability and the consequences of the failure of an economic entity to achieve the objectives of the activity;

c) internal control procedures-actions aimed at minimizing the risks affecting the achievement of the goals of the economic entity;

d) information that ensures the functioning of internal control and the ability to achieve its goals;

e) communication, which is the dissemination of information necessary for the adoption of managerial decisions and the implementation of internal control;

(e) An internal control evaluation carried out with respect to internal controls to determine their effectiveness, and the need for change.

The efficiency of the enterprise's activity directly depends on the organization of internal control (both financial and technical), implemented at all levels of management. In world economic practice, there is an axiom: "Internal control must exist at all levels of the organization, since it is impossible to delegate responsibility for control" [19]. The internal control system is organized by the management of the enterprise. This is the main difference between internal control and other types of control.

It should be noted that at present the problem of creating an effectively functioning system of internal control in most organizations is far from being solved, despite all its urgency. The results of the research show that enterprises with shortcomings in the organization of the internal control system incur serious financial losses, and enterprises that pay serious attention to internal control have the best result in both economic and financial activities [7]. Many managers of organizations are beginning to understand the need for a well-established system of internal control.

Internal control is a complex activity requiring some coordination. The variety of objects and objects of control, their functional differences predetermine the need to search for a universal structure and organization of control activities.

In the economic literature at the moment there is no generally accepted definition of the concept of the form of internal control and the generally recognized classification of its forms, compared, for example, with the forms of accounting. According to some authors [15], internal control can be carried out in two organizational forms:

1) Control performed directly at each workplace.

An example of this form of organization of internal control can serve: control when performing accounting operations, carried out in parallel with accounting work and organically related to it; self-control or joint control at production sites; control in functional departments; control over the implementation of management decisions.

2) Control performed by a specially created control device. Examples of this form of internal control include: control of accounting documents, carried out by specially created methodological control centers; carrying out internal audits by a specially created audit and control apparatus at the enterprise.

According to Burtsev, it is necessary to identify such forms of internal control as: internal audit and structural-functional form of internal control [11]. The choice of the form of internal control depends on the complexity of the management structure, organizational and legal form, types and scales of activities, the appropriateness of the scope of control of various aspects of activities, the attitude of the company's management to control.

The organization of internal control in the form of internal audit is inherent in large (holding associations or transnational corporations) and some medium-sized organizations, mainly possessing the following features:

1. the presence of foreign capital;

2. Complicated organizational structure;

3. the number of branches and subsidiaries;

4. a variety of activities;

5. The desire of the management bodies to obtain a fairly objective and independent assessment of the actions of managers at all levels of management.

In many organizations, there is no department (sector, bureau, group, etc.) of the internal audit and the audit commission (auditor). In this case, it is advisable to use the structural and functional form of the internal control of the organization to carry out internal control. The exercise of control, which necessarily enters into the duties of any manager, must be included in the functions of any responsible person [11]. This form, which meets the requirements of the Law of the Republic of Kazakhstan "On Accounting and Financial Reporting", should be applied by all organizations.

It seems to us that it is extremely difficult to create an effective internal control system. This is due, first, to organizational difficulties; secondly, with high professional requirements for employees of the internal control system, which must be qualified at least no less than the qualifications of the persons whose activities are being checked.

According to many experts, the involvement of departmental personnel in this process undermines the independence of inspections and reduces their quality. However, in our opinion, this is not quite so. Having made the calculation of the economic feasibility of creating an internal audit service, the heads of small enterprises will see that the total costs of paying employees of the department exceed the economic effect of their work. At the same time, it is necessary to take into account that the great information potential and knowledge about all intricacies in the organization's affairs favorably distinguish the heads of departments, allowing them to navigate in the affairs of the organization with greater accuracy.

In our opinion, the principle of independence, which is mandatory in the conduct of an external financial audit, becomes conditional in relation to internal control. The concepts of "independence" and "objectivity", being sufficiently close in meaning to the characteristics, differ in that the former is defined in the organizational context, and the second is defined as the professional quality of the examiner. Therefore, if it is impossible to achieve full independence, but if the principle of objectivity is observed, the quality of internal inspections will not suffer.

The system of internal control has more opportunities for effective implementation with the involvement of managers of different divisions, as:

-In the first place, they are the most interested in achieving the goals of organization and performance;

-secondly, as already noted above, for them there is no need to delve into specific issues of the organization of production and sales of products, they are professionally aware of them.

Thus, when carrying out control procedures on its own, the organization can solve all the problems related to this work quickly and promptly.

Of course, it is also true that employees of organizational units are adapted to its internal environment, which is a negative point, since they may not pay attention to some significant shortcomings.

Proceeding from this, we believe that the most optimal way to avoid such "habituality" and form an effectively operating system of internal control is co-sourcing, involving the division of functions between the responsible persons of the organization and the external specialized organization that is involved in the stage of setting up the internal control system, and also for solving individual problems in the process of its functioning. Co-sourcing allows to provide a qualitative solution to the problem at rational costs.

Advantages of using co-soursing include [14]:

1. the opportunity to use the services of experts in various fields;

2. access to highly professional staff;

3. flexibility in attracting audit resources (for example, when implementing a new system or having to conduct an unscheduled audit, you do not have to divert the organization's resources from other projects);

4. access to advanced technologies and methods for conducting inspections.

Summarizing the above, we will outline the main steps in the process of organizing the internal control system for small enterprises (large companies are not considered, since they usually have an internal control department or an audit department):

1. Determination of the form of organization of the internal control system.
2. Identification of the circle of officials, which will be entrusted with the functions of internal control, as well as the involvement of consultants from specialized organizations.
3. Development of regulations (orders, orders) concerning the organization of the internal control system.
4. Development or addition of relevant job descriptions with internal control functions.
5. Developing forms for documenting the results of internal control.
6. If necessary, and the availability of an opportunity to develop a schedule of continuing education.
7. Implementation of internal control functions within the established reporting period (in our opinion, the optimal periods will be 6 months and a calendar year).
8. Discussion of the results of internal control with the enterprise manager and owners.
9. Monitoring the effectiveness of the internal control system.
10. Adoption of management decisions on the results of internal control.

Conclusions. We believe that the use, in practice, of the developed proposals for the establishment of an internal control system will help to increase the effectiveness of the internal control system in enterprises.

Thus, at each enterprise, an internal control system should be created and operated aimed at identifying and preventing deficiencies in the state of security, reliability and efficiency of the enterprise, improving the quality of activities at all stages of the production cycle of the economic entity, and effectively ensuring the production process (works, services). The authors propose the stages of the formation of such a system in small enterprises, and it is recommended to distribute the functions of internal control between the heads of departments and an external specialized organization (co-sourcing).

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КӘСІПОРЫН БАСҚАРУ ЖҮЙЕСІНІҢ ІШКІ БАҚЫЛАУЫНЫҢ РӨЛІ

Аннотация. Мақала авторы ішкі бақылау тұжырымдамасын, оның субъектісін, объектілерін, субъектілерін, ішкі бақылау жүйесінің элементтерін қарастырады. Кәсіпорынның ұйымдастырушылық құрылымындағы ішкі бақылау жүйесінің орны анықталып, Қазақстан Республикасының кәсіпорындарында жүйені қалыптастыру кезеңдері келтірілген. Бухгалтерлік есептің халықаралық стандарттарын, Қазақстан Республикасының заңнамасына өзгерістерді кеңінен енгізу үрдісі бухгалтерлік есепті және бақылауды ұйымдастыруды жетілдіруді талап ете отырып, басқарудағы өзгерістерді сөзсіз жүзеге асырады.

Ішкі бақылау жүйесін ұйымдастыру бойынша ғылыми негізделген ұсыныстың жоқтығы осы мәселенің терең зерттелуін талап етеді, бұл мақаланың тақырыбының өзектілігін анықтайды. Осыған байланысты, ішкі бақылау жүйесін қалыптастырудың ұйымдастырушылық негізі ғылыми-практикалық маңызға ие және қазіргі заманғы кәсіпорынның қажеттіліктеріне сәйкес келеді.

Түйін сөздер: бақылау, ішкі бақылау жүйесі, ішкі бақылау жүйесінің элементтері, ішкі бақылауды ұйымдастырудың нысаны, бірлесіп пайдалану.

УДК 657.6; 621.31

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РОЛЬ ВНУТРЕННЕГО КОНТРОЛЯ В СИСТЕМЕ УПРАВЛЕНИЯ ПРЕДПРИЯТИЕМ

Аннотация. В статье автором рассматривается понятие внутреннего контроля, его предмет, объекты, субъекты, элементы системы внутреннего контроля. Определено место системы внутреннего контроля в организационной структуре предприятия и перечислены этапы формирования системы на предприятиях РК. Тенденция широкого внедрения международных стандартов учёта, изменения в законодательстве РК делают неизбежным преобразования в управлении, требуя при этом совершенствования в организации учёта и контроля.

Отсутствие научно обоснованных рекомендаций по организации системы внутреннего контроля требует глубокого исследования этого вопроса, что и определяет актуальность темы статьи. В этой связи, предлагаемые организационные основы формирования системы внутреннего контроля приобретают научное и практическое значение, и являются адекватными потребностям современного предприятия.

Ключевые слова: контроль, система внутреннего контроля, элементы системы внутреннего контроля, форма организации внутреннего контроля, косорсинг.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 159 – 166

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THE SEARCH FOR THE EFFICIENT BUSINESS MODEL FOR THE DAIRY SECTOR IN KAZAKHSTAN

Abstract. The article is devoted to the analysis of the problems and perspectives of the organizational development of the dairy industry in the context of the problems of sharp growth of the productivity of labor and export of processed products set in the last message of the President to the people of Kazakhstan. The analysis of organizational innovations, modern business models used by the AIC, is carried out. The accumulated problems and the main development trends that have manifested itself in the dairy industry in Kazakhstan over the past two years have been analyzed. It is shown that there is a stable solvent demand for milk and dairy products in the present time, which is still largely satisfied by retail sales of its production by small producers. Prices have been steadily rising; accordingly, all enterprises of the dairy industry have prospects for the further development. However, no new business models are being implemented and are not even planned in the State Program for the Development of the Agro-Industrial Complex adopted last year. It is established that the development of dairy enterprises does not bring Kazakhstan closer to the solution of the task set in the President's message to increase labor productivity and the share of exports of processed products over the next five years. The results of a survey of the owners of milk processing enterprises and dairy farms of the East Kazakhstan, Zhambyl and South-Kazakhstan regions, which over the past two years have been actively involved in sectoral integration processes, are presented in the work. Evaluation of the willingness of the economic agents of the dairy industry to participate in new business models, network structures of small business integration in the value chains of large enterprises has shown the demand for the development of a qualitatively new information and analytical support for forecasting and planning the formation of new business models in the dairy industry in Kazakhstan.

Key words: dairy industry, business model, organizational innovation, network structure, integration process, economic agent, system integrator, information system.

Introduction. In the message of the President to the people of Kazakhstan dated January 10, 2018, the enterprises of the agro-industrial complex (AIC) had been given a task to increase labor productivity and export of processed products "at least 2.5 times over the next five years" [1].

This should be fully applied to the Kazakhstani livestock, in particular, to the dairy industry. The country has a significant natural potential for the development of a dairy herd of pasture and, accordingly, milk production, which, due to its high qualities, can experience the special demand in world markets.

However, the achievement of the goals set in the message is hampered by a number of problems. Among them, as noted in the State Program for the Development of the Agro-industrial Complex (2017), is insufficient supply of fodder, a low proportion of the breeding stock of animals, inadequate sowing areas for fodder and forage crops, irrational use of pasture lands, incomplete coverage of farm animals with the veterinary and preventive measures, [2].

The message outlines the main ways to solve the problems of the industry, which are presented as "smart technologies", including the transition to the modern business models that ensure an increase in the effectiveness of economic interaction and cooperation of all sectors in the value chain of agricultural enterprises [1].

According to O. Sabden, the goal of transition to the new business models is that "small business from an almost isolated subsystem of the national economy should turn into an organic part of a single production and the financial complex ... it is necessary to create conditions in which large business in the process of cluster formation massively involves small businesses in their activities" [3].

Methods

The aim of this research is to analyze the problems and prospects for the organizational development of the dairy industry in the context of sharp growth in labor productivity and export of processed products

Analysis of secondary (previously collected by other researchers) information, as well as statistical data, used in:

– considering modern business models of the agro-industrial complex - network structures for integrating small businesses into the value chains of large enterprises;

– analyzing the accumulated problems and the main development trends in the dairy industry in Kazakhstan over the past two years;

In order to assess the willingness of the economic agents of the dairy industry to participate in the new business models, we conducted a survey among the owners of the milk processing enterprises and dairy farms in East Kazakhstan, Zhambyl and South Kazakhstan regions, which over the last two years took an active part in integration processes in the sector.

Interviewing is a used method of collection of primary data in the study, including open questions, semi-structured and carried out by phone. 58 respondents agreed to participate in the interview. The main condition of participation was anonymity: the non-disclosure of personal data and commercial information in relation to the name of enterprises.

In the process of the analysis of collected data, the qualitative methods of analysis were used: the number of respondents is insufficient for applying mathematical statistics methods. However, according to authoritative experts, when using qualitative methods of analysis, the number of respondents may be small; statistical analysis of data, as a rule, is not carried out [4]; the results of qualitative analysis are easier to identify cause-effect relationships, compared with quantitative methods of analysis [5].

Literature review

1. The competitiveness of the processing enterprises of the agro-industrial complex at the end of the last century became critically dependent on their ability to accommodate the main business processes and management models on the basis of unified information channels with their suppliers and customers throughout the supply chain. Methods of solving this problem were considered in the concept of the Supply Chain Management (SCM) [6].

After decades, with the onset of the " grave new world: the end of globalization" [7] the use of the food resources by the economically developed countries as an instrument of geopolitical domination over other countries led to the global transformations in the world food market:

– the redistribution of the food flows between developed and developing countries;

– transition from the "the steadily low prices era" to the period of the high price volatility;

– the shift of the market from the limited demand model to the limited supply model [8].

In recent years, active use and further improvement of the methods of state protectionism have been observed throughout the world. The main trend of the world food market is tightening protectionist policies and ignoring the international trade rules and rules formed in the 20th century [9].

2. The term "cluster" has been used to refer to "a group of geographically neighboring interrelated companies and related organizations operating in a particular sphere, characterized by the common set of activities and mutually complementary" (for analyzing the degree of coherence of actions of independent economic entities, one of the methods of mathematical statistics, the so-called cluster analysis) [10].

The term of "cluster" as a "statistically established class of related elements in a certain aggregate of them" is still used in many fields of science - chemistry, physics, sociology, astronomy [11].

However, in the Economics of the 21st century,

- when household incomes are steadily declining for already two decades [12];

- when specialists have proved that several decades of continuous economic growth in the 30-70's of the twentieth century does not at reflect the general laws of the world development, but are merely "a consequence of the accidental coincidence of several historical events" [13];

- cluster analysis has largely lost its predictive power in assessing the coherence of the actions of independent economic entities [14,15].

A kind of "structural embodiment" of the SCM concept mentioned above was the formation of the qualitatively different business models that are described in the modern economic literature in terms of "networked integrated structures" and "integrated corporate entities" [16,17].

In fact, this is the same socio-economic phenomenon that has been once referred to as the "cluster". However, to describe their formation, very different mathematical methods are now used: the so-called multi-agent modeling [18,19,20]. Therefore, in this study, we will treat them as network structures for the integration(NSI) of enterprises in the AIC.

3. Most of the enterprises of the AIC, being formally independent and independent subjects of the market, nevertheless, are not self-sufficient and investment-attractive, unable to develop on the principles of self-sufficiency and self-financing, to participate fully and on an equal footing in inter-industry competition. The general trend in the development of the agro-industrial complex is the formation of NSI, which includes enterprises of all segments of the value chain "production (crop and livestock production) - processing (food industry) - distribution (wholesale and retail trade)" [9].

NSI is a set of economic agents carrying out economic activities, which, unlike a corporation, may not have a certain legal status and formalized organizational structure. This is a complex multi-level socio-economic system that has a distributed management system with an informal coordinating center (a system integrator) [16].

The mechanism of formation of NSI is described in studies on economic sociology [21,22]. The main structural component of the NSI is not a subsidiary company (as a holding company), but an economic agent that can have a variety of organizational forms and legal status. In other words, the NSI in principle does not have an organizational structure. This is an informal business community, "whose agents can directly interact with other organizations, integrate into their structure or, conversely, exit from them depending on the market situation" [23].

4. A distinctive feature of the NSI is that their existence in principle is impossible without a realistic strategy. The strategy induces independent economic entities to follow the rules of interaction established for the participants of the NSI by her informal management center - a meta-agent, a system integrator. If they consider that the strategy is not effective enough, they will simply leave it, they will find another, more efficient, system integrator.

The special difficulty of strategic planning for the meta-agent - the system integrator of the NSI is that the system of concepts describing business processes does not coincide with the system of concepts used in strategic planning [17].

The activity and structure of the NSI are described with the help of a qualitatively different terms: institutions, agents, formal and informal rules governing their interaction, and so on. Even the basic terms of the theory of strategic management of organizations are difficult to apply without additional qualifications and explanations. The "classical" methodology of strategic planning cannot be used by the system integrator at all.

Results

1. Average per capita milk consumption in Kazakhstan is 235 kg per year, while in European countries this figure is more than 400 kg per year [24].

The Kazakhstani dairy industry is not yet able even to provide the population of the country with a quality product.

The main producers of raw materials for the dairy industry in Kazakhstan are personal subsidiary farms with the number of one to five head of cattle. Currently, these farms provide, according to different estimates, 80 to 85% of marketable milk for industry. The number of cows in private households is 86% of the total number of livestock; 94-95% of dairy products produce 167 thousand peasants and 2 million 200 thousand subsidiary farms [25].

Significant dispersion of the dairy production on small-scale farms, with non-compliance with the ration of feeding and keeping animals, as well as equipment for storing and cooling milk, adversely affects milk yield and quality. From the average Kazakhstani cow, 2233 liters of milk are annually obtained, while in Russia the corresponding figure is 3,500, in Belarus 3000 liters, and Germany 6923, Canada 7962, and in the USA 9219 liters [24].

As noted in the "State program for the development of the agro-industrial complex of the Republic of Kazakhstan", the share of premium milk in Kazakhstan occupies only 2-3% of the production volume, a small portion is occupied by the first grade, the bulk belongs to second-class milk.

Milk produced in such farms falls on industrial processing in a very limited amount, because in most cases it is irrationally used for personal consumption and sold through unofficial channels. Only about a third of milk produced in Kazakhstan undergoes industrial processing. Milk processing enterprises provide only 27% of the country's consumption of packaged milk; while the production capacity for industrial milk processing is not used in full [2].

2. As the analysis has shown, over the past two years, integration processes among the small producers of marketable milk have intensified in the dairy industry (association in agricultural production cooperatives):

– in the Zhambyl region, about 700 small and subsidiary farms joined several dozen cooperatives;

– in the South-Kazakhstan region, by the forces of 20 cooperatives 33 module milk reception stations were opened;

– in the Kokchetav region, four milk processing enterprises receive marketable milk from 530 personal farmsteads, united in 15 cooperatives;

– 43 and 7 points of milk reception have been created in the Aktyubinsk region.

At the same time, construction of milk-processing farms in milk processing enterprises continues in Kazakhstan. Thus, in the Almaty region, Adal company found a solution to the problem of the shortage of raw milk, creating a production complex so-called "farm-plant". The livestock of this farm is more than 1000 milch cows; from 2014 to 2017, the average milk yield was increased from 5 thousand to 7.5 liters per year; total investment in this project amounted to about 5 billion tenge

However, such a large-scale investment can afford a few enterprises of the dairy industry. In the East Kazakhstan region, three dairy processing companies combine support for agricultural cooperatives (36 milk reception points for small producers) with the construction of their own dairy farms (they have already built 37)/

3. The most interesting, in our opinion, results of our survey of managers of milk processing enterprises and dairy farms are illustrated in the diagrams of Fig. 1-3

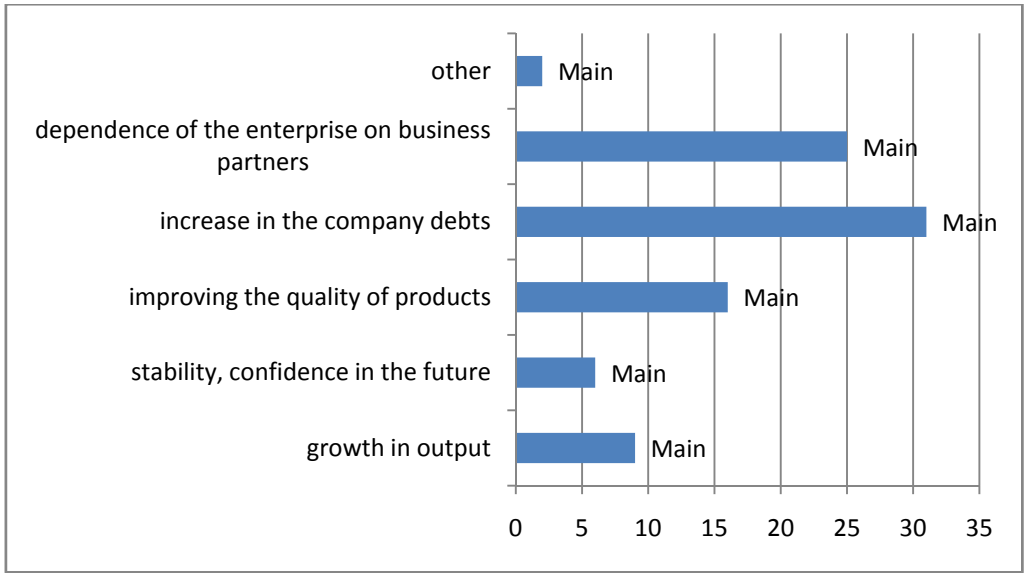

Figure 1 – The structure of answers to the question: What is the most significant result of participation in sectoral integration processes?

As we see, for the majority of respondents, the most significant changes are an increase in the company's debts and an increase in the company's dependence on business partners; in the prospects for growth in output and confidence in the future, most respondents are not at all sure about the answer.

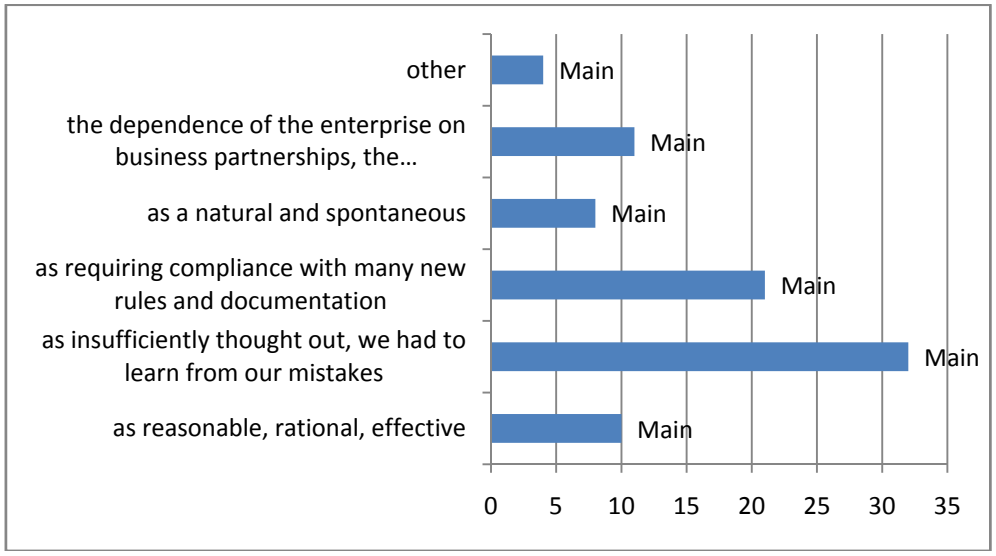

Figure 2 – The structure of the answers to the question: How do you assess the integration processes in which your enterprise took part?

The respondents' assessment of the practice of sectoral integration ("formation of clusters") is negative: the procedures are not sufficiently thought out, they had to learn from their mistakes; They are now required to comply with new rules and documentation.

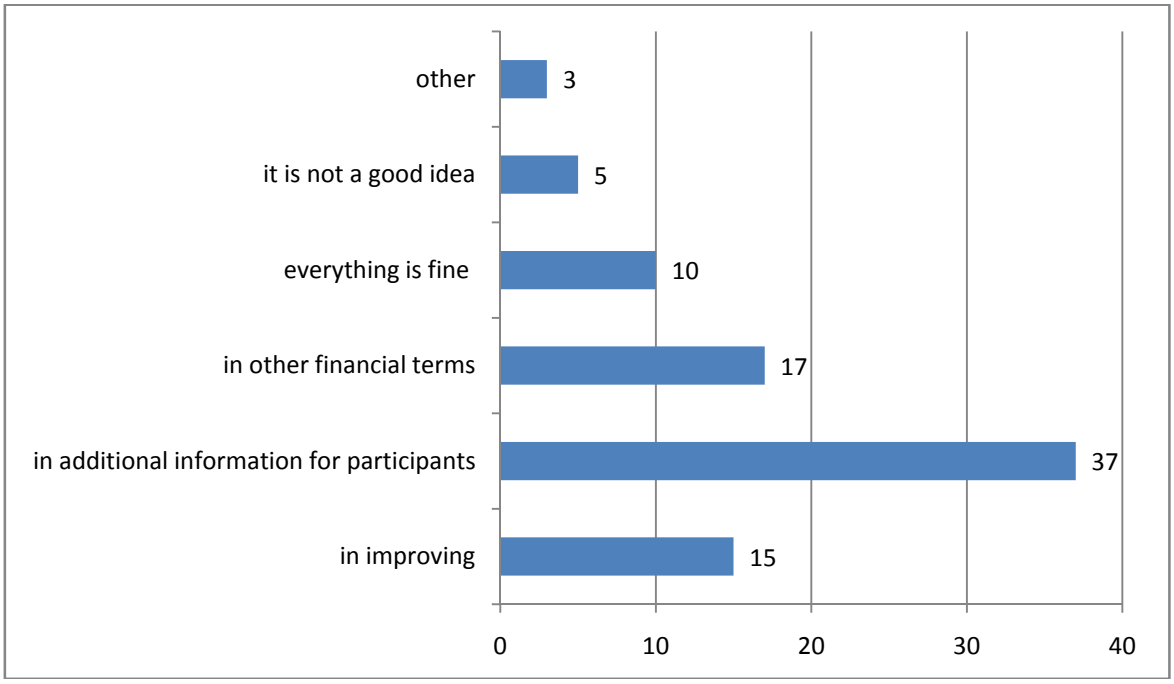

Figure 3 – The structure of answers to the question: In your opinion, are integration procedures ("formation of clusters") needed? (you can choose two answers)

As we have observed, in the opinion of the overwhelming majority of respondents, the main problem is not the terms of financing, but in the lack of information.

Discussion of findings

1. Up to the current date, the country has maintained a stable solvent demand for milk and dairy products, which is still largely satisfied by retail sales of its products by small producers. Prices are steadily growing [26]; accordingly, all enterprises of the dairy industry have prospects for development.

However, no new business models are being implemented, which is also not even planned in the State Program for the Development of the Agroindustrial Complex (2017) [2].

The development of dairy enterprises does not bring Kazakhstan one step closer to the solution of the task set in the President's message to increase labor productivity and the share of export of processed products grow over the next five years "at least 2.5 times" [1].

Obviously, this requires the development of the industry development strategy with a focus on organizational innovation.

2. The scientists of Kazakhstan have previously repeatedly developed organizational innovations for the dairy industry.

So, A.K. Zhumaev (2009) carried out mathematical modeling of the Kazakhstani dairy market and its' production and solved a number of tasks of multiply connected management of a large dairy company (that strategy for the development of the dairy industry, which in practice was implemented by Adal company) [27].

G.N. Nakipova, M.Zh. Kamenova and K.A. Akhmetova (2013) have analyzed integrated accounting of multidirectional trends in the production, distribution and consumption of dairy products, extrapolation and exponential smoothing methods were developed [28].

However, these studies do not answer the main question facing the dairy industry: how to improve the efficiency of the interaction of small/micro businesses and large processing enterprises in the context of the problems of sharp growth in labor productivity and export of processed products.

Conclusion

In our opinion, to address this issue as a promising new business model of the dairy industry should adopt the NSI.

As a result of our survey among the participants of the milk processing enterprises and dairy farms, we were convinced by the demand for the development of a qualitatively new information and analytical support for forecasting and planning the formation of NSI enterprises in the dairy industry.

The information system, without which, in principle, it is impossible to form the network structures of economic agents, should provide the following:

- exchange of information between all active and potential NSI participants;
- the unity of formal and informal rules of doing business in the NSI;
-analytical support for making timely and adequate managerial decisions by the system integrator/meta-agent.

To solve the first two tasks, it is quite enough to create an Internet server, which publishes all the working materials with detailed headings available to network participants; electronic mailing lists (based on e-mail and Internet forums) on specific topics of the project and sub-projects, as well as an information portal that will cover the activities of network participants.

In order to solve the third task, analytical support of the system integrator/meta-agent acceptance of timely and adequate managerial decisions, it is necessary to develop a special information system

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ҚАЗАҚСТАННЫҢ СҮТ ӨНЕРКӘСІБІ ТИІМДІ БИЗНЕС ҮЛГІСІН ІЗДЕУДЕ

Аннотация. Бұл мақала Елбасының Қазақстан халқына арнаған. Жолдауында белгіленген еңбек өнімділігінің күрт өсуі және өңделген өнімдерді экспорттау мәселелері бойынша сүт өнеркәсібінің ұйымдық дамуының проблемалары мен перспективаларын талдауға арналған. Ұйымдастырушылық инновацияларға, яғни АӨК қолданатын заманауи бизнес-үлгілерге талдау жүргізілді.

Соңғы екі жылда Қазақстанның сүт өнеркәсібінде көрініс тауып, жинақталған проблемалар және негізгі даму тенденциялары қарастырылды. Бүгінгі таңда сүт және сүт өнімдері тұрақты төлемге қабілетті сұранысқа ие екендігі айқын көрсетілді, бұл сұраныстың басым бөлігі әлі күнге дейін шағын өндірушілердің өз өнімдерінің бөлшек саудалары арқылы қанағаттандырылуда.

Бағалар тұрақты түрде өсуде; тиісінше, сүт өнеркәсібіндегі барлық кәсіпорындар даму перспективаларына ие. Дегенмен, ешқандай жаңа бизнес үлгілер іске асырылмауда - бұл тіпті өткен жылы қабылданған Агроөнеркәсіптік кешенді дамытудың Мемлекеттік бағдарламасында да жоспарланбаған. Сүт кәсіпорындарының дамуы әлі де болса Қазақстан Президентінің Жолдауында қойылған алдағы бес жылда еңбек өнімділігін арттыру және өңделген өнімдердің экспортының үлесін ұлғайтуға бағытталған міндеттерді орындауға бір қадам болса да жасамайтындығы анықталды.

Соңғы екі жылда өнеркәсіптік интеграциялық үдерістерде белсене атсалысқан Шығыс Қазақстан, Жамбыл және Оңтүстік Қазақстан облыстарындағы сүт өндіруші кәсіпорындар мен сүт фермаларының басшыларынан алынған сауалнама нәтижелері ұсынылуда. Сүт өнеркәсібінің экономикалық агенттерінің жаңа бизнес үлгіде, шағын бизнестердің ірі кәсіпорындардың өндіру-өткізу тізбектеріне бірігудегі желілік құрылымда қатысуға дайындығын бағалау жаңа сапалы ақпараттық және болжау аналитикалық қолдауды дамыту қажеттілігін және Қазақстанның сүт өнеркәсібі үшін жаңа бизнес үлгілерін қалыптастыруды жоспарлау қажеттілігін айқын көрсетті.

Кілт сөздер: сүт өнеркәсібі, бизнес үлгі, ұйымдастырушылық инновация, желілік құрылым, интеграциялық процесс, экономикалық агент, жүйелік интегратор, ақпараттық жүйе

УДК 338.43:631.15
МРНТИ 06.71.07

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МОЛОЧНАЯ ОТРАСЛЬ КАЗАХСТАНА В ПОИСКЕ ЭФФЕКТИВНОЙ БИЗНЕС МОДЕЛИ

Аннотация. Статья посвящена анализу проблем и перспектив организационного развития молочной отрасли в контексте задач резкого роста производительности труда и экспорта переработанной продукции, поставленных в последнем Послании Президента народу Казахстана. Проведён анализ организационных инноваций – современных бизнес моделей, используемых АПК.

Рассмотрены накопившиеся проблемы и основные тенденции развития, проявившиеся в молочной отрасли Казахстана за последние два года. Показано, что до настоящего времени в республике сохраняется стабильный платёжеспособный спрос на молоко и молочные продукты, который в значительной части всё ещё удовлетворяется за счёт розничной продажи своей продукции мелкими производителями. Цены устойчиво растут; соответственно, у всех предприятий молочной отрасли есть перспективы для развития.

Однако никаких новых бизнес моделей не внедряется – и это даже не планируется в принятой в прошлом году Государственной программе развития агропромышленного комплекса. Установлено, что развитие предприятий молочной отрасли пока ни на шаг не приближает Казахстан к решению поставленной в Послании Президента задачи увеличения за ближайшие пять лет производительности труда и доли экспорта переработанной продукции.

Представлены результаты опроса руководителей молокоперерабатывающих предприятий и молочно-товарных ферм Восточно-Казахстанской, Жамбылской и Южно-Казахстанской областей, которые за последние два года активно участвовали в отраслевых интеграционных процессах.

Оценка готовности экономических агентов молочной отрасли к участию в новых бизнес моделях, сетевых структурах интеграции малого бизнеса в производственно-сбытовые цепочки крупных предприятий показала востребованность разработки качественно нового информационно-аналитического обеспечения прогнозирования и планирования формирования новых бизнес моделей в молочной отрасли Казахстана.

Ключевые слова: молочная отрасль, бизнес модель, организационная инновация, сетевая структура, интеграционный процесс, экономический агент, системный интегратор, информационная система

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 167 – 171

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DEVELOPMENT OF NOZZLE-FREE CAPILLARY POROUS DUST-AND-GAS COLLECTORS WITH FOAM GENERATING AND DEFOAMING STRUCTURES

Abstract. The nozzle-free foam generators of air mechanical foam were designed along with its case, inlet and outlet nozzles, a set of grids and sprayer. They help to conduct foam generation processes with high effectiveness under low hydro-and-gas dynamic resistance. For further enhancement of the combined processes of gas mechanical foam and collecting micro-and-ultramicroscopic dust, a dust collector along with its case, inlet and outlet nozzles, a set of grids and sprayer was proposed, which is equipped with defoaming grid porous structure, whereas foam generating and defoaming structures are installed into in case consequently as per the dusty gas movement and sludge collector. Besides, each subsequent grid of foam generating porous structure is made with the increased size of cells following the cleanable gas; e.g. made of metal cells for clearance 0,08*0,14*1, and defoaming made of grids with decreasing size of cells following the cleanable gas, e.g made of metal cells for clearance 0,4*0,14*0,08.

Key words: dust-and-gas collector, capillary porous structures, porous foam generator, foam generation, heat-mass exchange, vapor bubble.

УДК 697 (075,8)

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РАЗРАБОТКА БЕЗФОРСУНОЧНЫХ КАПИЛЛЯРНО-ПОРИСТЫХ ПЫЛЕГАЗОУЛОВИТЕЛЕЙ С ПЕНОГЕНЕРИРУЮЩИМИ И ПЕНОГАСЯЩИМИ СТРУКТУРАМИ

Аннотация. Разработаны безфорсуночные пеногенераторы воздушно-механической пены, содержащий корпус, входной и выходной патрубки, пакет сеток, распылитель. Они позволяют проводить процессы генерации пены с высокой эффективностью при малых гидро- и газодинамических сопротивлениях. Для дальнейшей интенсификации совместных процессов генерации газомеханической пены и улавливания микро- и ультрамикроскопической пыли предложен пылеуловитель, содержащий корпус, входной и выходной патрубки, пакет сеток, распылитель, который снабжен пеногасящей сетчатой пористой структурой, причем пеногенерирующая и пеногасящая структуры установлены в корпусе последовательно по ходу движения запыленного газа, и щламосборником. Кроме того, каждая последующая сетка пеногенери-

рующей сетчатой пористой структуры выполнена с увеличивающимся размером ячеек по ходу движения очищаемого газа, например, из металлических с размером ячеек на просвет: 0,08*0,14*1, а пеногасящая – из сеток с уменьшающимся размером ячеек по ходу движения очищаемого газа, например, из металлических с размером ячеек на просвет: 0,4*0,14*0,08.

Ключевые слова: пылегазоуловитель, капиллярно-пористые структуры, пористый пеногенератор, пеногенерация, тепломассообмен, паровой пузырь.

Исследование процессов тепломассообмена кипением чистых жидкостей в капиллярно-пористых структурах выявило поведение внутренних (термогидравлических) характеристик (зарождение паровой фазы, плотность центров генерации, выброс капель из структуры, отрывной диаметр и частота отрыва пузырей, скорость роста пузырей [1-5]. Были разработаны различные пористые системы применительно к тепловым энергетическим установкам [6] и с целью их расчета обработаны экспериментальные данные с точностью ±20% в виде критериального уравнения для барботажа, вдува, отсоса, псевдоожижения, пеногенерации [7] и сконструированы высокоэффективные безфорсуночные капиллярно-пористые пылегазоуловители с пеногенерирующими и пеногасящими структурами [8-13].

Рассмотрим характерный аппарат из нового класса безфорсуночных пылегазоуловителей. Изобретение авторов «Пылеуловитель» [а.с.№1456608, МКИ Е21F 5/04, 1989] относится к различным областям народного хозяйства для высокоэффективной очистки газа (воздуха) от микро-и ультрамикроскопической пыли (фракций размером менее $5*10^{-6}$ м и $0,25*10^{-6}$ м соответственно), например, при сжигании топлива, переработке и транспортировке пылящих материалов, при удалении вентиляционных выбросов.

Известен пенный аппарат для улавливания газов и аэрозолей [а.с.№309717, кл.В. OId 47/04, 1971], содержащий патрубки ввода и удаления газа, корпус, волокнистую насадку, расположенную в корпусе, прокладку-перегородку, каплеотбойник.

Недостатком устройства является низкая эффективность улавливания микро- и ультрамикроскопической пыли, определяемая размерами пор насадки, что в свою очередь создает высокую материалоемкость, большие гидравлические сопротивления по движению жидкости и газодинамические сопротивления при прокачке газа (воздуха).

Небольшая продолжительность работы между регенерациями за счет забивания пор волокнистой насадки является серьезной проблемой. Пена образуется вне пористого тела и набрасывается на его поверхность. Это снижает эффективность улавливания пыли и интенсивность процессов массопереноса, что приводит к росту материалоёмкости, габаритов и массы аппарата.

Поток газа, проходя через волокнистую насадку, преодолевает большое газодинамическое сопротивление. Это связано с перерасходом энергии на его прокачку. Продолжительность работы между регенерациями такого аппарата будет невысокой, поскольку поры в волокнах начнут забиваться пылинками. Все это усложняет эксплуатацию аппарата и уменьшает его надежность.

В предлагаемых капиллярно-пористых структурах безфорсуночного пылегазоуловителя [8-13] высокую эффективность улавливания микро- и ультрамикроскопической пыли можно объяснить диффузионным механизмом осаждения пыли в пенном потоке в объеме и на поверхности структуры, когда пылинки испытывают непрерывное воздействие молекул газа, находящегося в броуновском движении, причем подвижность частиц будет увеличена путем термофореза, возникающего за счет разности температур между скелетом пористой структуры, пенного потока и частицами пыли, и за счет диффузиофореза, вызванного градиентом концентрации компонентов пенного потока, усиленным процессами испарения пенообразующего раствора в объеме пористой структуры и частичной конденсаций пара пенного потока.

Высокая устойчивость и стабильность пленки жидкости в ячейках сетчатых структур обеспечивается равномерным подводом жидкости распылителя и позволяет в 1,5÷2 раза уменьшить расход пенообразующего раствора при сохранении стойкости, дисперсности и высокократности пены, получаемой в пеногенерирующей структуре [8-13.]

Как показывают опыты [8,13] гидравлическое сопротивление сетчатых пористых структур по сравнению с волокнистой насадкой уменьшится в десятки раз, а газодинамическое – в несколько раз. За счет того, что предлагаемые пористые структуры имеют большие размеры ячеек по сравнению с порами волокнистой насадки, существенно увеличится период между регенерациями сеток, а значит, упрощается эксплуатация и повышается надежность работы пылеуловителя и срок службы.

Организовать устойчивый процесс в многофазном слое с помощью волокнистых и им подобным фильтрующим материалам (металлокерамические, спеченные порошки) не удается, так как пузыри пены закупоривают поры насадки, прекращаю поступление свежих порций пенообразующей жидкости к пузырегенерирующим порам при нагрузках в (2…2,5) раза меньших, чем для сетчатых структур.

Работает пылеуловитель следующим образом.

Загрязненный пылью поток вводится через патрубок подвода запыленного газа 1 в корпус пылеуловителя 2 (рис.1). Очистка газа от микроскопической пыли производится в пеногенерирующей пористой структуре 3 вида 0,08*0,14*1. Газомеханическая пена 10 выдувается газовым потоком из ячеек структуры, снабжаемой пенообразующим раствором 9, например, ПО-12, подаваемым из распылителя 4.

Пористая структура по сравнению с изотропной структурой позволяет существенно интенсифицировать массообменные процессы, протекающие в ее объеме и на поверхности за счет облегченного роста пузырей 8 от вершины конуса к его основанию, что повышает коагулирующую способность пены. Следовательно, интенсификация процессов приводит к росту эффективности улавливания микроскопической пыли за счет повышения коэффициента захвата пыли пеной в объеме структуры и на ее поверхности.

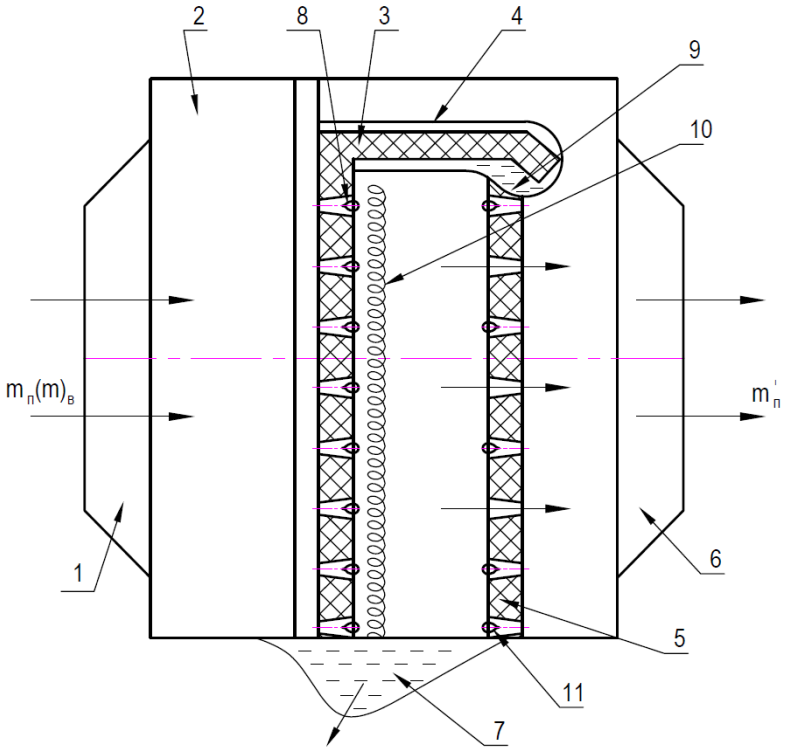

Рисунок 1 - Безфорсуночный капиллярно-пористый пылегазоуловитель с пеногенерирующими 3 и пеногасящими 5 структурами: 1 – входной патрубок; 2 – корпус пылеуловителя; 3 – пеногенерирующая пористая структура; 4 – распылитель; 5 – пеногасящая пористая структура; 6 – выходной патрубок; 7 – шламосборник; 8 – пузырь; 9 – пеногасящая пористая структура; 10 – газомеханическая пена; 11 – пузыри пены; $m_п$, $m_в$, $m^I_п$, – расходы пены, воздуха (пара)

Газомеханическая пена 10 будет разрушаться от поверхности и в объеме пеногасящей пористой структуры 5 вида 0,4*0,14*0,08. Пузыри пены 11 начнут интенсивно схлопываться в структуре за счет роста сопротивления от основания конуса структуры к его вершине. Микроскопическая пыль, содержащаяся в разрушаемой газомеханической пене, под действием гравитационных сил и сил давления, стекающего из распылителя по поверхности пористой структуры устремится в шламосборник 7.

Газ будет дополнительно очищаться от микроскопической пыли в пеногасящей структуре, где существенно интенсифицируется процесс разрушения газомеханической пены за счет того, что сетки набраны с уменьшающимся размером ячеек.

Это способствует повышению эффективности улавливания микроскопической пыли на ее поверхности и в объеме, за счет чего увеличивается коэффициент захвата пыли и коагулирующая способность разрушаемого пенного потока.

Газ, очищенный от микроскопической пыли, удаляется из аппарата через патрубок отвода очищенного газа 6.

Опыты показали [8,11], что по сравнению с фильтрующими материалами, такими как металлокерамика и спеченные порошки, расход пенообразующего раствора сокращается в (1,5…2) раза при сохранении стойкости, дисперсности и высокократности пены, гидравлическое сопротивление по транспорту пенообразующей жидкости уменьшается в (10…20) раз, газодинамическое сопротивление – в 1,8 раза, что уменьшает мощность насоса и вентилятора (дымососа), материалоемкость и габариты – в (2…2,5) раза, массу установки – в (3…4) раза.

Существенно повышается период между регенерациями и эффективность улавливания микроскопической пыли, которая может достигать значений (99,6…99,8)%, упрощается условия эксплуатации, возрастает надежность пылеуловителя и срок его службы, что подтверждается актами треста «Алма-Атаинжстрой» и Алма-Атинской ТЭЦ-2.

Экономический эффект от внедрения предложенного пылеуловителя будет иметь место за счет сокращения расхода пенообразующего раствора в 1,5÷2 раза, уменьшения гидравлического сопротивления по транспорту пенообразователя в (10÷20) раз, газодинамического сопротивления по прокачке запыленного потока – в 1,8 раза, материалоемкости и габаритов – в 2÷2,5 раза, массы установки в 3÷4 раза. Также упростятся условия эксплуатации аппарата, повысится период работы между регенерациями, а значит, возрастет его надежность и срок службы, что снизит капитальные и эксплуатационные затраты.

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КӨБІК ӨНДІРЕТІН ЖӘНЕ КӨБІК СӨНДІРЕТІН ҚҰРЫЛЫМДАРМЕН БҮРКІГІШСІЗ КАПИЛЛЯРЛЫ-КЕУЕКТІ ТОЗАҢ-ГАЗ ТҰТҚЫШТАРДЫ ӘЗІРЛЕУ

Аннотация. Корпус, кіру және шығу келте құбырлары, торшалар топтамасы, тозаңдатқыштан тұратын ауа-механикалық көбікке арналған бүркігішсіз көбік генераторлары әзірленді. Олар аз гидро және газдинамикалық қарсылықтарда жоғары тиімділікпен көбік өндіру процестерін жүргізуге мүмкіндік береді. Газ-механикалық көбікті өндіру мен микро және ультрамикроскопиялық тозаңды тұту бірлескен процестерін әрі қарай сәйкестендіру үшін көбік сөндіретін торкөзді кеуекті құрылыммен және қақ жинағышпен жабдықталған корпус, кіру және шығу келте құбырлары, торшалар топтамасы, тозаңдатқыштан тұратын тозаң тұтқыш ұсынылды, бұл ретте көбік өндіретін және көбік сөндіретін құрылымдар корпусқа тозаңдатылған газ қозғылысының бағытын бойлай орнатылды. Бұдан өзге, көбік өндіретін торкөзді кеуекті құрылымның кейінгі торшасы тазартылатын газдың қозғалыс бағыты бойымен ұяшықтардың ұлғаятын өлшемімен, мысалы, саңылауға ұяшықтарының өлшемі: 0,08*0,14*1 болатын метал торлардан, ал көбік сөндіретін торша - тазартылатын газдың қозғалыс бағыты бойымен ұяшықтардың кішірейетін өлшемімен, мысалы, саңылауға ұяшықтарының өлшемі: 0,4*0,14*0,08 болатын метал торлардан орындалды.

Түйін сөздер: тозаң-газ тұтқыш, капиллярлы-кеуекті құрылымдар, кеуекті көбік генераторы, көбік өндіру, жылу-масса алмасу, бу көпіршігі.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 172 – 180

UDC 636.1.082

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DAIRY PRODUCTIVITY AND MILK COMPOSITION OF MARES OF DIFFERENT GENOTYPES

Abstract. In the article, the materials of studies of the milking capacity of mares of different genotypes and the milk composition under the conditions of a stationary koumiss farm are presented. For the first time, the results of studies on the variability and interrelationship of the main components of milk and milk yield of mares under stable and pasture conditions are summarized and given in a comparative aspect. There are pedigree differences in the quantity and quality of milk, Novoaltaisk-Kazakh cross-breeds have a higher milking capacity, followed by the Kazakh mares of the Jabe type and the Don-Kazakh crossbreeds. During the lactation period, 1482.2 liters of commercial milk yield from the Kazakh mares of the Jabe type, 1513.4 liters from the Novoaltaisk-Kazakh hybrids and 1267.6 liters from the Don-Kazakh hybrids were received.

The highest fat content in milk was 1.79% in the Kazakh mares of Jabe type, in the Novoaltaisk-Kazakh hybrids it was 1.64% and in the Don-Kazakh hybrids - 1.52%. The protein content in milk of the Kazakh mares of Jabe type and the Novoaltaisk-Kazakh hybrids are practically the same 2.02 - 2.01%, and in the Don-Kazakh hybrids are only 1.87%. Variability of the fat content by lactation months is below the variability of milk yield and ranges from 5.06 to 7.88%. The correlation coefficient between milk yield and content of fat, protein, sugar had a negative value, and a positive relationship between the fat content and dry substance.

Keywords: genotype, milking capacity, lactation, variability, fat, protein, sugar, correlation.

УДК 636.1.082

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МОЛОЧНАЯ ПРОДУКТИВНОСТЬ И СОСТАВ МОЛОКА КОБЫЛ РАЗНЫХ ГЕНОТИПОВ

Аннотация. В статье приведены материалы исследований молочности кобыл разных генотипов и состав молока в условиях стационарной кумысной фермы. Впервые обобщены и даны в сравнительном аспекте результаты исследований по изучению изменчивости и взаимосвязи основных компонентов молока и удоя кобыл при конюшенно – пастбищном условий содержания. Установлены породные различия по количеству и качеству молока, более высокой молочностью обладают новоалтайско-казахские помеси, затем

казахские кобылы типа жабе и доно-казахские помеси. За период лактации получен товарный удой 1482,2 л от казахских кобыл типа жабе, 1513,4 л от новоалтайско-казахских помесей и 1267,6 л от доно-казахских помесей.

Наиболеее высокое содержание жира в молоке 1,79% наблюдалось казахских кобыл типа жабе, у новоалтайско – казахских помесей оно равнялось 1,64% и доно – казахских помесей 1,52%. Содержание белка в молоке казахских кобыл типа жабе и новоалтайско – казахских помесей практический одинаковы 2,02 – 2,01%. А доно – казахских помесей всего лишь 1,87%. Изменчивость содержания жира по месяцам лактации ниже изменчивости удоя и составляет от 5,06 до 7,88%. Коэффициент корреляции между удоем и содержанием жира, белка, сахара имело отрицатешльное значение, а между содержанием жира и сухого вещества положительная связь.

Ключевые слова: генотип, молочность, лактация, изменчивость, жир, белок, сахар, корреляция.

Введение

В условиях комплексной механизации сельскохозяйственного производства открываются значительные возможности для развития продуктивного коневодства в направлении производства кумыса и конины, связанного с обширными угодьями пастбищ в Казахстане (187 млн га).

Развитию коневодства, особенно табунного, как важной продуктивной отрасли уделяется большое внимание в Павлодарской области, где имеются 8 млн. 235 тыс. 900 га степных и полупустынных пастбищ и более 135 тыс. голов лошадей, где наиболее эффективно табунное коневодство. Табунные лошади, как и многие другие виды животных, способны при свободном перемещении в пастбищном пространстве поедать выборочно нужную для них растительность, что способствует получению экологически чистой конины и кумыса [1].

Производство кумыса в Казахстане имеет богатые многовековые традиции. Кумыс для казахов всегда был любимым напитком и заменял им вино, минеральную воду и другие напитки. В Республике ежегодно производится около 24 тыс. тонн кумыса, а к 2020 г планируется произвести до 30 тыс. тонн.

В решении этой задачи большое значение имеет перевод молочного коневодства на промышленную основу, за счет создания крупных стационарных кумысных ферм. Так, в Павлодарской области имеются две стационарные кумысные фермы «Алтай» и «Сакып», которые производят кумыс круглый год.

При одинаковых условиях кормления, ухода и содержания кобылы разных пород отличаются неодинаковой продуктивностью как в отношении количества, так и качества ее. Поэтому сравнительное изучение хозяйственно-полезных признаков лошадей способствует правильному выбору породы для тех или иных конкретных условий, что открывает большие дополнительные резервы в увеличении производства продуктов коневодства. При этом немаловажное значение имеет изучение характера и типов взаимосвязи основных селекционных признаков молочности: велечины удоя, содержании жира и белка в молоке.

По химическому составу молоко кобылы значительно отличается от молока других видов животных, а по содержанию молочного сахара и качественному составу белка близко к женскому. Аналогичное сходство наблюдается также по содержанию витамина «С». Кобылье молоко беднее жиром и белком, чем коровье. Однако в молоке кобыл содержание сахарав 1,5 раза, а витамина «С» почти в 10 раз больше, чем коровье. По количеству лактозы и золы кобылье молоко и женское молоко почти раноценны [2, 3, 4].

В молочном коневодстве все эти вопросы в комплексе мало изучены, тогда как в молочном скотоводстве они иследованы довольно глубоко [5, 6, 7]. Такое положение определило направление наших исследований.

Объект исследования – дойные казахские кобылы типа жабе и их помеси от заводских пород, разводимые в условиях крестьянского хозяйства «Алтай» Лебяжинского района Павлодарской области.

Цель работы. Изучить молочную продуктивность и химический состав молока кобыл разных генотипов, определить степень изменчивости, взаимосвязи основных компонентов молока между собой и с уровнем удоя.

Метод или методология проведения работы. Исследования по изучению молочной продуктивности и химического состава молока проведены на стационарной кумысной ферме

крестьяского хозяйства «Алтай» Лебяжинского района Павлодарской области на трех группах кобыл в период 2016 и 2017 гг.

Под опытом находилось 30 дойных кобыл, из них 10 голов казахских типа жабе, 10 голов новоалтайско-казахских и 10 голов доно-казахских помесей.

Для характеристики развития и типа телосложения подопытные кобылы были измерены и взвешены. У каждого животного бралось по 4 промера: высота в холке, косая длина туловища, обхват груди и обхват пясти [8]. С целью изучения особенностей телосложения кобыл вычислялись индексы: формата, широкотелости, массивности и костистости. Живая масса кобыл устанавливалась путем взвешивания на однотонных весах в начале и в конце лактации до утреннего кормления и поения.

Содержание дойных кобыл в осенне-зимний период конюшенно-пастбищное, а в весенне-летний – пастбищное.

Кобыл доили 6 раз в сутки, с перерывами между дойками в 2-2,5 часа электродоильным аппаратом ДДУ-2.

В осенне-зимний период кобылам кроме пастбищной растительности задавались грубые и концентрированные корма по классам с учетом живой массы и продуктивности [9].

Товарная молочность кобыл определялась ежемесячно в течение лактации методом контрольных удоев, два раза в месяц по двум смежным дням. Молочная продуктивность расчитывалась с учетом молока высосанного в ночное время жеребенком по формуле Сайгина И.А. [10].

Химический анализ молока кобыл проводился в лаборатории Инновационного Евразийского университета г. Павлодар на анализаторе MilkoScan. При этом определяли содержание белка, жира и сахара в молоке. Процентное содержание сухого обезжиренного остатка «СОМО» в молоке определяли по разности показателей молока и дистиллированной воды по шкале «СОМО».

Все экспериментальные данные обрабатывались биометрическим методом, применяемых для малых выборок [11].

Результаты работы

Зоотехническая характеристика дойных кобыл. В крестьянском хозяйстве «Алтай» наряду с чистопородным разведением казахских лошадей жабе для повышения продуктивности использовалось «прилитие крови» новоалтайской и донской пород, которые дали положительные результаты.

Данные промеров и живой массы дойных кобыл разных генотипов приведены в таблице 1.

Таблица 1 – средние промеры и живая масса опытных групп (n по 10 голов)

Показатели	Группы кобыл					
	Казахские типа жабе		Новоалтайско-казахские помеси		Доно-казахские помеси	
	$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv
Промеры, см: Высота в холке	142,7±0,47	1,04	148,4±0,70	1,49	147,4±0,65	1,40
Косая длина туловища	148,8±0,51	1,09	158,5±0,68	1,37	153,6±0,58	1,20
Обхват груди	178,3±0,70	1,24	191,5±0,69	1,13	174,0±0,57	1,04
Обхват пясти	18,4±0,11	1,85	20,3±0,21	3,25	19,7±0,18	2,89
Живая масса, кг	436,2±3,42	2,47	506,0±4,07	2,54	412,6±3,12	2,39
Индексы телосложения,%:: формата	104,3	-	106,8	-	104,2	-
обхвата груди	124,9	-	129,0	-	118,0	-
коститости	12,9	-	13,7	-	13,4	-
массивности	150,4	-	154,7	-	128,9	-

Данные таблицы 1 свидетельствуют, что дойные кобылы новоалтайско-казахских помесей очень рослые (148,4 см) с удлиненным туловищем (158,5 см), глубокой грудной клеткой (191,5 см), отличной костистостью (20,3 см), высокой живой массой (506,0 кг), индекс массивности-154,7.

Казахские кобылы типа жабе, имея достаточный рост 142,7 см, косую длину туловища 148,8 см, обхват груди 178,3 см и живую массу 436,2 кг несколько уступают новоалтайско-казахским помесям по живой массе на 69,8 кг (16,0%), тем не менее отличаются высоким индексом массивности-150,4.

Кобылы доно-казахских помесей отличаются гармоничным сложением, имеют не высокий обхват груди (174,0 см), характерный для верхового склада экстерьера, несколько уступают первым двум группам кобыл по живой массе соответственно на 23,6 кг (5,4%) и на 93,4 кг (22,6%). У кобыл этой группы не высокий индекс массивности, равный 128,9.

По промерам высоты в холке, косой длине туловища и обхвату груди кобылам всех трех групп присущи более стабильные показатели коэффициента изменчивости (от 1,04 до 1,49). Более высокие коэффициенты изменчивости наблюдались у кобыл по живой массе (2,39-2,54), затем по обхвату пясти (от 1,85 до 3,25). В дальнейшей селекционно-племенной работе отбор лошадей по живой массе и костистости даст положительные результаты по улучшению этих признаков.

Дойные кобылы всех трех групп имели крепкий тип конституции, хорошо развитую грудную клетку, округлые ребра, растянутый корпус. О крепком типе конституции кобыл можно судить по развитию костяка. Так, индекс костистости составил: у казахских кобыл типа жабе-12,9, новоалтайско-казахских помесей - 13,7 и у доно-казахских помесей-13,4.

Молочная продуктивность. Исследования, проведенные в 2016-2017 гг на стационарной кумысной ферме крестьянского хозяйства «Алтай» показали, что кобылы разных генотипов имели неодинаковую молочную продуктивность. Более высокой молочной продуктивностью в пастибищных и конюшенно-пастбищных условиях содержания обладают новоалтайско - казахские помеси. Затем в порядке убывания идут казахские кобылы типа жабе и матки доно-казахских помесей (табилица 2).

Таблица 2 – Фактический (товарный) надой молока кобыл по месяцам лактации, л (n по 10)

Показатели	Месяц лактации (2016-2017 гг)						
	Май II	Июнь III	Июль IV	Август V	Сентябрь VI	Октябрь VII	Ноябрь VIII
Казахские типа жабе							
$X \pm m_x$	9,1±0,37	9,2±0,31	8,7±0,33	7,5±0,29	5,9±0,25	4,9±0,24	3,1±0,19
Cv	18,1	15,1	16,8	17,1	18,9	21,5	26,3
Новоалтайско-казахские помеси							
$X \pm m_x$	9,3±0,50	9,4±0,48	9,0±0,41	7,8±0,38	5,8±0,36	4,6±0,34	3,2±0,29
Cv	16,9	16,1	15,8	15,5	19,8	23,7	28,7
Доно-казахские помеси							
$X \pm m_x$	7,2±0,29	7,9±0,40	7,5±0,29	6,7±0,30	5,1±0,22	4,2±0,19	2,8±0,17
Cv	17,9	22,4	17,3	19,7	19,5	20,4	27,4

Из данных таблицы 2 видно, что лактационная кривая по месяцам лактации у кобыл всех трех групп заметно изменялась. Более высокий фактический надой кобылы показали на 2-3 месяце лактации, затем удой постепенно снижался, причем более резко к концу лактации.

У дойных казахских кобыл жабе и новоалтайско-казахских помесей после 2 месяца лактации идет снижение индивидуальной изменчивости удоя, который достигает наименьшего показателя и казахских кобыл типа жабе (15,1), у новоалтайско-казахских помесей на пятом-15,5 и у доно-казахских помесей на четвертом-17,3 месяце лактации, после чего наблюдается увеличение коэффициента изменчивости, особенно резко на 7 и 8 месяце лактации.

Наши исследования показали, что кобылы разных генотипов имели неодинаковую молочность (таблица 3).

Из данных таблицы 3 видно, что за 214 дней лактации молочная продуктивность новоалтайско-казахских помесей составила 3167,2 л, казахских кобыл типа жабе-3103,0 л и доно-казахских помесей-2632,2 л.

Товарный удой, полученный от кобыл первой группы, составил 1482,2 л, второй группы - 1513,4 л и третьей - 1267,6 л. Удой новоалтайско-казахских помесей превышает на 2,1% или на 31,2 л чем казахских кобыл типа жабе, на 19,4% или на 245,8 л больше по сравнению с доно-казахскими помесями.

Таблица 3 – Молочная продуктивность кобыл разных генотипов за период лактации, л

Группы кобыл	Фактический удой		Молочная продуктивность		Живая масса, кг	На 100 кг живой массы
	за день	за лактацию	за сутки	за лактацию		
Казахские типа жабе	6,93±0,19	1482,2±39,3	14,5±0,39	3103,0±89,6	436,2	711
Новоалтайско-казахские помеси	7,07±0,28	1513,4±52,9	14,8±0,54	3167,2±108,5	506,0	626
Доно-казахские помеси	5,92±0,17	1267,6±35,3	12,3±0,33	2632,2±73,6	412,6	638

Однако по индексу молочности (в расчете на 100 кг живой массы) кобылы занимают несколько иное положение, чем по абсолютному показателю. Этот показатель наибольшим оказался у казахских кобыл типа жабе (711 кг), затем у доно-казахских помесей (638 кг) и у новоалтайско-казахских помесей (626 кг). Эти данные согласуются с исследованиями профессора Барминцева Ю.Н. [12], который отмечает, что лучшими показателями по индексу молочности отличаются местные породы как казахская, башкирская и новокиргизская, чем тяжеловозные, рысистые и верховые породы. Он считает, что такое ценное качество лошадей местных пород необходимо сохранять и совершенстововать в процессе племенной работы.

Химический состав молока кобыл. Исследования химического состава молока кобыл разных генотипов представляет большой научный и практический интерес, так как на основании этих данных возможно осуществить оценку пород и разрабатывать пути их дальнейшего совершенствования.

Сведения о химическом составе молока кобыл разных генотипов приведены в таблице 4.

Из данных таблицы 4 видно, что в молоке казахских кобыл типа жабе (10,68), новоалтайско-казахских помесей (10,50) сухого вещества содержится больше, чем в молоке доно-казахских помесей (10,23).

Наиболее высокое содержание жира в молоке обнаружено также у казахских кобыл типа жабе (1,79). Второе место по жирномолочности занимают новоалтайско-казахские помеси (1,64), затем доно-казахские помеси (1,52). Известно, что при выработке кумыса из кобыльего молока жир остается практически без изменений, так как нормальная микрофлора кумыса не вырабатывает фермента липазы, расщепляющего жир на глицерин и жирные кислоты. Это примечательно тем, что составные части молочного жира кобыл, особенно линолевая, линоленовая и арахидоновая кислоты, обладающие витаминными свойствами и не синтезирующиеся в организме человека и животных, полностью используются при употреблении кумыса [13, 14].

Таблица 4 – Состав молока кобыл разных генотипов в среднем за лактацию

Группы кобыл	Показатели	Содержится в молоке, %				
		сухое вещество	жир	белок	сахар	СОМО
Казахские типа жабе	$X \pm m_x$	10,68±0,06	1,79±0,02	2,02±0,03	6,48±0,05	8,90±0,05
	Cv	2,66	5,26	6,10	3,37	2,58
Новоалтайско-казахские помеси	$X \pm m_x$	10,50±0,08	1,64±0,03	2,01±0,03	6,51±0,03	8,71±0,05
	Cv	2,50	5,06	5,12	1,27	1,94
Доно-казахские помеси	$X \pm m_x$	10,23±0,05	1,52±0,03	1,87±0,02	6,32±0,04	8,72±0,04
	Cv	2,10	7,88	4,66	3,00	1,92

Содержание белка в молоке казахских кобыл типа жабе составляет 2,02%, у новоалтайско - казахских помесей 2,01%, то есть практически одинаковы, в то время как у доно - казахских помесей всего лишь 1,87%.

По содержанию молочного сахара в молоке кобыл на первом месте стоят новоалтайско-казахские помеси (6,51), затем идут казахские кобылы типа жабе (6,48) и доно-казахские помеси (6,32). Молочный сахар играет большую роль в производстве кумыса, является основным источником питания для молочнокислых бактерий. Под действием эндоферментов бактерий

молочный сахар гидролизуется с образованием различных веществ, которые придают кумысу определенный вкус и аромат. Поэтому важно иметь сравнительные данные о содержании этого компонента в молоке кобыл разных генотипов [15, 16, 17].

Содержание нежировых сухих веществ играет немаловажную роль при качественной оценке молока. Если содержание жира в кобыльем молоке подвергается наибольшим изменениям под воздействием различных факторов, то количество СОМО колеблется в относительно узких пределах. По нашим данным, в молоке кобыл разных генотипов содержание СОМО было различным. Так, в молоке казахских кобыл типа жабе СОМО больше на 2,14 % по сравнению с новоалтайско-казахскими помесями и на 2,02% чем у доно-казахских помесей.

Наиболее высокая изменчивость по составу молока наблюдалась у казахских кобыл типа жабе в сравнении с помесными животными, что представляет основу для ведения эффективного отбора по этим признакам при выборе пород для сезонных и стационарных кумысных ферм.

Взаимосвязь составных компонентов молока с удоем и между собой. Нами проанализирована взаимосвязь между величиной удоя, содержанием жира, белка и молочного сахара в молоке кобыл за лактацию, а также тип связи между этими компонентами (таблица 5).

Из данных таблицы 5 видно, что коэффициент корреляции между величиной удоя и содержанием в нем жира имеет отрицательное значение в молоке у казахских кобыл типа жабе и новоалтайско-казахских помесей, за исключением молока, полученного от доно-казахских помесей (+0,084), где связь выражается положительным, но очень низким показателем. Наибольшая величина отрицательного коэффициента корреляции получена в группе новоалтайско-казахских помесей (-0,388), затем у казахских кобыл типа жабе (-0,371).

Между величиной удоя и содержанием белка в молоке корреляция тоже отрицательная, за исключением казахских кобыл типа жабе, где коэффициент корреляции близок к нулю, но имеет положительный знак (+0,076).

Отрицательная связь наиболее выражена по группе новоалтайско-казахских помесей, где коэффициент корреляции имеет величину (-0,198), а у доно-казахских помесей невысокие (-0,071).

Таблица 5 – Коэффициенты корреляции между средними показателями компонентов молока и удоем у кобыл разных генотипов

Показатели	СОМО	Жир	Белок	Сахар	Удой
Казахские кобылы типа жабе					
Сухое вещество	+0,115	+0,408	+0,366	+0,072	+0,072
СОМО		+0,252	+0,271	+0,038	+0,127
Жир			+0,231	+0,247	-0,371
Белок				-0,013	+0,076
Сахар					-0,526
Новоалтайско-казахские помеси					
Сухое вещество	+0,353	+0,722	+0,839	+0,686	-0,537
СОМО		+0,221	+0,306	+0,326	-0,121
Жир			+0,397	+0,403	-0,388
Белок				+0,572	-0,198
Сахар					-0,020
Доно-казахские помеси					
Сухое вещество	+0,680	+0,367	+0,049	+0,036	+0,382
СОМО		+0,012	+0,551	-0,018	+0,463
Жир			+0,129	+0,015	+0,084
Белок				+0,059	-0,071
Сахар					-0,127

Связь между удоем и молочным сахаром во всех трех группах кобыл отрицательная. Наиболее она выражена у казахских кобыл типа жабе, где коэффициент корреляции имеет высокую величину (-0,526). А у новоалтайско-казахских и доно-казахских помесей коэффициенты корреляции невысокие (от -0,002 до -0,127).

Коэффициент корреляции между удоем и СОМО у казахских кобыл типа жабе (+0,127) и доно-казахских помесей (+0,463) имеет положительное значение, тогда как у новоалтайско-казахских помесей отрицательное (-0,121).

Взаимосвязь между содержанием жира и сухого вещества во всех трех группах кобыл была положительная. Так, у новоалтайско-казахских помесей этот показатель равен +0,722, у казахских кобыл типа жабе +0,408 и у доно-казахских помесей +0,367.

Коэффициенты корреляции между белком и другими компонентами молока также как и между жиром во всех случаях положительны, за исключением белок-сахар у казахских кобыл типа жабе, который имеет отрицательное значение, но близкое к нулю (-0,013).

Рассматривая взаимосвязь величины удоя и процента жира в молоке по месяцам лактации видно, что у кобыл разных генотипов она проявляется по разному (таблица 6).

Из данных таблицы 6 видно, что за лактацию связь между величиной удоя и процентом белка в молоке кобыл выражается небольшими отрицательными коэффициентами корреляции. Высокоя отрицательная связь проявляется у казахских кобыл типа жабе на третьем (-0,298), пятом (-0,456), шестом (-0,320) и седьмом (-0,397) месяцах лактации. У новоалтайско - казахских помесей на третьем (-0,238), четвертом (-0,439) и седьмом (-0,794) месяцах лактации, у доно-казахских помесей только на восьмом месяце лактации (-0,377).

Таблица 6 – Взаимосвязь величины удоя, процента жира, белка и сахара по месяцам лактации

Группа кобыл	Коэффициент корреляции по месяцам лактации						
	II	III	IV	V	VI	VII	VIII
Удой-белок							
Казахские кобылы типа жабе	+0,086	-0,298	+0,126	-0,456	-0,320	-0,397	+0,083
Новоалтайско-казахские помеси	-0,186	-0,238	-0,439	-0,082	+0,144	-0,794	-0,152
Доно-казахские помеси	-0,173	+0,002	+0,236	-0,092	-0,174	+0,311	-0,377
Удой-жир							
Казахские кобылы типа жабе	-0,153	-0,807	-0,509	-0,310	+0,273	+0,032	-0,256
Новоалтайско-казахские помеси	+0,147	+0,005	-0,375	-0,232	+0,183	+0,051	-0,019
Доно-казахские помеси	-0,043	-0,320	+0,186	-0,207	+0,071	+0,050	+0,024
Удой-сахар							
Казахские кобылы типа жабе	-0,158	-0,628	-0,570	-0,663	+0,127	+0,068	-0,033
Новоалтайско-казахские помеси	-0,491	+0,090	-0,174	-0265	-0,303	+0,745	-0,699
Доно-казахские помеси	-0,017	-0,630	+0,205	-0,600	-0,364	-0,043	+0,165

Высокие отрицательные коэффициенты корреляции между удоем и процентом жира у казахских кобыл типа жабе наблюдается на третьем

(-0,807), четвертом (-0,509), пятом (-0,310) и на восьмом (-0,256) месяцах лактации. У новоалтайско-казахских помесей высокая отрицательная связь была на четвертом (-0,375) и пятом (-0,232) месяцах лактации, а у доно-казахских помесей на третьем (-0,320) и пятом (-0,207) месяцах лактации.

Взаимосвязь между удоем и сахаром во всех группах кобыл за лактацию была отрицательной. У казахских кобыл типа жабе более высокая положительная связь (+0,127) наблюдалась только на шестом месяце лактации, а новоалтайско-казахских (+0,745) на седьмом и доно - казахских помесей (+0,205) на четвертом месяце лактаций.

Данные анализа соотношения белок - жир в молоке кобыл разных генотипов приведены в таблице 7.

Из приведенных данных таблицы 7 следует, что наиболее высокое соотношение белок-жир наблюдается в молоке казахских кобыл типа жабе, в среднем за семь месяцев лактации это соотношение равно 0,88 с колебаниями по ходу лактации от 0,76 на седьмом до 0,96 на четвертом месяцах лактации.

У более жидкомолочных доно-казахских помесей это соотношение, за опытный период составляло 0,86 с колебаниями от 0,70 на четвертом до 0,94 на восьмом месяцах лактации.

По группе новоалтайско-казахских помесей отношение белок-жир в молоке было ниже, чем в остальных группах и равнялось 0,81 с колебаниями от 0,76 на седьмом месяце лактации до 0,89 на четвертом месяце лактации.

Таблица 7 - Соотношение процента белка и жира в молоке кобыл разных генотипов по месяцам лактации

Месяц лактации	Группы кобыл		
	казахские типа жабе	новоалтайско-казахские помеси	доно-казахские помеси
II	0,90	0,83	0,78
III	0,92	0,85	0,79
IV	0,96	0,89	0,91
V	0,88	0,87	0,76
VI	0,80	0,78	0,70
VII	0,76	0,76	0,80
VIII	0,87	0,82	0,94
В среднем	0,88	0,81	0,86

Таким образом, увеличение удоя кобыл за лактацию может сопровождаться снижением жирности молока при сохранении его белковости. При повышении процента жира может снизиться удой, тогда как процент белка в одних случаях будет повышаться, если жирность молока не превышает определенного уровня, но может остаться на одном уровне или понижаться в случаях резкого повышения жирномолчности.

Вместе с этим по месяцам лактации наблюдаются большие вариации в соотношении изучаемых признаков в степени и характере зависимости между ними, что очевидно, обусловено разной и относительно самостоятельной их изменчивостью.

Выводы

В условиях стационарной кумысной фермы крестьянского хозяйства «Алтай» молочная продуктивность и химический состав молока кобыл разных генотипов неодинаковы. Боле продуктивными являются новоалтайско-казахские помеси (3167,2 л) и казахские кобылы типа жабе (3103,0 л), чем доно-казахские помеси (2632,2 л). По индексу же молочности на первом месте стоят казахские кобылы типа жабе (711 кг), затем доно-казахские помеси (638 кг) и новоалтайско-казахские помеси (626 кг).

По содержанию жира, белка, СОМО, сухого вещества в молоке казахские кобылы типа жабе выгодно отличаются от кобыл новоалтайско-казахских и доно-казахских помесей.

Изменчивость основных показателей удоя у кобыл невысокая и составляет от 15,1 до 28,7 %, по содержанию жира в молоке от 5,06 до 7,88 %, белка от 4,66 до 6,10 %, сахара от 1,27 до 3,37 %.

Связь между содержанием жира и белка в молоке кобыл положительная, но не одинаковая (от +0,129 до +0,397). Отбор по жирномолочности не обеспечивает одновременного увеличения содержания белка в молоке. Поэтому селекцию с лошадьми целесообразно вести не на максимальное развитие отдельных признаков, а на оптимальное их сочетание.

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УДК 636.1.082

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ӘРТҮРЛІ ТҮРЛІ ГЕНОТИПТЕГІ БИЕЛЕРДІҢ СҮТТІЛІГІ ЖӘНЕ СҮТ ҚҰРАМЫ

Аннотация. Мақалада стационар қымыз фермасы жағдайында түрлі генотипті биелердің сүттілігі мен сүт құрамының зерттеу материалдары келтірілген. Алғашқы рет жайылымда және ат қораларда бағылатын биелердің сауылуы және сүттің негізгі компонентінің өзгергіштігі және өзара байланысының салыстырмалы аспектісінің зерттеу нәтижелері көрсетілген.

Зерттеулерден сүттің мөлшері және сапасына түрлік айырмашылықтар анықталған, жаңаалтай – қазақ қоспалары жоғары сүттілікке ие, кейінгі сатыда қазақы жабы биелері және дон – қазақ қоспалары. Лактация барысында алынған тауарлық өнім қазақ жабы биесінен 1482,2 л, 1513,4 л жаңаалтай – қазақ қоспасынан және дон – қазақ қоспасынан 1267,6 л.

Сүттегі майдың жоғары мөлшері 1,79% қазақы жабы биесінде байқалды, ал жаңаалтай – қазақ қоспаларында 1,64% және дон – қазақ қоспасында 1,52% теңелді. Қазақы жабы биесінің және жаңаалтай – қазақ қоспаларының сүтіндегі ақуыз мөлшері шамамен бірдей болды - 2,02 – 2,01%. Ал дон – қазақ қоспасында - 1,87% көрсетті. Сүттену айларындағы май мөлшерінің өзгергіштігі сауу өзгергіштігінен төмен және 5,06 до 7,88% құрады. Сауу арасындағы және май, ақуыз және қант мөлшерінің коэффицент корреляциясы теріс мәнге ие болды, ал май мөлшері және құрғақ заттардың арасындағы байланыс оң мәнге ие болды.

Түйін сөздер: генотип, сүттілік, сүттену, өзгергіштік, май, ақуыз, қант, корреляция.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 181 – 185

636/22/28/033

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SOME ASPECTS OF SELECTION-BREEDING WORK IN MEAT CATTLE BREEDING

Abstract. In this article highlights the main aspects of selection and breeding work used in the specialized meat cattle breeding of the Republic at the present time. The need to preserve and develop the genetic diversity of livestock herds of beef breeds was noted, while preference should be given to cattle of domestic selection. Import should be carried out under obligatory scientific support and in pre-prepared farms. To increase the reliability of the origin of breeding animals, DNA testing should be widely implemented and the IAS database used.

Key words: specialized meat cattle breeding, genetics, selection, breeding, breeding work, productivity.

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НЕКОТОРЫЕ АСПЕКТЫ СЕЛЕКЦИОННО-ПЛЕМЕННОЙ РАБОТЫ В МЯСНОМ СКОТОВОДСТВЕ

Аннотация. В статье приведены основные моменты организации селекционно-племенной работы, применяемые в специализированном мясном скотоводстве республики в настоящее время. Отмечена необходимость сохранения и развития генетического разнообразия стад скота мясных пород, при этом предпочтение должно отдаваться скоту отечественной селекции. Завоз по импорту следует осуществлять под обязательным научным сопровождением и в заранее подготовленные хозяйства. Для повышения достоверности происхождения племенных животных следует широко внедрять ДНК-тестирование и использовать базу данных ИАС.

Ключевые слова: специализированное мясное скотоводство, генетика, селекция, разведение, племенная работа, продуктивность.

Повышение продуктивности, улучшение качественных показателей производимой продукции в первую очередь связано с уровнем осуществляемой в мясном скотоводстве селекционно-племенной работы, в чем немаловажную роль играет применяемая система оценки племенной ценности разводимых животных. В государствах постсоветского пространства до последнего времени применяется система оценки племенной ценности специализированного мясного скота, основанная на материалах, полученных в результате ежегодных бонитировок племенных стад в разрезе половозрастных групп [1]. Основными учитываемыми признаками при бонитировке мясного скота являются: интенсивность роста молодняка и затраты корма на 1 кг прироста живой массы; живая масса животных по возрастным периодам; молочность коров (по живой массе молодняка в 6-месячном возрасте); балльная оценка конституции и экстерьера; степень проявления генотипа и выраженность породной принадлежности [2].

Бонитировка проводится с участием специалистов хозяйств, что не в полной мере обеспечивает достоверность полученных данных. Для исключения субъективности в оценке племенной ценности в практику мясного скотоводства рекомендуется внедрить сервисные центры по представлению экспертов для независимого снятия фенотипических показателей оцениваемого поголовья племенного мясного скота с занесением данных в базу информационно-аналитической системы (далее – ИАС) (рисунок 1).

Использование услуг сервисных центров и независимых экспертов позволит достоверно и объективно оценивать племенные качества животных, что определит предпосылки более тщательного отбора мясного скота для воспроизводства и дальнейшей селекции.

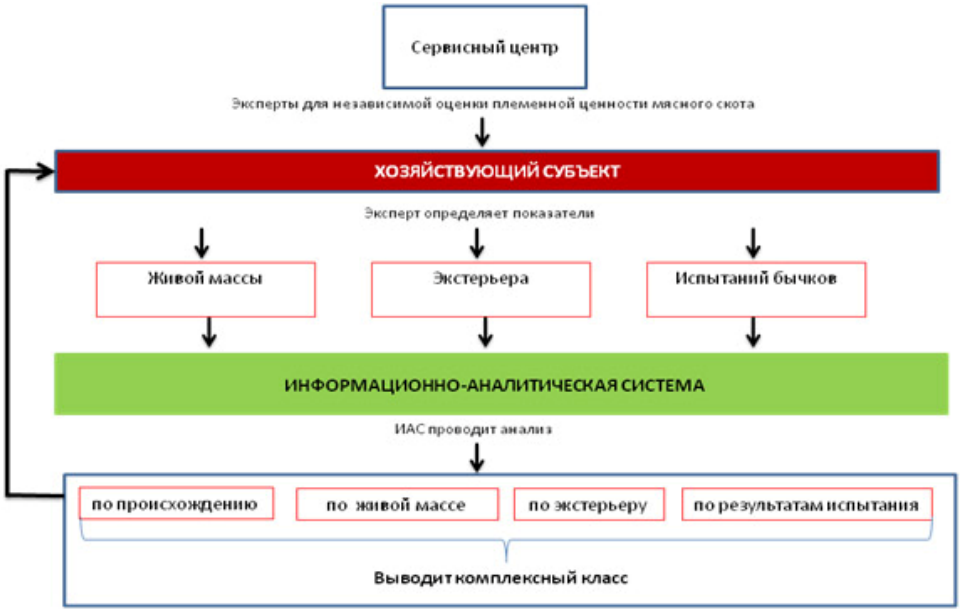

Рисунок 1 – Организация оценки племенной ценности мясного скота

По завершению комплексной оценки племенной ценности мясного скота полученные материалы подвергаются всестороннему анализу, на основании которого планируется селекционное улучшение стада (отбор и подбор пар, осуществление заказных спариваний, внесение изменений и дополнений в перспективные планы селекционно-племенной работы, комплектование стада за счет собственного ремонтного молодняка, осуществление племзакупа и т.д.), а также технологические, кормленческие и ветеринарные мероприятия.

В практике ведущих мировых производителей племенного мясного скота в последние годы широко применяется метод индексной оценки племенной ценности. В нашей республике также уже создаются предпосылки к переходу на эту методику: разработаны методические подходы, создана и функционирует информационно-аналитическая система (ИАС) с банком данных по племенным и продуктивным характеристикам животных [3,4]. Однако, как показала практика, достоверность заносимых в базу данных ИАС показателей оказалась весьма невысокой, т.к. отсутствует механизм обеспечения действенного контроля за их получением. Кроме того, недостаточный уровень кормления племенных животных в большинстве хозяйств не позволяет полностью раскрыть их генетически обусловленные продуктивные качества.

В сложившейся практике воспроизводства стада в мясном скотоводстве, в том числе и в племенных стадах, применяется в основном метод естественного оплодотворения: редко ручная и, чаще всего, вольная случки. Этот факт значительно снижает эффективность селекции, в связи с чем проведение генетической экспертизы, подтверждающей происхождение племенных животных по отцовской линии, считаем неотъемлемым элементом организации достоверного племенного учета в мясном скотоводстве. Однако, в сложившейся на текущий момент ситуации внедрение индексной оценки племенной ценности видится преждевременным и возможным только после решения вопросов полноценной кормовой базы, и внедрения подтверждения достоверности происхождения племенных животных генетическими методами.

Для обеспечения достоверных данных о происхождении племенного мясного скота, палаты по породам, согласно существующих методик, организуют отбор биопроб из хозяйств с составлением необходимых сопровождающих документов (рисунок 2) и передают биопробы в аккредитованные лаборатории, где определяют аллели животных по 12 локусам, а результаты заносят в базу данных ИАС, для обработки и автоматического установления происхождения.

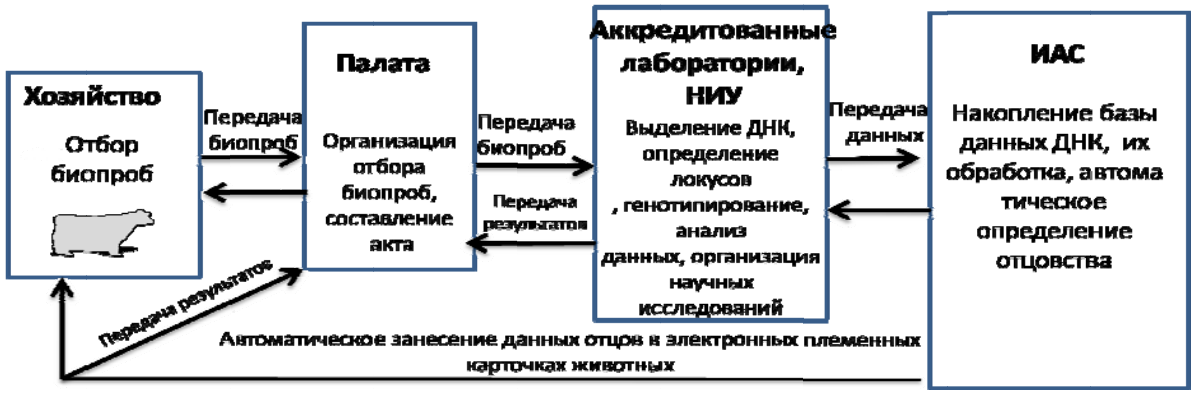

Рисунок 2 – Определение достоверности происхождения животных ДНК методом

Генетические исследования по подтверждению достоверности происхождения в первую очередь следует осуществлять в группах племенных животных, входящих в обязательный материал, представляемый при апробации новых селекционных достижений (заводских линий, пород и типов). Затем, поэтапно, генетическими исследованиями следует охватить: быко-производящую группу коров, входящую в племенное ядро и составляющую 18-20% от общего маточного поголовья; быков-производителей, работающих в племенном стаде, находящихся на испытаниях по собственной продуктивности и оцениваемых по качеству потомства; племенное ядро, составляющее 50-60% от общего поголовья коров; телок после отбивки и доращивания, предназначенных для ремонта селекционной группы, племенного ядра и намечаемых для племреализации.

Для обеспечения качественной и бесперебойной работы по определению достоверности происхождения необходимо выполнение следующих условий: научно-исследовательским учреждениям АПК РК разработать единую отечественную методику определения генетических тестов для сельскохозяйственных животных; на законодательном уровне утвердить механизм установления происхождения животных мясных пород посредством исследования образцов генетического материала.

Организация племенной работы в мясном скотоводстве в целом должна представлять собой комплекс мероприятий по повышению генетического потенциала мясного скота, направленных на получение максимального количества приплода и высококачественной говядины, обеспечивающих максимальный экономический эффект.

В процессе селекционно-племенной работы в мясном скотоводстве задействованы следующие подразделения, функционал которых требуется объединить в единую систему (рисунок 3).

Палаты и сервисные центры обеспечивают отбор и назначение в хозяйства квалифицированных бонитеров, организацию проверок достоверности получаемых в процессе бонитировок результатов, регулярность поступления и контроль за внесением в базу ИАС текущих зоотехнических событий (отел, отбивка от матерей, показатели живой массы и др.).

Информационно-аналитическую систему рекомендуется размещать или при МСХ РК, или при головном научно-исследовательском институте, т.к. в первом случае будет задействован административный ресурс (МСХ является заказчиком всех исследований по животноводству) и регулируемая законодательная база, во втором случае будет обеспечена первичная основа всех исследований по животноводству, что связано с тем, что основная функция ИАС – это сбор достоверной информации и ее первичный анализ. Институты на основе этих данных обосновывают выбор перспективных исследований, составление бюджетных и грантовых заявок, обеспечивают качественное выполнение краткосрочных (технологических) и переходящих (селекционных) исследований. На основе данных ИАС рассчитываются индексы племенной ценности, анализ которых и применение в дальнейшей селекции (пород, популяций, типов и линий) также производится научными учреждениями. Институты в дальнейшем предоставляют готовую информацию по оценке племенной ценности палатам и хозяйствующим субъектам в

области племенного животноводства (к/х, ТОО, ЛПХ и пр.). Специалисты хозяйств в свою очередь формулируют свои предложения по направлениям селекционного улучшения разводимых племенных стад и передают в палаты, которые через НИУ в дальнейшем обеспечивают научное сопровождение работ по решению поставленных задач.

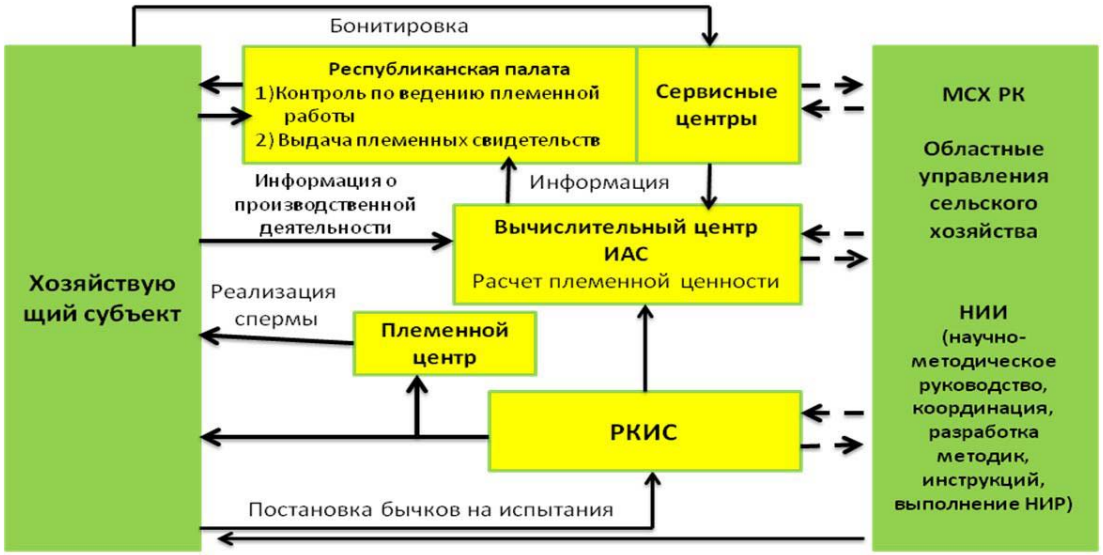

Рисунок 3 – Рекомендуемая схема управления племенной работой в мясном скотоводстве

Известно, что одним из основных требований создания пород сельскохозяйственных животных и их совершенствования является формирование внутрипородной структуры. Обладая определенной монолитностью, любая порода должна дифференцироваться на отдельные структурные элементы со специфическими свойствами развития того или иного признака, которые в результате умелого отбора и подбора обеспечивают прогресс породы в целом [5]. Каждое животное в стаде, и тем более в породе, обладает своими особенностями, которые выражены не только в отличиях по телосложению, характеру и уровню продуктивности, но и в способности сохранять эти особенности в потомстве. Если таким животным является производитель, от него оставляют на племя сыновей и дочерей, а от них внучатое и т.д. поколения, которые при направленном отборе и подборе образуют сходную по типу и продуктивности группу животных – линию.

Заводская линия - это структурное подразделение породы, представляющее собой наследственно устойчивую группу животных, имеющих общее происхождение по мужской стороне родословной и характеризующихся сходством и своеобразием желательного типа и продуктивности. Заводские линии создаются в результате целенаправленного отбора и подбора, использования препотентных быков-улучшателей.

В США и странах Западной Европы разведение по линиям обычно рассматривается только как метод родственного разведения. Это обусловлено тем, что разведение по линиям, как система работы с породой, требует ее единства. Однако благодаря стремлению фермеров обеспечить свои стада ценными производителями, осуществлялся соответствующий отбор, а использование инбридинга неизбежно ведет к кроссам, то есть используются те же методы работы, которые характерны для разведения по линиям. Совершенствование пород скота методом систематизированной селекции базируется на ведении племенной работы в регионах республики по единой, скоординированной по стадам программе, при широком использовании быков из высокопродуктивных линий и перспективных родственных групп. Разведение по линиям в племенных стадах преследует цель поддержания их генетической структуры и внутрипородного разнообразия, создания новых генотипов с желательными качествами, в том числе с использованием лучшего мирового генофонда в вводном скрещивании. Ведение племенной работы в товарных хозяйствах также должно проводиться при широком использовании линейных животных. Только лишь при этом условии в воспроизводстве поголовья возможно осуществлять обоснованный групповой

подбор посредством системной ротации линий. Большим стимулом повышения мясной продуктивности товарных стад является кроссирование линий со специфической комбинационной способностью в выявленных в племенных хозяйствах эффективных сочетаниях.

В условиях применяемой в Казахстане традиционной, экстенсивной, стойлово-пастбищной системы ведения мясного скотоводства, безусловно, приоритет необходимо отдавать отечественным породам мясного скота (казахская белоголовая, аулиекольская, санта-гертруда, тип жетісу), которые отличаются большей экономичностью и лучшим качеством производимой в условиях естественных пастбищ продукции.

Завоз мясного скота по импорту, активно осуществляемый в последние годы, показал далеко неоднозначные результаты: в хозяйствах, где были созданы кормовые и технологические условия, аналогичные странам-импортерам, продуктивность животных была достаточно высокой, а импортированный скот, содержащийся в обычных, свойственных отечественному мясному скотоводству условиях, показал низкую продуктивность и высокий отход. Завоз мясного скота по импорту следует планировать при наличии соответствующих условий кормления и содержания в хозяйствах-импортерах, а последующее его разведение осуществлять под обязательным научным сопровождением.

Таким образом, для повышения эффективности ведения отрасли мясного скотоводства в Казахстане, необходим системный подход, объединяющий усилия ученых, производственников и административно-управленческого аппарата АПК.

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ЕТТІ БАҒЫТТАҒЫ МАЛ ШАРУАШЫЛЫҒЫНДАҒЫ СЕЛЕКЦИЯЛЫҚ-АСЫЛДАНДЫРУ ЖҰМЫСЫНЫҢ КЕЙБІР ҚЫРЛАРЫ

Аннотация. Мақалада қазіргі уақытта республиканың мамандандырылған етті мал шаруашылығында қолданылатын селекциялық – асылдандыру жұмыстарының негізгі кезеңдері көрсетілді. Отандық селекцияға басымдақ бере отырып етті бағыттағы мал табындарының генетикалық әртүрлілігінің дамуы мен сақтау қажеттілігі айқындалды. Малды шетелден тасмалдау жүйесі алдын-ала дайындалған шаруа қожалықтарында міндетті тұрды ғылымдардың қатысуы негізінде жүзеге асырылуы тиіс. Асыл тұқымды малдардың шығу тегінің сенімділігін арттыру мақсатында ДНК тестілеуін кеңінен қолданып, ақпараттық талдау жүйесінің (IAS) деректер базасын пайдалану қажет.

Түйін сөздер: мамандандырылған етті мал шаруашылығы, генетика, селекция, мал өсіру, асылдандыру жұмысы, өнімділік.

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REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 186 – 194

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THE SEARCH FOR THE EFFICIENT BUSINESS MODEL FOR THE DAIRY SECTOR IN KAZAKHSTAN

Abstract. The article is devoted to the analysis of the problems and perspectives of the organizational development of the dairy industry in the context of the problems of sharp growth of the productivity of labor and export of processed products set in the last message of the President to the people of Kazakhstan. The analysis of organizational innovations, modern business models used by the AIC, is carried out. The accumulated problems and the main development trends that have manifested itself in the dairy industry in Kazakhstan over the past two years have been analyzed. It is shown that there is a stable solvent demand for milk and dairy products in the present time, which is still largely satisfied by retail sales of its production by small producers. Prices have been steadily rising; accordingly, all enterprises of the dairy industry have prospects for the further development. However, no new business models are being implemented and are not even planned in the State Program for the Development of the Agro-Industrial Complex adopted last year. It is established that the development of dairy enterprises does not bring Kazakhstan closer to the solution of the task set in the President's message to increase labor productivity and the share of exports of processed products over the next five years. The results of a survey of the owners of milk processing enterprises and dairy farms of the East Kazakhstan, Zhambyl and South-Kazakhstan regions, which over the past two years have been actively involved in sectoral integration processes, are presented in the work. Evaluation of the willingness of the economic agents of the dairy industry to participate in new business models, network structures of small business integration in the value chains of large enterprises has shown the demand for the development of a qualitatively new information and analytical support for forecasting and planning the formation of new business models in the dairy industry in Kazakhstan.

Key words: dairy industry, business model, organizational innovation, network structure, integration process, economic agent, system integrator, information system.

УДК 338.43:631.15
МРНТИ 06.71.07

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МОЛОЧНАЯ ОТРАСЛЬ КАЗАХСТАНА В ПОИСКЕ ЭФФЕКТИВНОЙ БИЗНЕС МОДЕЛИ

Аннотация. Статья посвящена анализу проблем и перспектив организационного развития молочной отрасли в контексте задач резкого роста производительности труда и экспорта переработанной продукции, поставленных в последнем Послании Президента народу Казахстана. Проведён анализ организационных инноваций - современных бизнес моделей, используемых АПК.

Рассмотрены накопившиеся проблемы и основные тенденции развития, проявившиеся в молочной отрасли Казахстана за последние два года. Показано, что до настоящего времени в республике сохраняется

стабильный платёжеспособный спрос на молоко и молочные продукты, который в значительной части всё ещё удовлетворяется за счёт розничной продажи своей продукции мелкими производителями. Цены устойчиво растут; соответственно, у всех предприятий молочной отрасли есть перспективы для развития.

Однако никаких новых бизнес моделей не внедряется – и это даже не планируется в принятой в прошлом году Государственной программе развития агропромышленного комплекса. Установлено, что развитие предприятий молочной отрасли пока ни на шаг не приближает Казахстан к решению поставленной в Послании Президента задачи увеличения за ближайшие пять лет производительности труда и доли экспорта переработанной продукции.

Представлены результаты опроса руководителей молокоперерабатывающих предприятий и молочно-товарных ферм Восточно-Казахстанской, Жамбылской и Южно-Казахстанской областей, которые за последние два года активно участвовали в отраслевых интеграционных процессах.

Оценка готовности экономических агентов молочной отрасли к участию в новых бизнес моделях, сетевых структурах интеграции малого бизнеса в производственно-сбытовые цепочки крупных предприятий показала востребованность разработки качественно нового информационно-аналитического обеспечения прогнозирования и планирования формирования новых бизнес моделей в молочной отрасли Казахстана.

Ключевые слова: молочная отрасль, бизнес модель, организационная инновация, сетевая структура, интеграционный процесс, экономический агент, системный интегратор, информационная система.

Введение

В Послании Президента народу Казахстана от 10 января 2018 года перед предприятиями агропромышленного комплекса (АПК) поставлена задача увеличения за ближайшие пять лет производительности труда и экспорта переработанной продукции «как минимум в 2,5 раза» [1].

В полной мере это относится к казахстанскому животноводству, в частности, к молочной отрасли. У республики имеется значительный природный потенциал для развития молочного стада пастбищного содержания и, соответственно, производства молока, которое, благодаря своим высоким вкусовым качествам, может пользоваться особым спросом на мировых рынках.

Однако достижению целей, поставленных в Послании, препятствует целый ряд проблем. Среди них, как отмечается в Государственной программе развития АПК (2017) – недостаточная обеспеченность кормовой базой, низкая доля племенного поголовья животных, недостаточность посевных площадей под кормовыми и фуражными культурами, нерациональное использование пастбищных угодий, неполный охват сельскохозяйственных животных ветеринарно-профилактическими мероприятиями и др. [2].

В Послании намечены основные способы решения проблем отрасли, которые обозначены как «умные технологии» – в том числе, переход к современным бизнес моделям обеспечивающим повышение эффективности хозяйственного взаимодействия т кооперации всех звеньев производственно-сбытовой цепочки предприятий АПК [1].

По словам О. Сабден, цель перехода к новым бизнес моделям состоит в том, что «малый бизнес из практически изолированной подсистемы национальной экономики должен превратиться в органическую составную часть единого производственно-финансового комплекса… необходимо создать условия, когда крупный бизнес в процессе образования кластеров массово вовлекает в свою деятельность предприятия малого бизнеса» [3].

Методы

Цель данного исследования – анализ проблем и перспектив организационного развития молочной отрасли в контексте задач резкого роста производительности труда и экспорта переработанной продукции.

Анализ вторичной (ранее собранной другими исследователями) информации, а также статистических данных, использованных:

– при рассмотрении современных бизнес моделей АПК – сетевых структур интеграции малого бизнеса в производственно-сбытовые цепочки крупных предприятий;

– при анализе накопившихся проблем и основных тенденций развития, проявившихся в молочной отрасли Казахстана за последние два года;

Для того чтобы оценить готовность экономических агентов молочной отрасли к участию в новых бизнес моделях, мы провели опрос руководителей молокоперерабатывающих предприятий и молочно-товарных ферм Восточно-Казахстанской, Жамбылской и Южно-Казахстанской

областей, которые за последние два года активно участвовали в отраслевых интеграционных процессах.

Как метод сбора первичных данных в исследовании использовалось интервьюирование – с открытыми вопросами, полуструктурированное; проводилось по телефону. На участие в интервью дали согласие 58 респондентов. Условием участия была анонимность – неразглашение личных данных и коммерческой информации в привязке к наименованию предприятий.

При обработке полученной информации использовались качественные методы анализа: количество респондентов недостаточно для применения методов математической статистики. Однако, как утверждают авторитетные специалисты, при использовании качественных методов анализа оно может быть невелико; статистический анализ данных, как правило, не проводится [4]; результаты качественного анализа легче поддаются выявлению причинно-следственных связей, по сравнению с количественными методами анализа [5].

Литературный обзор

1. Конкурентоспособность перерабатывающих предприятий АПК уже в конце прошлого века стала критически зависеть от их способности синхронизировать основные бизнес-процессы и модели управления на основе единых информационных каналов со своими поставщиками и клиентами по всей цепи поставок. Методы решения этой проблемы рассматривались в концепции Supply Chain Management (SCM) [6]**.**

Спустя десятилетия, с наступлением «сурового нового мира конца глобализации» / «grave new world: the end of globalization» [7] использование экономически развитыми государствами продовольственных ресурсов, как инструмента геополитического доминирования над другими странами, привели к глобальным трансформациям на мировом рынке продовольствия:

– перераспределению потоков продовольствия между развитыми и развивающимися странами;

– переходу от «эпохи устойчиво низких цен» к периоду высокой ценовой волатильности;

– сдвигу рынка от модели ограниченного спроса к модели ограниченного предложения [8].

В последние годы во всём мире наблюдается активное использование и дальнейшее совершенствование методов государственного протекционизма. Главный тренд мирового рынка продовольствия – ужесточение протекционистской политики и игнорирование сформировавшихся в XX веке международных торговых норм и правил [9].

2. В своё время для обозначения «группы географически соседствующих взаимосвязанных компаний и связанных с ними организаций, действующих в определённой сфере, характеризующихся общностью деятельности и взаимодополняющих друг друга» был использован термин «кластер» (для анализа степени согласованности действий независимых хозяйствующих субъектов применялся один из методов математической статистики, т.н. кластерный анализ) [10].

Понятие «кластер», как «статистически установленный класс родственных элементов в некой их совокупности» до настоящего времени используется во многих отраслях науки – химии, физике, социологии, астрономии [11].

Однако в экономике XXI века, в условиях,

– когда уже второе десятилетие во всём мире доходы домохозяйств устойчиво снижаются [12],

– когда специалистами доказано, что несколько десятилетий непрерывного экономического роста в 30-70-х гг. XX века отнюдь не отражают общие закономерности мирового развития, а являются всего лишь «следствием случайного совпадения нескольких исторических событий» [13],

– кластерный анализ в значительной мере утратил свою прогностическую силу при оценке согласованности действий независимых хозяйствующих субъектов [14, 15].

Своего рода «структурным воплощением» упомянутой нами выше концепции SCM стало формирование качественно иных бизнес моделей, которые трактуются в современной экономической литературе в терминах «сетевые интегрированные структуры» и «интегрированные корпоративные образования» [16,17].

По сути, это тот же социально-экономический феномен, что когда-то обозначался термином «кластер»; однако для описания их формирования теперь применяются совсем другие математические методы – т.н. мульти-агентное моделирование [18,19,20]. Поэтому в данном

исследовании мы будем их трактовать как сетевые структуры интеграции предприятий АПК (ССИ).

3. Большинство предприятий АПК, формально являясь самостоятельными и независимыми субъектами рынка, тем не менее, не являются самодостаточными и инвестиционно-привлекательными, не способны развиваться на принципах самоокупаемости и самофинансирования, в полной мере и на равных участвовать в межотраслевой конкуренции.

Общая тенденция развития АПК – формирование ССИ, в состав которых входят предприятия всех звеньев производственно-сбытовой цепочки «производство (отрасли растениеводства и животноводства) – переработка (пищевая отрасль) – дистрибьюция (оптовая и розничная торговля)» [9].

ССИ – совокупность осуществляющих хозяйственную деятельность экономических агентов, которая, в отличие от корпорации, может не иметь определённого правового статуса и формализованной организационной структуры. Это сложная многоуровневая социально-экономическая система, имеющая распределённую систему управления с неформальным координационным центром (системным интегратором) [16].

Механизм формирования ССИ описан в исследованиях по экономической социологии [21,22]. Основным структурным компонентом ССИ является не дочерняя компания (как у холдинга), а экономический агент, который может иметь самые разные организационные формы и правовой статус. Т.е. ССИ в принципе не имеет организационной структуры; это неформальное бизнес-сообщество, «агенты которой могут напрямую взаимодействовать с другими организациями, интегрироваться в их структуру или, наоборот, выходить из них в зависимости от ситуации на рынке [23].

4. Отличительная особенность ССИ – в том, что их существование в принципе невозможно без реально действующей стратегии. Именно она побуждает независимые хозяйствующие субъекты следовать правилам взаимодействия, установленным для участников ССИ её неформальным управляющим центром – мета-агентом, системным интегратором. Если они посчитают, что стратегия недостаточно эффективна, то просто выйдут из её состава, найдут себе другой, более эффективный, системный интегратор.

Особая трудность стратегического планирования для мета-агента – системного интегратора ССИ заключается в том, что система понятий, описывающих бизнес-процессы, совершенно не совпадает с системой понятий, используемых в стратегическом планировании [17].

Деятельность и структура ССИ описываются с помощью качественно иной системы терминов: институты, агенты, формальные и неформальные правила, регулирующие их взаимодействие и т.п. Даже базовые термины теории стратегического управления организациями трудно применять без дополнительных оговорок и пояснений - а уж «классическую» методологию стратегического планирования системный интегратор вообще не может использовать.

Результаты исследования

1. Среднедушевое потребление молока в Казахстане составляет 235 кг в год, тогда как в европейских странах этот показатель составляет более 400 кг в год [24]. Казахстанская молочная отрасль пока что не в состоянии даже население страны полностью обеспечить качественным продуктом. Основными производителями сырья для молочной промышленности в Казахстане являются личные подсобные хозяйства с численностью от одной до пяти голов скота. В настоящее время такие хозяйства обеспечивают по разным оценкам от 80 до 85% товарного молока для промышленности. Количество коров в личных подворьях составляет 86% от общего поголовья; 94-95% молочной продукции производят 167 тыс. крестьянских и 2 млн. 200 тыс. подсобных хозяйств [25].

Значительная распылённость молочного производства по мелкотоварным хозяйствам, при несоблюдении рациона кормления и содержание животных, а также оборудования для хранения и охлаждения молока, отрицательно сказывается на удоях и на качестве. От среднестатистической казахстанской коровы ежегодно удаётся получить 2233 литра молока, тогда как в России соответствующий показатель составляет 3500, в Беларуси - 3000 литров, а Германии - 6923, Канаде - 7962, в США - 9219 литров [24].

Как отмечается в «Государственной программе развития агропромышленного комплекса РК», доля молока высшего сорта в Казахстане занимает всего 2-3% от объёмов производства, небольшую долю занимает и первый сорт, большая часть приходится на молоко второго сорта.

Молоко, произведённое в таких хозяйствах, попадает на промышленную переработку в очень ограниченном количестве, поскольку в большей части нерационально используется на личное потребление и продаётся через неофициальные каналы. Лишь около трети производимого в Казахстане молока проходит промышленную переработку. Молокоперерабатывающие предприятия обеспечивают лишь 27% потребления питьевого упакованного молока страны; при этом производственные мощности по промышленной переработке молока не используются в полном объёме [2].

2. Как показал проведённый нами анализ, за последние два года в молочной отрасли среди мелких производителей товарного молока активизировались интеграционные процессы (объединение в сельскохозяйственные производственные кооперативы):

– в Жамбылской области произошло объединение около 700 мелких и подсобных хозяйств в несколько десятков кооперативов;

– в Южно-Казахстанской области силами 20 кооперативов открыто 33 модульных пунктов приёма молока;

– в Кокчетавской области четыре молокоперерабатывающие предприятия получают товарное молоко из 530 личных подворных хозяйств, объединившиеся в 15 кооперативов;

– в Актюбинской области созданы 43 и 7 пунктов приёма молока.

В то же время в Казахстане продолжается строительство молокоперерабатывающими предприятиями собственных молочно-товарных ферм. Так, в Алматинской области компания «Адал» нашла решение проблемы нехватки сырого молока, создав производственный комплекс «ферма-завод». Поголовье этой фермы составляет более 1000 дойных коров, причем с 2014 по 2017 год показатели среднего удоя были увеличены с 5 тысяч до 7,5 литров в год, а общий объем инвестиций в этот проект составил около 5 млрд. тенге. Однако столь масштабные инвестиции могут позволить себе немногие предприятия молочной отрасли. В Восточно-Казахстанской области три молокоперерабатывающих предприятия сочетают опору на сельскохозяйственные кооперативы (36 пунктов приёма молока для мелких производителей) со строительством собственных молочно-товарных ферм (их построено уже 37ед.).

3. Наиболее интересные, по нашему мнению, результаты проведённого нами опроса руководителей молокоперерабатывающих предприятий и молочно-товарных ферм представлены на диаграммах рисунков 1–3.

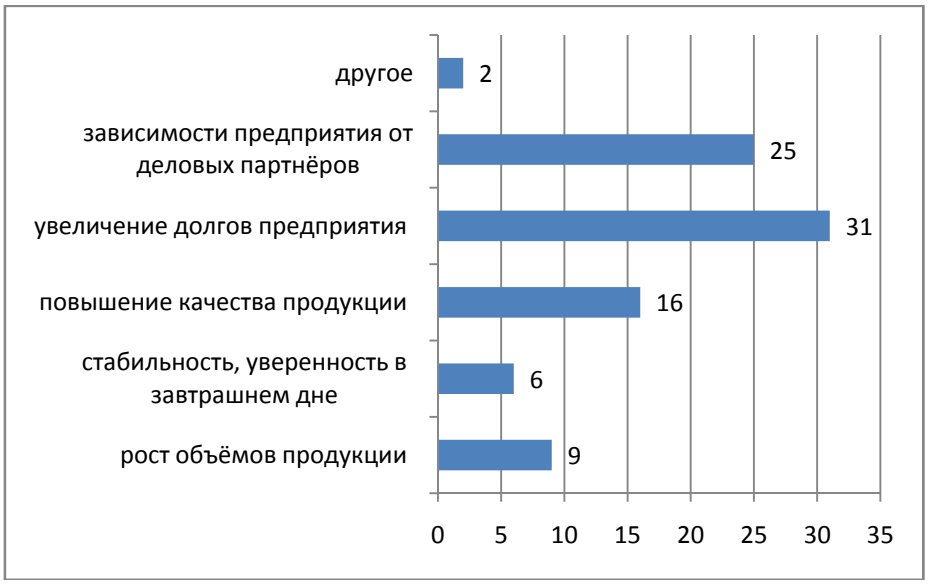

Рисунок 1 – Структура ответов на вопрос: Какой результат от участия в отраслевых интеграционных процессах Вы считаете наиболее существенным?

Как мы видим, для большинства респондентов наиболее значимые изменения - увеличение долгов предприятия и рост зависимости предприятия от деловых партнёров; в перспективах роста объёмов продукции и уверенности в завтрашнем дне большинство респондентов совершенно не уверены.

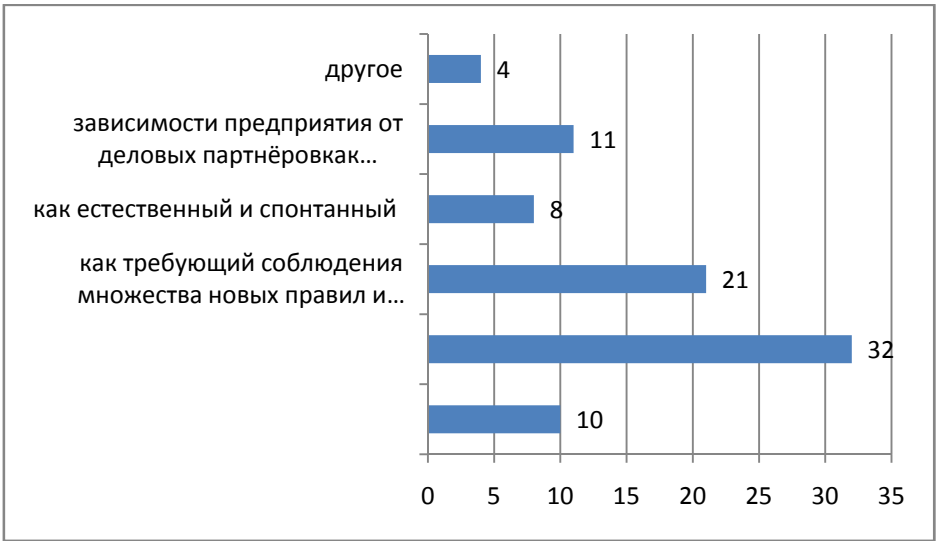

Рисунок 2 – Структура ответов на вопрос: Как Вы оцениваете интеграционные процессы, в которых приняло участие Ваше предприятие?

Оценка респондентами практики отраслевой интеграции («формирования кластеров») – негативная: процедуры недостаточно продуманы, приходилось учиться на своих ошибках; от них теперь требуется соблюдение множества новых правил и ведения документации.

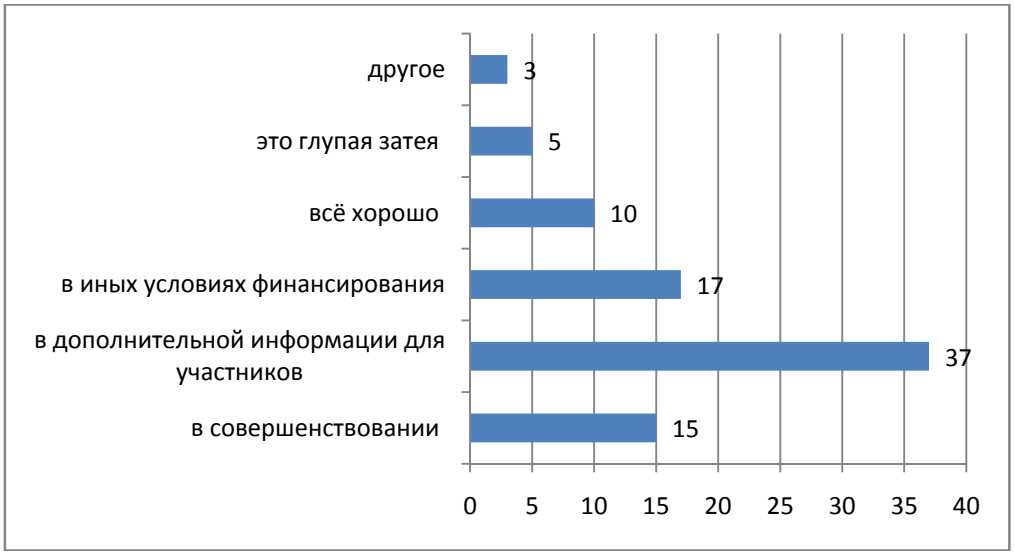

Рисунок 3 – Структура ответов на вопрос: По Вашему мнению, нуждаются ли интеграционные процедуры («формирование кластеров»)?

Как мы убедились, по мнению подавляющего большинства респондентов, главная проблема – отнюдь не условия финансирования, а дефицит информации.

Обсуждение результатов

1. До настоящего времени в республике сохраняется стабильный платёжеспособный спрос на молоко и молочные продукты, который в значительной части всё ещё удовлетворяется за счёт

розничной продажи своей продукции мелкими производителями. Цены устойчиво растут [26], соответственно, у всех предприятий молочной отрасли есть перспективы для развития.

Однако никаких новых бизнес моделей не внедряется – и это даже не планируется в Государственной программе развития АПК (2017) [2].

Развитие предприятий молочной отрасли пока ни на шаг не приближает Казахстан к решению поставленной в Послании Президента задачи увеличения за ближайшие пять лет производительности труда и доли экспорта переработанной продукции «как минимум в 2,5 раза» [1].

Очевидно, для этого необходима разработка стратегии развития отрасли с упором на организационные инновации.

2. Учёными Казахстана ранее неоднократно осуществлялись разработки организационных инноваций для молочной отрасли.

Так, А. К. Жумаевым (2009) было проведено математическое моделирование казахстанского рынка молока и молочной продукции и решён ряд задач многосвязного управления крупной молочной компанией (та стратегия развития молочной отрасли, которая на практике была реализована компанией «Адал») [27].

Г.Н. Накиповой, М.Ж. Каменовой и К.А. Ахметовой (2013) для комплексного учёта разнонаправленных тенденций в сфере производства, распределения и потребления молочной продукции были разработаны методы экстраполяции и экспоненциального сглаживания [28].

Однако эти исследования не дают ответа на главный вопрос, стоящий перед молочной отраслью: как повысить эффективность взаимодействия малого/микро бизнеса и крупных перерабатывающих предприятий в контексте задач резкого роста производительности труда и экспорта переработанной продукции.

Выводы

По нашему мнению, для решения данного вопроса в качестве перспективной новой бизнес модели молочной отрасли следует принять ССИ.

В результате проведённого нами опроса руководителей молокоперерабатывающих предприятий и молочно-товарных ферм мы убедились в востребованности разработки качественно нового информационно-аналитического обеспечения прогнозирования и планирования формирования ССИ предприятий молочной отрасли.

Информационная система, без которой в принципе невозможно формирование сетевых структур экономических агентов, по нашему мнению должна обеспечивать:

– обмен информацией между всеми действующими и потенциальными участниками ССИ;

– единство формальных и неформальных правил ведения бизнеса в ССИ;

– аналитическую поддержку принятия системным интегратором/мета-агентом своевременных и адекватных управленческих решений.

Для решения первых двух задач вполне достаточно создания интернет-сервера, на котором публикуются все рабочие материалы с подробной рубрикацией, доступные для участников сети; системы электронных списков рассылки (на базе электронной почты и Интернет-форумов) по отдельным темам проекта и подпроектам, а также информационного портала, который будет освещать деятельность участников сети.

Для решения третьей задачи – аналитической поддержки принятия системным интегратором/мета-агентом своевременных и адекватных управленческих решений – необходима разработка специальной информационной системы.

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ҚАЗАҚСТАННЫҢ СҮТ ӨНЕРКӘСІБІ ТИІМДІ БИЗНЕС ҮЛГІСІН ІЗДЕУДЕ

Аннотация. Бұл мақала Елбасының Қазақстан халқына арнаған. Жолдауында белгіленген еңбек өнімділігінің күрт өсуі және өңделген өнімдерді экспорттау мәселелері бойынша сүт өнеркәсібінің ұйымдық дамуының проблемалары мен перспективаларын талдауға арналған. Ұйымдастырушылық инновацияларға, яғни АӨК қолданатын заманауи бизнес-үлгілерге талдау жүргізілді.

Соңғы екі жылда Қазақстанның сүт өнеркәсібінде көрініс тауып, жинақталған проблемалар және негізгі даму тенденциялары қарастырылды. Бүгінгі таңда сүт және сүт өнімдері тұрақты төлемге қабілетті сұранысқа ие екендігі айқын көрсетілді, бұл сұраныстың басым бөлігі әлі күнге дейін шағын өндірушілердің өз өнімдерінің бөлшек саудалары арқылы қанағаттандырылуда.

Бағалар тұрақты түрде өсуде; тиісінше, сүт өнеркәсібіндегі барлық кәсіпорындар даму перспективаларына ие. Дегенмен, ешқандай жаңа бизнес үлгілер іске асырылмауда - бұл тіпті өткен жылы қабылданған Агроөнеркәсіптік кешенді дамытудың Мемлекеттік бағдарламасында да жоспарланбаған. Сүт кәсіпорындарының дамуы әлі де болса Қазақстан Президентінің Жолдауында қойылған алдағы бес жылда еңбек өнімділігін арттыру және өңделген өнімдердің экспортының үлесін ұлғайтуға бағытталған міндеттерді орындауға бір қадам болса да жасамайтындығы анықталды.

Соңғы екі жылда өнеркәсіптік интеграциялық үдерістерде белсене атсалысқан Шығыс Қазақстан, Жамбыл және Оңтүстік Қазақстан облыстарындағы сүт өндіруші кәсіпорындар мен сүт фермаларының басшыларынан алынған сауалнама нәтижелері ұсынылуда. Сүт өнеркәсібінің экономикалық агенттерінің жаңа бизнес үлгіде, шағын бизнестердің ірі кәсіпорындардың өндіру-өткізу тізбектеріне бірігудегі желілік құрылымда қатысуға дайындығын бағалау жаңа сапалы ақпараттық және болжау аналитикалық қолдауды дамыту қажеттілігін және Қазақстанның сүт өнеркәсібі үшін жаңа бизнес үлгілерін қалыптастыруды жоспарлау қажеттілігін айқын көрсетті.

Түйін сөздер: сүт өнеркәсібі, бизнес үлгі, ұйымдастырушылық инновация, желілік құрылым, интеграциялық процесс, экономикалық агент, жүйелік интегратор, ақпараттық жүйе.

REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
ISSN 2224-5227
Volume 2, Number 318 (2018), 195 – 202

УДК 336.22

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METHODICAL TOOLKIT OF REGIONAL TAX POTENTIAL ASSESSEMENT

Abstract. In this article, the authors consider methodological tools for assessing the tax potential of the region. The relevance of the chosen topic was substantiated in the article. As methods used: deduction, induction and comparative-comparative methods. The authors analyze various approaches to the definition of the term «tax potential». The author's interpretation of this concept is presented in the article. Next, methods for assessing the tax potential are considered. The first method analyzed was the method of a representative tax system. The second method is based on the gross regional product. The mechanisms of action of the assessment methods presented were considered. Using these methods, an analysis of the tax potential of the two regions - Almaty and Karaganda regions was carried out. With regard to the first method, it was noted that the Almaty region is unstable. The Karaganda oblast has an increase in the degree of realization of the tax potential in this indicator. According to the second method, there was an overfulfilment of the planned value in the Almaty region. While in Karaganda, this could only be fixed in 2017. In conclusion, ways to increase the tax potential of the region are given. The most effective of them is the improvement of the tax base of the region. As a proposal, tools have been described that can improve the accuracy of the assessment. These include a tax passport and a bloch-chain system. The results of the article can be used for further investigation of the analyzed issue. The proposed instruments can be used by local authorities for a more reliable assessment of their own tax potential.

Key words: tax potential, region, valuation method, tax passport, block-chain.

УДК 336.22

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МЕТОДИЧЕСКИЙ ИНСТРУМЕНТАРИЙ ОЦЕНКИ НАЛОГОВОГО ПОТЕНЦИАЛА РЕГИОНА

Аннотация. В данной статье авторы рассматривают методический инструментарий оценки налогового потенциала региона. В статье была обоснована актуальность выбранной темы. В качестве методов использованы: дедукция, индукция и сравнительно-сопоставительные методы. Авторы анализируют различные подходы к определению термина «налоговый потенциал». В статье представлена авторская трактовка данного понятия. Далее рассматриваются методы оценки налогового потенциала. Первым анализируемым методом был метод репрезентативной налоговой системы. Вторым – метод на основе показателя валового регионального продукта. Были рассмотрены механизмы действия представленных методов оценки. С применением данных методов был проведен анализ налогового потенциала двух регионов – Алматинской и Карагандинской областей. В отношении первого метода было отмечено, что Алматинская область отличается нестабильностью. Карагандинская область по данному показателю имеет рост степени реализации налогового потенциала. По второму методу в Алматинской области отмечалось перевыполнение планового значения. В то время как в Карагандинской это может было зафиксировано только в 2017 году. В заключении приводятся способы повышения налогового потенциала региона.

Наиболее эффективным из них считается совершенствование базы налогообложения региона. В качестве предложения были описаны инструменты, которые могут повысить точность оценки. К ним относятся налоговый паспорт и система bloch-chain. Результаты статьи могут быть использованы для дальнейшего исследования анализируемого вопроса. Предложенные инструменты могут быть использованы местными органами власти для более достоверной оценки собственного налогового потенциала.

Ключевые слова: налоговый потенциал, регион, метод оценки, налоговый паспорт, block-chain.

В современных условиях Республика Казахстан поставила перед собой задачу динамичного социально-экономического развития страны и её вхождения в 30 наиболее развитых стран мира. Для достижения намеченных целей необходимо выполнить ряд условий, среди которых необходимо отметить эффективную оценку налогового потенциала регионов Республики Казахстан и на этой основе дальнейший рост их экономики [1]. Эффективная оценка налогового потенциала казахстанской экономики требует справедливо оценивать доходные возможности бюджета каждого региона в отдельности и экономики в целом [2]. Налоговый потенциал региона выступает наиболее целесообразной характеристикой потенциально доступных финансовых ресурсов, что позволит провести рациональную оценку возможностей каждого региона и сократить объемы трансфертов из малочисленных регионов-доноров [3]. Верная оценка налогового потенциала региона дает возможность оценить действительную потребность в финансовой помощи, повышает самостоятельность регионов, снимает в какой-то мере противоречия между регионами и центром в связи с тем, что устраняется главная причина – несправедливость в распределении финансовой помощи [4]. Следовательно, перед нами стоит задача формирования такого методического инструментария оценки налогового потенциала региона, который будет в полной мере отражать возможности региона, а также позволит выявить источники роста налоговых поступлений в региональный бюджет.

Для выполнения поставленной задачи будет использоваться ряд следующих методов – дедукция, индукция, сравнительно-сопоставительные методы, а именно анализ, синтез, сравнение, классификация, измерение, а также факторный анализ.

Максимально достоверная оценка налогового потенциала каждого региона выступает одним из важнейших факторов формирования бюджетной, а соответственно, и налоговой политики государства в целом, так как этот показатель является наиболее целесообразной характеристикой доступных финансовых ресурсов [5].

Данная тема актуальна для казахстанской практики в связи с тем, что в Республике Казахстан местные бюджеты регионов дифференцированы по объему налоговых поступлений. Это связано, прежде всего, с их неравномерным развитием, что в свою очередь отражается на уровне налогового потенциала региона. Так, большинство регионов Республики Казахстан являются реципиентами и нуждаются в финансовой поддержке в связи с тем, что собственный налоговый потенциал данных регионов недостаточен для осуществления поставленных перед ними задач и покрытия собственных расходов.

Обеспечение политической самостоятельности, производственной автономии и экономической независимости каждого региона – необходимый элемент в механизме ускоренного, сбалансированного и устойчивого роста национальной макроэкономической системы [6].

Под налоговым потенциалом в мировой практике понимается способность базы налогообложения, которая находится в пределах обозначенной территории, приносить налоговые поступления, т.е. доход в местные бюджеты. В свою очередь в Республике Казахстан под налоговым потенциалом следует понимать максимально возможную сумму поступлений налогов и других обязательных платежей в бюджет, рассчитываемую для определения объемов доходов региона [7].

Приведенное выше понятие в авторской трактовке приняло следующий вид – «налоговый потенциал есть не просто потенциальный, возможный объем налоговых поступлений, а такой размер налоговых платежей, который не приведет к угнетению деловой активности и к снижению производительности налогоплательщиков, а также это есть результат взаимодействия органов налоговой службы с налогоплательщиками и эффективность осуществления фискальных усилий со стороны государства в лице налоговых органов».

Оценка регионального налогового потенциала может осуществляться в абсолютном выражении или в индексах, которые отражают соотношение искомого показателя к среднему значению показателя в масштабе страны или выбранной группы. Индексы являются более справедливым отражением действительности, так как они в меньшей степени зависимы от недостатков в применяемых методах расчета, а также позволяют сократить в ощутимой мере влияния инфляционных процессов [8].

В мировой практике существует множество методов оценки налогового потенциала, основными из них можно назвать метод на основе репрезентативной системы и метод на основе валового регионального продукта (ВРП) [9].

Одним из основных методов оценки налогового потенциала, как было отмечено ранее, является «метод репрезентативной налоговой системы». Данная система разработана экспертной комиссией Соединенных Штатов Америки по межбюджетным отношениям [10].

Сущность применения репрезентативной системы как метода оценки налогового потенциала заключается в расчете суммы платежей в бюджет, которую возможно собрать при условиях, что усилия налоговых органов находятся на среднем уровне, структура налогов и их ставки являются одинаковыми во всех регионах. По полученным данным о собранных налогах рассчитывается совокупный объем поступлений, т.е. налоговый потенциал.

Основным преимуществом рассматриваемого метода является то, что в нем можно применять регрессионный анализ. Соответственно, использование данного анализа сократит объем необходимой для измерения налогового потенциала информации. Следовательно, аналитику потребуются данные лишь о совокупных доходах в анализируемом регионе, а также набор из нескольких переменных, используемых в виде косвенных измерителей региональных налоговых баз [11].

Несмотря на существующие достоинства представленного метода оценки налогового потенциала региона, он имеет свои недостатки, основные из которых могут быть устранены с помощью совершенствования используемой налоговой отчётности. Для этого необходимо проводить более оперативную работу в области формирования официальной информации о налогооблагаемых базах для ряда налогов, используемых в репрезентативной налоговой системе (РНС) [12].

Согласно методу на основе ВРП оценить уровень налогового потенциала можно с помощью произведения средневзвешенной налоговой ставки (в данном случае, исключая города республиканского значения, а базируясь исключительно на данных областей) за предыдущий период и прогнозного значения ВРП на оцениваемый период.

При этом средневзвешенная налоговая ставка измеряется в процентах, рассчитывается как «соотношение суммы налоговых обязательств всех областей к суммарному значению их ВРП» [13].

Далее произведем расчет налогового потенциала по выше рассмотренным методам оценки по двум регионам Республики Казахстан – Алматинской и Карагандинской областям.

Метод РНС применяется в отношении бюджетообразующих налогов, к которым в рассматриваемых регионах можно отнести КПН. Базой налогообложения, тесно связанной с объемами поступлений платежей по выбранному налогу, служит прибыль до налогообложения (ПДН) компаний. Первым шагом рассчитаем средневзвешенную репрезентативную ставку по КПН. Для расчета регионального налогового потенциала анализируемых областей на 2017 год будут использованы данные о фактических налоговых поступлениях по КПН в бюджет, сгенерированные на территории рассматриваемых регионов, а также в качестве базы налогообложения решено применять показатель ПДН за 2016 год. Для определения средневзвешенной налоговой ставки будут использованы вышеперечисленные данные.

Таким образом, средневзвешенная налоговая ставка по КПН, рассчитанная как соотношение средней по регионам страны величины фактически собранных поступлений КПН и средней по регионам страны величины базы налогообложения (ПДН), в 2016 году составила 0,2647 или 26,47%. Аналогично была рассчитана средневзвешенная налоговая ставка по КПН за 2014 и 2015 года. Так, рассматриваемый показатель составил в 2014 году – 44,09%, в 2015 – 35,11%, в 2016 – 26,47%.

Следующим шагом для вычисления регионального налогового потенциала по КПН на 2017 год для анализируемых регионов следует перемножить средневзвешенную налоговую ставку за 2016 год и показатель ПДН за тот же период. Таким образом, расчет для Алматинской области на 2017 год 89,24 миллиарда тенге, умноженные на 26,47%, в результате получаем 23,62 миллиарда тенге – налоговый потенциал по КПН Алматинской области. Аналогично проведем расчет по Алматинской области за 2015 и 2016 года, затем сравним полученные значения с фактическим объемом налоговых поступлений по КПН, т.е. выявим степень реализации алматинского налогового потенциала по КПН как соотношение фактического объема ПДН и прогнозного значения, умноженного на 100%.

По аналогичному алгоритму проводим расчет карагандинского налогового потенциала по КПН за 2015 – 2017 года: средневзвешенная по регионам страны ставка за предыдущий период перемножается с показателем ПДН за аналогичный период. Например, карагандинский налоговый потенциал на 2017 год вычисляется путем перемножения средневзвешенной налоговой ставки 2016 года с ПДН Карагандинской области за 2016 год. Результаты проведенных расчетов представлены в таблице 1.

Таблица 1 – Степень реализации налоговых потенциалов по КПН Алматинской и Карагандинской областей за 2015-2017 года

Год	**Алматинская область**			**Карагандинская область**		
	Налоговый потенциал, млрд. тенге	Фактические налоговые поступления, млрд. тенге	Степень реализа-ции, %	Налоговый потенциал, млрд. тенге	Фактические налоговые поступления, млрд. тенге	Степень реализации, %
2015	28,72	11,2	39	30,63	20,43	66,7
2016	14,05	22,19	157,94	21,99	62,55	284,45
2017	23,62	24,95	105,63	24,71	77,48	313,56
Примечание – Рассчитано автором на основе данных источника [14]						

Таким образом, нами была проведена оценка регионального налогового потенциала по КПН по двум анализируемым областям за 2015 – 2017 года в рамках метода РНС. Динамический анализ прогнозной величины алматинского налогового потенциала по КПН показал, что данный показатель отличается нестабильностью в рассматриваемом периоде. В 2016 году рассматриваемый показатель сократился в сравнении с предыдущим периодом на 14,67 миллиардов тенге или 51,1%. Данное значительное увеличение объясняется одновременным снижением двух составляющих. Во-первых, сокращением средневзвешенной налоговой ставки на 8,98%. Во-вторых, сужением базы налогообложения по КПН в рассматриваемом регионе, т.е. уменьшением показателя ПДН на 25,12 миллиарда тенге или на 38,6%. В 2017 году наблюдался рост абсолютного значения прогнозной величины налогового потенциала анализируемого региона за счет заметного увеличения объема ПДН и сокращения средневзвешенной налоговой ставки на 8,64%.

В отношении Карагандинской области можно отметить аналогичную ситуацию, т.е. в период с 2015 года на 2016 год наблюдалось сокращение прогнозного показателя налогового потенциала на 8,64 миллиарда тенге в абсолютном выражении и на 28,2% в процентном выражении. А в следующем периоде отмечается рост рассматриваемого показателя, который составил – 2,72 миллиарда тенге или 12,4%. Причины таких колебаний аналогичны тем, что были отмечены в отношении Алматинской области.

Согласно данным таблицы 18, в 2015 году Алматинской областью не был реализован имеющийся налоговый потенциал. В 2016 году степень реализации регионального налогового потенциала по КПН заметно увеличилась (на 118,94%). Данное увеличение может быть объяснено снижением прогнозного значения налогового потенциала по КПН наряду с увеличением фактически аккумулированных налоговых поступлений по анализируемому налогу. Полученный рост степени реализации регионального налогового потенциала в 2016 году сменяется падением на 52,31% в последующем периоде. Это обусловлено одновременным повышением прогнозного значения регионального налогового потенциала и фактического объема налоговых поступлений по

анализируемому налогу, но имеющее различный темп роста – 68% и 12% соответственно.

При сравнении степени реализации регионального налогового потенциала по рассматриваемому налогу в Алматинской и Карагандинской областях можно заметить, что в последней отмечается повышенный уровень налоговой нагрузки, возникший из-за производства фактического объема налоговых поступлений в размере, превышающем прогнозное значение регионального налогового потенциала. В отношении динамики анализируемого показателями в обоих регионах можно отметить рост в анализируемом периоде, но при этом, в Карагандинской области он отличается высокой скоростью, так как за 2015-2017 года он вырос на 246,86%.

Таким образом, мы провели оценку алматинского и карагандинского налогового потенциала по КПН за 2015-2017 года. По результатам проведенного сравнительного анализа было выявлено, что динамика регионального налогового потенциала по исследуемому налогу Алматинской области и степень его реализации характеризуются нестабильностью. В то время как Карагандинская область, напротив, характеризуется стабильным ростом степени реализации в исследуемом периоде.

Далее рассчитаем уровень налогового потенциала анализируемых регионов за 2015 – 2017 года с использованием метода на основе ВРП. Для этого произведём расчет средневзвешенной налоговой ставки по 14 областям Республики Казахстан за 2014 – 2016 года, как было отмечено ранее, из расчета исключены города республиканского значения, которые имеют значительные объемы ВРП и налоговых поступлений, что приводит к искажению среднего значения ставки по стране. Для наглядности рассмотрим расчет за 2016 год, в котором соотносятся суммарное значение налоговых поступлений (3 489,28 миллиардов тенге) и сумма ВРП 14 областей Республики Казахстан (31 333 миллиардов тенге). Так, средневзвешенная налоговая ставка за 2016 год составила 11,1%. В 2014 и 2015 году рассматриваемый показатель составил 11,2% и 10,3%.

Для определения налогового потенциала за 2017 год для Алматинской области умножим средневзвешенную налоговую ставку 2016 года (11,1%) на прогнозируемое значение ВРП для данной области на 2017 год (2 004,3 миллиарда тенге). Аналогичным способом можно произвести расчет налогового потенциала Карагандинской области за 2017 год, умножив средневзвешенную налоговую ставку 2016 года на прогнозное значение объема ВРП анализируемой области на 2017 год. Величина прогнозируемых показателей ВРП по обоим рассматриваемым регионам за 2015 – 2017 года отражена в таблице 2.

Таблица 2 – Прогнозируемые объемы ВРП Алматинской и Карагандинской области, миллиард тенге

Область	**2015**	**2016**	**2017**
Алматинская	1 874,7	1 930,9	2 004,3
Карагандинская	2 753,3	2 893,2	3 003,2
Примечание – Составлено автором на основе данных источников [16, 17]			

В результате проведенного расчета получаем значение налогового потенциала за 2017 год по Алматинской области равное 222,48 миллиардов тенге. Проведем аналогичные расчеты за 2015 и 2016 года по Алматинской и Карагандинской областям. Результаты расчетов представлены в таблице 3.

Таблица 3 – Степень реализации налоговых потенциалов Алматинской и Карагандинской областей за 2015-2017 года

Год	**Алматинская область**			**Карагандинская область**		
	Налоговый потенциал, млрд. тенге	Фактические налоговые поступления, млрд. тенге	Степень реализа-ции, %	Налоговый потенциал, млрд. тенге	Фактические налоговые поступления, млрд. тенге	Степень реализа-ции, %
2015	209,97	253,43	120,7	308,37	236,12	76,6
2016	198,88	264,56	133	297,99	259,44	87,1
2017	222,48	318,57	143,2	333,36	340,38	102,1
Примечание – Рассчитано автором на основе данных таблиц 2 и источника [18]						

Если провести сравнение значений полученных в результате расчета в таблице 3, то можно

отметить, что фактический объем налоговых поступлений превышает прогнозный объем налогового потенциала в Алматинской области за весь анализируемый период. Сумма превышения за три года в среднем составила примерно 68 миллиардов тенге.

В отношении Карагандинской области следует отметить, что превышение наблюдается только в 2017 году, а в предыдущих периодах отмечается противоположная тенденция, т.е. налоговый потенциал рассматриваемого региона не в полной мере реализовывался. Превышение прогнозного значения над фактическим в среднем за два года составил приблизительно 55 миллиардов тенге. Это сигнализирует о том, что в Карагандинской области имелся резерв роста фактических поступлений налоговых платежей в бюджет в указанном размере, который был использован в полном объеме в последующем периоде.

Таким образом, уровень регионального налогового потенциала во многом зависит от избираемой методики его оценки, что приводит к необходимости выявления сильных и слабых сторон использованных методик оценки регионального налогового потенциала. Данная информация будет представлена в последующем подразделе магистерской диссертации.

Проведенная оценка регионального налогового потенциала на основе показателя ВРП и РНС продемонстрировала, что в определенных случаях региональный налоговый потенциал анализируемых регионал не был реализован в полной мере. Соответственно, перед налоговыми органами стоит задача по повышению степени реализации регионального налогового потенциала путем увеличения объема налоговых поступлений в бюджет.

Наиболее распространенными способами повышения объема налоговых поступлений в доходную часть бюджета являются следующие:

- введение новых видов налога;
- повышение ставок по существующим налогам;
- совершенствование администрирование в налоговой сфере;
- сужение круга субъектов, способных использовать налоговые льготы;
- прямое сокращение количества налоговых льгот;
- совершенствование базы налогообложения региона.

Для облегчения процесса оценки регионального налогового потенциала, т.е. для того, чтобы он стал менее трудоёмким, необходимо собрать всю необходимую для анализа информацию в едином документе. В целях точной и достоверной оценки налогового потенциала каждой административно-территориальной единицы следует разрабатывать для них налоговый паспорт на регулярной основе.

Под налоговым паспортом подразумевается комплексный документ, использование которого позволит оценивать уровень регионального налогового потенциала. В данном документе получит отражение характеристика базы налогообложения региона, объемы налоговых поступлений в целом и в отдельности по каждому виду налога в динамике. Это предоставит возможность спрогнозировать будущие налоговые поступления на среднесрочную перспективу в соответствии с действующим законодательством, а также с учетом возможных изменений в нем. Разработка исследуемого документа также предоставит возможность смоделировать показатели базы налогообложения и будущий объем налоговых поступлений на основе ретроспективных данных, а также путем внесения корректировок и поправок в определенные параметры базы налогообложения.

В первую очередь, налоговый паспорт отвечает интересам органов государственной власти в объективной оценке сложившейся ситуации в области налогообложения в стране, регионе, а также предоставит возможность принимать решения, способствующие повышению степени собираемости налоговых платежей и сборов. Помимо этого разработка исследуемого документа обеспечит наличие достоверной информации об объеме налоговых поступлений, а также позволит определить существующие резервы их роста. Паспортизация регионов особенно актуальна в свете осуществляемой фискальной политики по децентрализации регионов Казахстана, которая была обозначена в Послании Президента Республики Казахстан [19].

В отмеченном документе также предлагается использование системы block-chain для администрирования возврата НДС. В связи с те, что block-chain – это сеть, которая выполняет привязку транзакций в непрерывную цепочку транзакций, каждая из которых содержит новую

информацию, плюс предыдущие данные [20]. Данная технология может использоваться для хранения информации обо всех налогоплательщиках региона, уплачиваемых ими налогов, способствовать быстрому получению данных о налоговом потенциале региона и нахождению путей по его повышению.

Таким образом, на сегодняшний день методический инструментарий оценки налогового потенциала несовершенен. При этом он может быть расширен и улучшен с помощью внедрения новых инновационных для отечественной практики инструментов информационной технологии. Предложенный налоговый паспорт и block-chain могут использоваться в совокупности, то есть вся отмеченная информация для налогового паспорта может храниться в цепочке данных и периодически обновляться, что позволит своевременно реагировать на изменения объема налогового потенциала региона.

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УДК 336.22

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АЙМАҚТАРДЫҢ САЛЫҚТЫҚ ӘЛЕУЕТІН БАҒАЛАУДЫҢ ӘДІСТЕМЕЛІК ҚҰРАЛДАРЫ

Аннотация. Осы мақалада авторлар аймақтың салық әлеуетін бағалаудың әдістемелік құралдарын қарастырады. Таңдалған тақырыптың өзектілігі мақалада негізделген. Қолданылатын әдістер: шегеру, индукция және салыстырмалы-салыстырмалы әдістер. Авторлар мерзімдік «салық әлеуетін» анықтауға әртүрлі тәсілдерді талдайды. Осы тұжырымдаманың автордың түсіндірмесі мақалада келтірілген. Одан кейін салық әлеуетін бағалау әдісі қарастырылады. Талданып отырған бірінші әдіс өкілдік салық жүйесінің әдісі болды. Екінші әдіс жалпы өңірлік өнімге негізделген. Ұсынылған бағалау әдістерінің әрекет ету тетіктері қаралды. Осы әдістерді пайдалана отырып, екі аймақтың - Алматы және Қарағанды облыстарының салық әлеуетін талдау жүргізілді. Бірінші әдіске қатысты Алматы облысының тұрақсыз екендігі атап өтілді. Қарағанды облысында осы көрсеткіш бойынша салық әлеуетін іске асыру дәрежесі артты. Екінші әдіске сәйкес, Алматы облысында жоспарлы құнды асыра пайдалану болды. Қарағандыда бұл 2017 жылы ғана белгіленуі мүмкін. Қорытындылай келе, аймақтың салық әлеуетін арттыру жолдары қарастырылған. Олардың ең тиімдісі - аймақтың салық базасын жақсарту. Ұсыныс ретінде бағалаудың дұрыстығын жақсартуға болатын құралдар сипатталды. Оларға салық төлқұжаты мен блок-тізбектер жүйесі кіреді. Мақаланың нәтижелері талданатын мәселені әрі қарай зерттеу үшін пайдаланылуы мүмкін. Ұсынылған құжаттар жергілікті билік органдары өздерінің салықтық әлеуетін барынша сенімді бағалау үшін пайдаланылуы мүмкін.

Түйін сөздер: салық потенциалы, аймақ, бағалау әдісі, салық төлқұжаты, block-chain.

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www:nauka-nanrk.kz

ISSN 2518-1483 (Online), ISSN 2224-5227 (Print)

http://www.reports-science.kz/index.php/ru/

Редакторы *М. С. Ахметова, Т.А. Апендиев, Аленов Д.С.*
Верстка на компьютере *А.М. Кульгинбаевой*

Подписано в печать 13.04.2018.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
12,6 п.л. Тираж 500. Заказ 2.

Национальная академия наук РК
050010, Алматы, ул. Шевченко, 28, т. 272-13-18, 272-13-19