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MUAMMOLARI**

**АКТУАЛЬНЫЕ ВОПРОСЫ СОВРЕМЕННОЙ НАУКИ,
ОБРАЗОВАНИЯ И ВОСПИТАНИЯ**

**ACTUAL PROBLEMS OF MODERN SCIENCE,
EDUCATION AND TRAINING**





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ACTUAL PROBLEMS OF MATHEMATICS, PHYSICS AND MECANICS

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STRUCTURAL FEATURES OF SOLID SOLUTIONS $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ FILMS GROWN FROM A LIQUID PHASE ON GaAs SUBSTRATES AND SOME PHOTOELECTRIC PROPERTIES OF HETEROSTRUCTURES ON THEIR BASIS

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ABSTRACT: Layers of solid solutions $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ on (100) GaAs and (100) GaP substrates were grown by liquid phase epitaxy from an indium melt solution. The solid solution $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$) had a mono-crystal structure with the orientation (100), constant of the lattice $a_{\text{s.s.}} = 6.486 \text{ \AA}$ and the hole conductivity type. The spectral dependence of the absorption coefficient was used to estimate the band gap of the epitaxial layer of the solid solution, which was 0.11 eV.

The spectral photosensitivity of $n\text{-GaAs-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ and $n\text{-GaP-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ heterostructures covers the wavelength range from 1.0 to 5.3 μm .

Keywords: solid solution, liquid-phase epitaxy, band gap energy, carrier concentration, heterostructure, spectral dependence of the absorption coefficient, spectral dependences of the photosensitivity.

АННОТАЦИЯ: Методом жидкофазной эпитаксии из индиевого раствора расплава выращены слои твердых растворов $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ на $\text{GaAs}(100)$ и $\text{GaP}(100)$ подложках. Твердый раствор $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$) имел монокристаллическую структуру с ориентацией (100), с параметром решетки $a_{\text{s.s.}} = 6.486 \text{ \AA}$ и дырочной проводимости. Для оценки ширины запрещенной зоны эпитаксиального слоя твердого раствора, которая составляла 0,11 эВ, использовалась спектральная зависимость коэффициента поглощения. Спектральная фоточувствительность гетероструктур $n\text{-GaAs-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ и $n\text{-GaP-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ охватывает диапазон длин волн от 1,0 до 5,3 мкм.

Ключевые слова: твердый раствор, жидкофазная эпитаксия, энергия запрещенной зоны, носители заряда, гетероструктура, спектральная зависимость коэффициента поглощения, спектральная зависимость фоточувствительности.

АННОТАЦИЯ: Суюк фазали эпитаксия усули билан индийли эритмадан $\text{GaAs}(100)$ ва $\text{GaP}(100)$ тагликларида $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ қаттиқ қотишманинг қатламлари ўстирилди. $\text{InSb}_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$) қаттиқ қотишма (100) ориентацияли, $a_{\text{s.s.}} = 6.486 \text{ \AA}$ панжара доимийли монокристалл, ковакли ўтказувчанликли структурага эга. Қаттиқ қотишманинг эпитаксиал қатламларини 0,11 эВ га тенг тақикланган зонасини кенглигини баҳолаш учун ютилиш коэффициентини спектрал боғланишидан фойдаланилди. $n\text{-GaAs-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ ва $n\text{-GaP-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ гетероструктураларни спектрал фотосезгирлиги тўлқин узунлигининг 1,0 дан 5,3 мкм гача бўлган диапазонини эгаллайди.

Калит сўзлар: қаттиқ қотишма, суюқ фазали эпитаксия, тақиқланган зона энергияси, заряд ташувчилар, гетероструктура, ютилиш коэффициентининг спектрал боғланиши, фотосезгирликни спектрал боғланиши.

Introduction

Narrow-gap solid solutions obtained on the basis of elemental semiconductors and binary compounds III-V are promising semiconductor materials for the creation of various optoelectronic devices operating in the middle and far infrared (IR) emission spectrum. On the basis of GaSb and its GaInAsSb, AlGaAsSb solid solutions, efficient light emitting diodes [1] and high-speed photodiodes [2] were created. They operate in the spectral range 1.5–4.8 μm , which have absorption lines for water vapor, CO₂, and nitrogen-containing molecules (H₂O, NO₂, NH₃), hydrocarbon molecules, etc. and, therefore, can be used for environmental and technological control of the environment [3]; they can be used in medicine, as well as in fiber optical communication lines. On the basis of InAsSb/InAsSbP heterostructures grown on InAs substrates [4], spontaneous emission sources were created, that operate in the long-wavelength IR region of the spectrum in the wavelength range of 3–5 μm . The InAs_{1-x-y}Sb_xBi_y epitaxial layers ($x = 0.82$ and $y = 0.0018$) with the long-wavelength edge of the intrinsic optical absorption of 8.9 μm at 77 K were obtained by the method of liquid-phase epitaxy on InSb substrates with 5.9 μm at 77 K [5]. According to calculated estimates [6], the creation of elastically strained heterocompositions of the InAs_{1-x-y}Sb_xBi_y/InSb type can significantly decrease the band gap of solid solutions and displace the edge of intrinsic optical absorption at 77 K to 12-14 μm . The thickness of the epitaxial layers forming such heterocompositions should not exceed the limit corresponding to the transition of the elastically strained state to relaxed one with the formation of misfit dislocations, and in most cases lie in the range from units to hundreds of nm, which complicates the process of growing such heterostructures.

Despite the great success of research and development of various optoelectronic devices based on III-V semiconductor compounds, at present only some of them have found practical application. This is due to the relative complexity of their cleaning and growing crystals, which makes them still quite expensive compared to elemental semiconductor materials, such as germanium and silicon.

This paper presents the results of experimental studies of the growth and some electrophysical, photovoltaic properties of n-GaAs-p-(InSb)_{1-x}(Sn₂)_x heterostructures. Since solid solutions (InSb)_{1-x}(Sn₂)_x are narrow-gap materials, optoelectronic devices operating in the far-IR region of the spectrum in the wavelength range from 6 to 14 μm can be developed on their basis.

Research Methodology

1. Features of liquid-phase epitaxy of films of solid solutions (InSb)_{1-x}(Sn₂)_x on GaAs substrates.

To substantiate the possibility of forming solid solutions of elemental semiconductors and binary compounds III-V, we proceed from the thermodynamic principle of crystal chemistry, which is that in any physicochemical system, whose components are chemical elements, there is a chemical interaction between atoms (or ions) for all their quantitative ratios. At low temperatures atoms tend to be positioned in relation to each other in such a way as to produce the largest possible advantage of energy with given effective charges and atomic sizes. This arrangement of atoms is hindered by structural possibilities, and at high temperatures by thermal motions too [7]. Note that even if the structural possibilities exclude the formation of solid solutions by the mutual substitution of atoms (or molecules) of components, under favorable thermal conditions. It is possible the formation of solid solutions for the substitution of compounds (groups of the same atoms or different ones) structurally and energetically, since displace entropy causes the thermodynamic potential system decreases.

Growing mono-crystals of compound III-V and solid solutions based on them by the method of liquid phase epitaxy is based on the direct interaction of the

elements or molecules of the solution of the forming components and their crystallization from the melt solution. These compounds at temperatures close to the melting point, disproportionate by reaction



moreover, depending on volatility, some elements of group V can easily pass into the gas phase, but elements of group III have low vapor pressure and can remain in a liquid state, resulting in a disproportionation of the compound, and this makes it difficult to synthesize and grow mono- crystals from solution - melt at high temperatures close to the melting point. It should be noted that compounds III-V as compared with elements of group IV have a lower melting point. Such a relative lowering of the melting point in these compounds occurs due to a certain amount of ionicity in the bond. Consequently, the temperature is very significant for the growth of epitaxial layers based on compound III-V.

Under certain thermodynamic conditions the possibility of the formation of a solid solution of substitution of Group IV and III-V compounds is determined by the type of crystal lattices of the components forming the solution, their charge states and geometrical sizes [8]:

$$\Delta z = (z_{\text{IV}} + z_{\text{IV}}) - (z_{\text{III}} + z_{\text{V}}) = 0, \quad (2)$$

$$\begin{aligned} |\Delta r| &= |(r_{\text{IV}} + r_{\text{IV}}) - (r_{\text{III}} + r_{\text{V}})| \leq 0.1 \cdot (r_{\text{IV}} + r_{\text{IV}}) \\ |\Delta r| &= |(r_{\text{IV}} + r_{\text{IV}}) - (r_{\text{III}} + r_{\text{V}})| \leq 0.1 \cdot (r_{\text{III}} + r_{\text{V}}) \end{aligned} \quad (3)$$

where z_{III} , z_{IV} and z_{V} are valencies; r_{III} , r_{IV} and r_{V} are the covalent radii of atoms of the chemical elements of groups III, IV and V, respectively. Condition (2) provides for the electroneutrality of the dissolved chemical elements or compounds in the solvent semiconductor material; it is fulfilled when the dissolved elements are isovalent in relation to the solvent semiconductor. Condition (3) provides for the proximity of the geometric parameters of the solvent compound (m) and the soluble compound (n), excluding the occurrence of significant distortions of the crystal lattice

in solid solutions. The smaller $|\Delta r|$, the lower the energy of the elastic distortions of the crystal lattice, therefore, the greater the crystalline perfection of the solid substitution solution and the greater the solubility n in m . When the difference between the sum of the covalent radii of the atoms of the molecules of the components forming solution is more than 10%, the formation of the solid solution from these components is insignificant.

The sum of the valences of atoms of Sn_2 molecules ($z_{\text{Sn}} + z_{\text{Sn}} = 8$) and InSb ($z_{\text{In}} + z_{\text{Sb}} = 8$), as well as the covalent radii $r_{\text{Sn}} + r_{\text{Sn}} = 2,80 \text{ \AA}$ and $r_{\text{In}} + r_{\text{Sb}} = 2,80 \text{ \AA}$ are equal, therefore, these molecules satisfy conditions for the formation of solid solution substitution (2) and (3). Wot replacing Sn_2 molecules with InSb molecules, the deformation of the crystal lattice will be insignificant, the energy of elastic distortions of the crystal lattice will be minimal. It is known that the forbidden zone of semiconductor tin has the value 0.08 eV, and indium antimonide - 0.18 eV, therefore, solid solutions based on them are perspective materials for optoelectronic devices operating in the infrared range of the emission spectrum with the wavelength longer than 6 microns.

Analys and Results

Solid solutions $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ were grown by liquid phase epitaxy from a limited volume of indium melt in an atmosphere of hydrogen purified by palladium in technological installation with a vertical reactor. In the graphite cassette of the reactor, horizontally positioned substrates were fixed, they were separated from each other by graphite supports. A liquid solution-melt was poured into the space between the two upper and lower substrates through the side slots of the cassette. The distance between the upper and lower substrates was varied from 0.25 to 2.5 mm. This regulated the volume of the solution-melt. Polished GaAs wafers with the diameter of 20 mm, with the crystallographic orientation of (100), n-type conductivity with the carrier density of $(4-7) \cdot 10^{17} \text{ cm}^{-3}$ served as substrates.

The technological conditions allowed the following parameters to be varied: the component composition of the solution-melt; distance between upper and lower

supports; the beginning and end of the crystallization temperature of the grown layer; speed of forced cooling of the melt solution.

When we choose a metal solvent for the preparation of a liquid solution-melt, we studied the solubility of InSb in various metal solvents. The most acceptable solvent for technological reasons was In. The solubility of InSb was determined in the temperature range of 220–450 ° C by the method of weight loss of indium antimonide samples placed in liquid indium and kept in it until the solution was saturated. The effect of Sn on the solubility of InSb was taken into account. The composition of the In–InSb–Sn-melt solution was calculated on the basis of literature data [9] and the results of preliminary experiments, taking into account the solubility of binary components.

The growth of epitaxial layers was carried out by varying the temperature of the beginning of crystallization from 300 to 400 ° C, the speed of forced cooling from 0.5 to 3 grad/min. Depending on mode of the growth, the thickness of the epitaxial layers changed within 4–15 μm. Specially not doped layers had conductivity of p-type. The mode of optimal growth had the following parameters: the temperature range of growth was 325–250 ° C, the solution-melt thickness was 1 mm, the cooling rate was 1 grad/min. At the initial moment of growth, InSb crystallizes from the solution-melt, since at the selected epitaxy temperature the solution is saturated in relation to InSb. At lower temperatures, conditions are created for growing the solid solution $(\text{InSb})_{1-x}(\text{Sn}_2)_x$, since at these temperatures the solution-melt becomes supersaturated by indium antimonide and tin. Under these conditions, we were able to obtain crystal-perfect, mirror-smooth epitaxial films of the $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ solid solution on GaAs substrates.

Since the periods of the crystal lattices of GaAs (5.653 Å) and InSb (6.475 Å) are different, growing InSb on arsenide gallium substrates without a buffer layer or without a graded-gap $(\text{GaAs})_{1-x}(\text{InSb})_x$ ($0 \leq x \leq 1$) layer seems to be will be very difficult [10, 11]. The melt solution was not diluted with gallium arsenide; consequently, after the contact the substrate with indium melt- solution at the given

temperature a slight dissolution of the substrate occurs and at the initial moment dissolved GaAs molecules will be present in the solution at the crystallization front. Based on the principle of similarity, i.e. the similar dissolve in the similar, it can be assumed that at the initial moment of growth crystallization of the graded-gap layer of the substitution solid solution $(\text{GaAs})_{1-x}(\text{InSb})_x$ with varying composition occurs. The tetrahedral lattices of the such layer are shown in Fig.1.

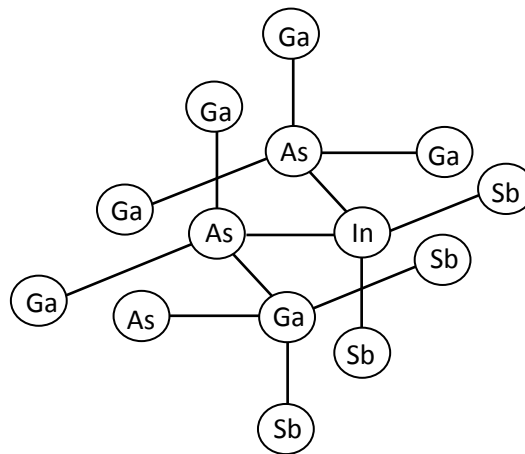


Fig.1.

Tetrahedral lattices of the substitution solid solution $(\text{GaAs})_{1-x}(\text{InSb})_x$.

As can be seen from Fig. 1, the tetrahedral lattices of the $(\text{GaAs})_{1-x}(\text{InSb})_x$ solid solution have both Ga-As, In-Sb, and Ga-Sb, In-As bonds. Difference of covalent radii of atoms of GaAs and InSb molecules:

$$\Delta r = |(r_{\text{Ga}} + r_{\text{As}}) - (r_{\text{In}} + r_{\text{Sb}})| = 0,36 \text{ \AA}, \quad (4)$$

is more than 12%. However, the difference between the covalent radii of the atoms of the molecules GaAs and GaSb, GaAs and InAs, as well as InSb and GaSb, InSb and InAs:

$$\Delta r = |(r_{\text{Ga}} + r_{\text{As}}) - (r_{\text{Ga}} + r_{\text{Sb}})| = 0,18 \text{ \AA},$$

$$\Delta r = |(r_{\text{Ga}} + r_{\text{As}}) - (r_{\text{In}} + r_{\text{As}})| = 0,18 \text{ \AA},$$

$$\Delta r = |(r_{\text{In}} + r_{\text{Sb}}) - (r_{\text{Ga}} + r_{\text{Sb}})| = 0,18 \text{ \AA},$$

$$\Delta r = (r_{\text{In}} + r_{\text{Sb}}) - (r_{\text{In}} + r_{\text{As}}) = 0,18 \text{ \AA}, \quad (5)$$

is less than 7.4%; Consequently, these molecules satisfy conditions (2), (3) and, under certain thermodynamic conditions, they form solid substitution solutions, just as noted in [12] for $(\text{GaSb})_{1-x-y}(\text{Si}_2)_x(\text{GaAs})_y$ solid solution y . It should be noted that the lattice parameters of GaSb (6.095 Å) and InAs (6.058 Å) have an intermediate value between GaAs and InSb. Thus, the transition region is a layer with varying composition. This layer, providing a smooth transition from GaAs to InSb, reduces the mechanical stress in the transition region between substrate and film and the negative role of the mismatch of the lattice parameters gradually decreases.

Research Methodology

2. Structural and photoelectric measurements of parameters of n-(GaAs)–p-(InSb)_{1-x}(Sn₂)_x (0 ≤ x ≤ 0.05) - heterostructures

2.1. Structural studies of epitaxial layers of (InSb)_{1-x}(Sn₂)_x (0 ≤ x ≤ 0.05) solid solutions grown on GaAs substrates.

The structural study of the obtained epitaxial layers was carried out on a DRON-UM1 X-ray diffractometer. Diffraction spectra were recorded by continuous recording on the radiation of the copper anode ($\lambda_{\alpha} = 1.5418 \text{ \AA}$, $\lambda_{\beta} = 1.3922 \text{ \AA}$) using the Θ – 2Θ scheme in the step-by-step scanning mode. The voltage and current of the anode were 30 kV and 10 mA, respectively. The exposure time varied in the range of 1–3 hours.

Figure 2 shows the diffraction patterns of the epitaxial layer of the solid solution $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$). It can be seen that in the diffraction pattern of the epitaxial layer there are two pronounced selective structural reflexes with a very large intensity and a small one. The analysis showed that the most intense narrow reflex at $2\theta = 41.97^\circ$ is due to the scattering of X-ray quanta from the base planes of the {300} InSb series of the film lattice and has a width of $\omega \approx 1.62 \cdot 10^{-3} \text{ rad}$. The less intense narrow reflex at $2\theta = 41.85^\circ$ is due to the scattering of X-rays from the planes of the $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ solid solution lattice and has a width of $\omega \approx 8.61 \cdot 10^{-4} \text{ rad}$. The

narrow width of the peaks and the absence of other peaks in the diffractogram indicates a high degree of perfection of the crystal lattice of the epitaxial layer, that is, the grown films are mono-crystal. However, the shape of the peak at $2\theta = 41.97^\circ$ is singlet and has some asymmetry on the side of a large scattering angle, that is, there is no complete splitting by α_1 and α_2 radiations. This indicates the presence of residual elastic microstrains of a growth character in the crystal lattice of the studied film [13]. We assume that in this case the regions with elastic microstresses in the lattice of the epitaxial layer are mainly caused by different covalent radii of atoms of the substrate molecules ($r_{\text{Ga}} + r_{\text{As}} = 2.44 \text{ \AA}$) and solid solution ($r_{\text{In}} + r_{\text{Sb}} = 2.80 \text{ \AA}$, $r_{\text{Sn}} + r_{\text{Sn}} = 2.80 \text{ \AA}$).

Analys and Results

Based on the data of diffraction patterns the lattice parameter of the film was determined from the expression $a = d_{hkl} \sqrt{h^2 + k^2 + l^2}$ [14], where d_{hkl} is the distance between atomic planes with indices hkl . The condition of x-ray diffraction at atomic interplanar distances is described by the Wulff-Bragg equation, which has the form $\lambda = 2d_{hkl} \cdot \sin \theta$ (θ is the angle of reflection of X-rays, or Bragg angle, λ is the wavelength of the used radiation). The lattice parameters of the InSb epitaxial layer and the $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ solid solution were $a_{\text{InSb}} = 6.475 \text{ \AA}$ and $a_{\text{s.s.}} = 6.486 \text{ \AA}$ respectively.

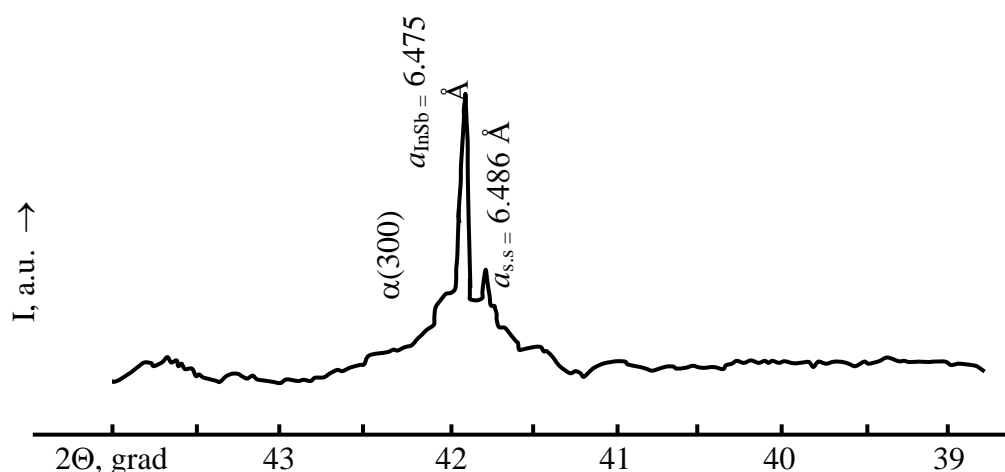


Fig.2.

The diffraction pattern of n-(GaAs)-p-(InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$) - heterostructures.

Studies of the chemical composition of the surface and cut of the grown epitaxial layers (InSb)_{1-x}(Sn₂)_x were carried out on a Jeol JSM 5910 LV-Japan x-ray microanalyzer. The results of X-ray microanalysis and raster pictures on the cup and on the surface showed that the epitaxial layers do not contain metallic inclusions and the distribution of components on the surface of the epitaxial layer is uniform and in the volume of the solid solution (InSb)_{1-x}(Sn₂)_x it varies within $0 \leq x \leq 0.05$. The entire surface of the substrate was covered with a overall film firmly connected to it, and the surface of the layer was mirrored

Research Methodology

2.2. Current-voltage characteristics of n-GaAs-p-(InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$) heterostructures.

To study the current-voltage characteristics (CVC) of n-GaAs-p-(InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$) heterostructures, ohmic contacts were created by sputtering silver in vacuum. The CVC presented in Fig. 3 was researched at room temperature.

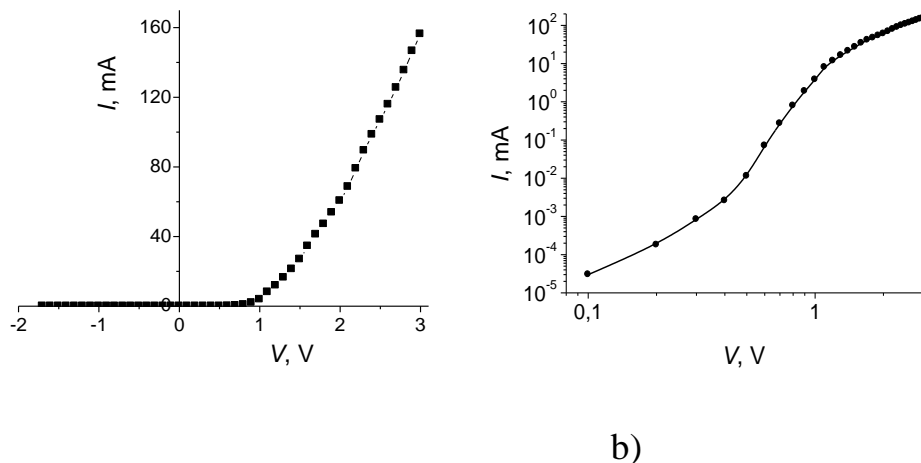


Fig.3.

Volt – ampere characteristic of n-GaAs-p-(InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$) heterostructure (a) and its straight branch on logarithmic scales.

Analys and Results

The initial part of the CVC characteristic (up to 0.7 V) is well described by the well-known exponential dependence obtained by V.I. Stafeev [15] for p-n- diode structures with an ohmic rear contact:

$$I = I_0 \exp\left(\frac{qV}{ckT}\right), \quad (6)$$

and refined in [16] for p-i-n structures. The values of the exponent “c” in the exponent and the preexponential factor - I_0 , calculated from the experimental data, of the current–voltage characteristics were $c = 7.75$ and $I_0 = 7.7$ nA, respectively.

Dependence (6) is characteristic of the so-called “long” p-n- diode, i.e. when $d/L_n > 1$, where d is the base length, $L_n = \sqrt{D_n \tau_n}$ is the diffusion length of minority carriers. Electronic processes due to charge modulation when a current passes through the structure are mainly determined by the transition layer and the p-(InSb)_{1-x}(Sn₂)_x solid solution. Therefore, the thickness of the epitaxial layer, which was $d \approx 15$ μm, was taken as the base thickness.

The exponent “c” in the exponent is described by the expression [16]:

$$c = \frac{2b + ch\left(\frac{d}{L_n}\right) + 1}{b + 1}, \quad (7)$$

where $b = \mu_n/\mu_p$ is the ratio of electron and hole mobilities. For undoped InSb, the ratio μ_n/μ_p is $b \approx 21$ [17]. When the concentration of dopants increases, carrier mobility decreases rapidly. Taking this fact into account, in order to estimate the parameters of the p-(InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$) solid solution, we took $b = 15$. Then, using expression (7), we can determine d/L_n , which takes the value 5.24. Then you can find the diffusion length of minority carriers $L_n = 2,9$ microns.

An analysis of the direct branch of the CVM characteristic (Fig. 3b) shows that exponential dependence is followed by power-law portions — $I \sim V^m$ with different values of the exponent depending on the applied voltage. In the voltage range from

0.7 to 1.1 V, a dependence is observed - $I \sim V^{7,4}$, then at voltages (1.1-1.9) V - $I \sim V^{3,8}$, and at (2.2- 3,0) B - quadratic dependence $I \sim V^2$.

Research Methodology

2.3. The spectral dependence of the absorption coefficient of the epitaxial layer of solid solution (InSb)_{1-x}(Sn₂)_x ($0 \leq x \leq 0.05$)

The spectral dependences of the absorption coefficient (α) of the epitaxial layer of the solid solution (InSb)_{1-y}(Sn₂)_y ($0 \leq y \leq 0.05$), grown on GaAs substrates (Fig. 4) were studied. The layer thickness was $d \approx 15 \mu\text{m}$. The absorption coefficient was estimated based on the Bouguer-Lambert law [18]:

$$I(\lambda) = (1 - R(\lambda))^2 \cdot I_0(\lambda) \cdot e^{-\alpha(\lambda) \cdot d}, \quad (8)$$

where $R(\lambda)$ is the reflection coefficient of electromagnetic radiation from the film surface, $I_0(\lambda)$ and $I(\lambda)$ are the intensities of monochromatic electromagnetic radiation incident on the sample and transmitted through the sample, respectively. Taking into account that the (InSb)_{1-y}(Sn₂)_y studied sample is a narrow-gap semiconductor, the $\alpha = \alpha(\lambda)$ dependence was determined by the optical absorption method in the deep infrared region of the emission spectrum on the two-channel compensation spectrophotometer SPECORD-71 IR. As can be seen from fig. 4 the absorption coefficient of the solid solution (InSb)_{1-y}(Sn₂)_y ($0 \leq y \leq 0.05$) covers a wide range of wavelengths in the deep IR spectral range and reaches $\sim 14 \mu\text{m}$. For the long-wave edge, the dependences $\alpha = \alpha(\lambda)$ the band gap of the solid solution ($E_{g, \text{InSbSn}}$) was estimated. It was $E_{g, \text{InSbSn}} \approx 0.11 \text{ eV}$, which is less than the width of the band gap of the InSb compound - $E_{g, \text{InSb}} = 0.18 \text{ eV}$. ($E_{g, \text{Sn}} = 0.08 \text{ eV}$).

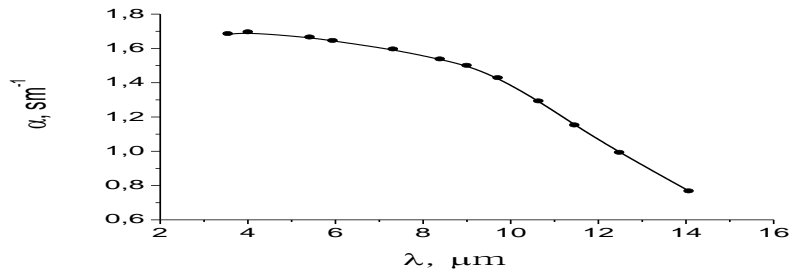


Fig. 4.

The spectral dependence of the absorption coefficient of the epitaxial layer of solid solution $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$).

2.4. Spectral dependences of the photosensitivity of $\text{n-GaAs-p-(InSb)}_{1-x}(\text{Sn}_2)_x$, $\text{n-GaP-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ heterostructures.

The spectral dependences of the photosensitivity of heterostructures based on an $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ solid solution were studied. For this purpose $\text{n-GaAs-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ and $\text{n-GaP-p-(InSb)}_{1-x}(\text{Sn}_2)_x$ heterostructures were made, growing from the liquid phase of the epitaxial layer of the solid solution on various substrates (n-GaAs and n-GaP). The composition of the transition layer varies along film thickness; closer to the substrate the wide-gap component, InSb , prevails, and as the film grows, the molar content of Sn increases and reaches 5 mol.% on the surface of the epitaxial film. To clarify the role of the components of the solid solution in the photovoltaic process that occurs in the studied heterostructures, their spectral photosensitivity was investigated experimentally using an infrared spectrometer IKS-21. The measurement results are shown in Fig.5.

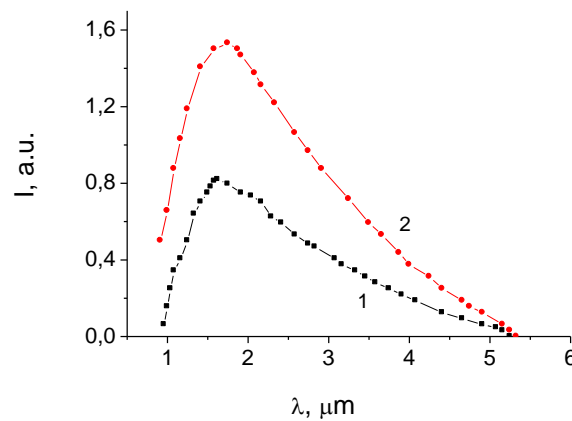


Fig. 5.

Spectral dependences of the photosensitivity of n-GaAs–p-(InSb)_{1-x}(Sn₂)_x (1) and n-GaP–p-(InSb)_{1-x}(Sn₂)_x (2) heterostructures

Analys and Results

From figure 5 it can be seen that the photosensitivity of both structures is identical and covers a wide range of wavelengths - from 1.0 to 5.3 μm with a maximum at 1.65 μm . The photosensitivity of both structures in the long-wavelength range of the spectrum is limited to the wavelength of 5.3 μm . The lack of completeness of the absorption of the layer of the solid solution (InSb)_{1-x}(Sn₂)_x in the long-wavelength range is caused by the fineness of the upper sublayer of the solid solution enriched by tin. The decrease of photosensitivity in the short wavelength range is due to the depth of the separation barrier of the p–n junction, which in our case is $\sim 15 \mu\text{m}$, which is greater than the diffusion length of minority carriers $L_n \approx 2,9 \mu\text{m}$. Consequently, photocarriers generated by photons with a wavelength of $\lambda < 1 \mu\text{m}$ do not reach the separating barrier of the p–n junction and do not contribute to the photocurrent.

Conclusion

Thus, the possibility of obtaining a perfect mono-crystal epitaxial layer of the solid solution $(\text{InSb})_{1-x}(\text{Sn}_2)_x$ ($0 \leq x \leq 0.05$) with the crystallographic orientation (100) and hole type conductivity by liquid phase epitaxy from In-melt solution on GaAs and GaP substrates at temperatures below the melting point of the components of the solid solution. The spectral dependences of the absorption coefficient and photosensitivity of heterostructures based on the obtained solid solution were determined experimentally.

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MODERN PROBLEMS OF TECHNICAL SCIENCES

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DEVELOPMENT OF INGIBITOR COMPOSITION OF CORROSION FOR PROTECTION OF STEEL ARMATURE

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Abstract.. For over 150 years, reinforced concrete structures have been used in construction. A long-term study of the durability of reinforced concrete structures in various operating conditions shows that dangerous damages caused by the development of reinforcement corrosion, which pose a threat to public health, are often encountered. Corrosion of reinforcement is usually caused by exposure to reinforced concrete by atmospheric chemical factors caused by the presence of aggressive components in concrete, such as sulfates, carbonates, chlorides. Today in domestic practice there are over 100 different compositions for inhibiting the corrosion of reinforcing steel. The disadvantages of the existing anticorrosive materials are their high cost and low accessibility, as well as the impossibility of using them to combat multicomponent salt and acid corrosion.

In the conditions of the Aral Sea region, in the production of reinforced concrete products, highly saline water and quartz sand are used, which contain chloride and sulphate salts of calcium, magnesium and sodium in various amounts (Table 1). With the presence of the listed salts in the composition of reinforced concrete products, steel reinforcement is subjected to severe corrosion. Therefore, one of the important tasks is the protection of steel reinforcement in concrete products produced in the conditions of the Khorezm region and the Republic of Karakalpakstan.

Аннотация. На протяжении более 150 лет железобетонные конструкции применяются в строительстве. Многолетнее изучение стойкости железобетонных конструкций в различных условиях эксплуатации показывает, что часто встречаются опасные повреждения, вызываемые развитием коррозии арматуры, которые создают угрозу здоровью населения. Коррозия арматуры вызвана, как правило, воздействием на железобетон атмосферно-химических факторов, обусловленных содержанием в бетоне агрессивными компонентами, как сульфаты, карбонаты, хлориды. Сегодня в отечественной практике насчитывается свыше 100 различных композиций для ингибирования коррозии арматурной стали. Недостатками существующих антикоррозионных материалов является дороговизна и малодоступность, а также невозможность их применения для борьбы с многокомпонентной солевой и кислотной коррозией.

В условиях Приаралья при производстве железобетонных изделий применяются сильнозасоленные воды и кварцевые пески которые в своем составе содержат в различных количествах хлоридные и сульфатные соли кальция, магния и натрия (табл. 1). При наличие перечисленных солей в составе железобетонных изделий, стальная арматура подвергается сильной коррозии. По этому, одно из важной задачей является защита стальной арматуры в железобетонных изделиях производимых в условиях Хорезмской области и Республики Каракалпакстан.

Аннотация. Темир-бетон конструкциялар 150 йилдан бери қурилишда ишлатилиб келинмоқда. Кўп йиллик тадқиқотлар кўрсатишича, ушбу конструкциялардаги арматуранинг занглаши оқибатидаги бузилишлардан ҳаёт учун ҳавфли ҳолатлар учрамоқда. Арматуранинг занглаши атмосфера-кимёвий факторлар, сульфатлар, карбонатлар, хлоридлар каби агрессив компонентлар таъсири оқибатида бўлади. Бугунги кунларда 100 дан ортиқ арматура занглашига қарши ингибиторлар мавжуд. Уларнинг асосий камчиликлари таннархининг қимматлигида ва камномалигида, ҳамда кўп тузли, кислотали системаларда самарасининг пастлигидадир. Орол бўйи регионида темир-бетон буюмлар ишлаб чиқаришда кучли тузланган сувлар ва кварц қумлари ишлатилади. Маҳсулотда ушбу тузларнинг бўлиши арматуранинг кучли коррозияга учрашига олиб келади. Шу сабабли Хоразм вилояти ва Қорақалпоқ Республикасида тайёрланаётган темир-бетон конструкцияларнинг пўлат арматурасини химоялаш масаласи ўта долзарбдир.

Keywords: reinforced concrete construction, steel reinforcement, corrosion, gossypol resin, modified lignin, hexamethylenetetramine, degree of protection

Ключевые слова: железобетонная конструкция, стальная арматура, коррозия, госсиполовая смола, модифицированный лигнин, гексаметиленetetрамин, степень защиты

Калит сўзлар: темир-бетон конструкция, пўлат арматура, коррозия, госсипол смоласи, модифицирланган лигнин, гексаметиленetetрамин, химоя даражаси

Methodology. Experimental studies were performed using modern physicochemical methods, such as X-ray phase, IR spectroscopic, elemental analysis.

Методология. Экспериментальные исследования выполнялись с применением современных физико-химических методов, таких как рентгенофазовый, ИК-спектроскопический, элементный анализ.

Scientific novelty. As a result of the interaction of modified gossypolovoy resin, oxidative destruction of lignin and hexamethylene-amine, inhibitors of corrosion of reinforcement in the Priaralie reinforced concrete structure were obtained for the first

time. According to the physicommechanical properties of the composition meets the requirements of all standards.

Научная новизна. В результате взаимодействия модифицированной госсиполовой смолы, окислительной деструкции лигнина и гексаметилентетрамина впервые получены ингибиторы коррозии арматуры в железобетонной конструкции Приаралья. По данным физико-механических свойств композиция отвечает по всем требованиям стандартов

The resulting data. Inhibitor compositions based on gossypol resin from the oil and fat industry and lignin waste from the hydrolysis industry were synthesized and tested, the mechanism of action of which is characterized by barrier type of protection with the acquisition of rust modifying properties.

Полученные данные. Синтезированы и испытаны ингибиторные композиции на основе госсиполовой смолы-отхода масложировой промышленности и лигнина-отхода гидролизной промышленности, механизм действия которых характеризуется барьерным типом защиты с приобретением свойств модификаторов ржавчины.

Features

- easy to get;
- technology of preparation and use is simple;
- high physical and mechanical properties;
- high degree of protection and adhesive properties;
- wide temperature range of plasticity, increased heat and frost resistance;
- low cost.

Особенности:

- легко доступны;
- технология приготовления и использования проста;
- высокие физико-механические показатели;
- высокие степень защиты и адгезионные свойства;

- широкий температурный интервал пластичности, повышенное теплоиморозостойкость;
- низкая себестоимость.

Introduction

The basis of any corrosion damage is an electrochemical process that proceeds according to a complex mechanism. To prevent corrosion of reinforcement, we consider the use of a mixture of inhibitors, which has a so-called synergistic effect. Concrete corrosion is the main enemy of all concrete and reinforced concrete structures. The most serious problem is the influence of the chemical factor, the influence of aggressive substances (carbonates, sulfates, chlorides). Protection of reinforced concrete structures from corrosion is the most important task in the design, construction and operation. Protection of reinforcement in reinforced concrete construction is absolutely relevant for all types of buildings, structures and facilities. The features of modern high-strength reinforcing steel and their stress state in structures make the consequences of their corrosion very dangerous. For a possible increase in their corrosion resistance under voltage, it is necessary to thoroughly study the conditions and areas of safe use of the structures reinforced by them. It is also necessary to carefully examine the protective properties of concrete in relation to steel reinforcement and their changes over time.

It is known that oxidized products of gossypol resin and lignin are weak corrosion inhibitors [2-6]. This is most likely due to the fact that they are poorly or not completely soluble, or the appropriate solvent has not been selected to completely transfer them to the solution. The use of technical hydrolytic lignin and its modifications as the basis of the rust converter is related to the fact that it contains phenol, hydroxyl and carboxyl groups that interact with corrosion products and bind iron ions into complex compounds of chelate structure [7, 8, 9].

Despite harsh acid treatment, a significant amount of reactive free and esterified phenolic and aliphatic hydroxyls and unsubstituted positions of the aromatic core of phenylpropane lignin structural units are present in hydrolyzed lignin, which causes

its ability to further modify and degrade under the influence of various chemical reagents, as a result go into water-and alkaline-soluble state with the formation of a number of organic carboxylic and polycarb new acid [10].

In this work, hydrolytic lignin is considered from the point of view of its use in the production of anti-corrosion materials. For this purpose, lignin from the Yangiyul biochemical plant was used for laboratory experiments. The elemental composition of hydrolytic lignin% per absolutely dry substance is as follows, mass%: C –17.34, H - 6.43, O - 43.50. The content of functional groups, mass%: phenolic (OH) - 5.06, OCH₃ - 3.06, COOH - 1.18, total acid groups 6.24. The moisture content of the lignin used is 60–65%, the ash content is 4.12–2.74%.

The use of cheap gossypolovoy resin-waste industry as the basis of anti-corrosion coating is due to the fact that it contains phenolic, hydroxyl and carboxyl groups that interact with corrosion products and bind iron ions into complex compounds of chelate structure [11,12].

From this position, gossypol resin can be an effective material against corrosion, only on condition that appropriate solvents and another synergistic inhibitor are selected. For this purpose, we used hexamethylenetetramine (CH₂)₆N₄, which is one of the most well-known representatives of acid corrosion inhibitors [11, 12].

Methods and materials. Studies were performed using modern chemical, physico-chemical methods. Modified lignin of gossypol resin and hexamethylenetetramine were used for inhibitor synthesis. Results and discussion. The development of corrosion in reinforced concrete structures begins with reinforcement, when concrete does not have sufficient protective properties, i.e. collapses under the influence of an environment that is aggressive towards it. Typically, this kind of destruction is exacerbated by the action of humid air and is characteristic of a humid climate. Rust formed during the oxidation of steel reinforcement increases its volume, increases internal pressure and leads to fracture of concrete and exposure of the reinforcement. As a result, the bare bars of the reinforcement are destroyed more rapidly, which leads to rapid wear of the concrete. In the chemical composition of the water

resources of Urgench, used in the production of building materials, increased rates of sulphates (437 mg / l) and chlorides (402 mg / l) (Table 1). Exposure to sulfates may also lead to the destruction of reinforced concrete structures. Sulfates react with other chemical components that form various products, which leads to an increase in volume, which leads to the formation of cracks in the concrete and subsequent fracture of the structure. Another important reason for the destruction of concrete in the conditions of the Aral Sea region are chloride ions. Chlorides cause corrosion of the reinforcement, destroying the oxidized iron layer, which leads to further oxidation. These salts destroy both steel reinforcement and concrete itself. The destruction caused by calcium chloride, accelerate the corrosion of reinforcement. Salts, reacting with calcium hydrate, which is in concrete, forms an oxidized calcium hydrate, which is in concrete, forms an oxidized calcium hydrate, followed by an increase in volume.

To prevent corrosion, various expensive inhibitors are added to the concrete mix, however, the actions of these components are served from time to time.

In order to improve the performance properties, a competitive anti-corrosion coating technology has been developed for valves. Based on the use of waste oil and hydrolysis industry, i.e. cheap and affordable raw materials, the production of anti-corrosion coatings has a high level of organization of technological processes and relatively high economic efficiency.

From this point of view, the products of oxidative degradation of lignin and gossypol resin can be effective corrosion inhibitors, provided that the appropriate solvents and other inhibitors that enhance synergy are selected. This implies the need to enhance the inhibitory ability of nitrolignin, adding to it a gossypol resin, which, after modification, will become reactive with high complexing properties. Hexamethylenetetramine was also used to enhance the protective properties.

Conducted numerous studies to determine the optimal proportions of the composition of the proportion of positive results. According to the experiments, the following ratio of components are optimal, wt%:



gossypolovy pitch (GS): 48,5 - 49, 5

nitrolignin (NL): 49.5 - 50.0

Hexamethylenetetramine (HMTA): 0.5 - 1.0

The composition is capable of converting iron oxide to non-corrosive compounds with excellent adhesion to reinforcement. The conversion process takes place in neutral media (pH 5.0-6.0). Improves the functional properties of concrete and prolongs their life. Provides adhesion strength, corrosion resistance and weather resistance of the anti-corrosion coating system

A distinctive feature of the inhibitor composition is that its components are easily accessible, the technology of preparation and use is simple. In this composition, the components of the mixture, separately or together as an intermediate complex, can change the nature of the interaction of the surface of metals with the surrounding corrosive medium and, thereby, enhance the protective effect of inhibitors. This technique is of particular relevance for the protection against corrosion of metal structures in contact with multicomponent media, i.e., suitable in the Aral Sea region

The main factors of the proposed composition affecting the state of the reinforcement in concrete: environmental features, density of concrete and thickness of the protective layer, type of binder and mode of hardening of concrete, various additives introduced into the concrete mix, as well as cracks formed in the concrete during the operation of structures. Practical recommendations should be based on in-depth theoretical and thorough experimental research. Recommendations should undergo a long-term review. Therefore, for testing, the corrosion behavior of reinforcing steel in concrete was evaluated by accelerated corrosion testing using electrochemical methods of research on samples made of cement-sand (1: 3) solution from Urgench, 40x40x160 mm in size, longitudinally reinforced with a steel rod 6 in diameter mm, 120 mm long.

The tests were carried out on samples reinforced with reinforcement without corrosive lesions (standard), with corrosive lesions (thickness of corrosion products

from 150 to 300 μm), with corrosive lesions of the same thickness, treated with the developed composition. Sample preparation for testing was carried out in accordance with the standard of the CMEA 4421-83. The prepared sample was installed in an electrochemical cell and the magnitude of the stationary potential was determined. Then, using a potentiostat, changing the potential in the automatic mode, the current density was measured. Electrochemical tests were carried out after exposure of the concrete samples to corrosive media: carbonization to the depth of the reinforcement and subsequent wetting in water and drying, as well as alternating wetting in a saline solution (3% NaCl solution) and drying. The tests were carried out on three twin samples in three periods: after collection of brand strength by the samples, and also after 90 and 180 days of incubation in the above media. The corrosion state of the reinforcement in the cement-sand samples was evaluated by the nature of the anodic polarization curves.

Table 1.

The chemical composition of the water resources of Urgench, used in the production of building materials

№	Indicators	Water sources	
		Shavat channel	ChakkakulZahkash
1	Suspended substances, mg / l	63	70
2	pH	6,7	7,65
3	Dry residue, mg / l	1718	2178
4	Hardness, mg / l	14,5	20,5
5	Chlorides, mg / l	402	553
6	Sulfates, mg / l	437	599
7	PO_4^{3-} , mg/l	13,3	19,0
8	Ca^{2+} , mg/l	1,2	1,5
9	Mg^{2+} , mg/l	-	250

For experimental comparison of the inhibitory activity of the composition (GS + NL + HMTA), sodium nitrite was used. The data obtained are presented in tables 2,3.

From the data of table 2, we can conclude that it is quite acceptable reliability of protection of reinforcement in concrete prepared on sand-cement mixture in the Aral Sea conditions, can be achieved by using as anti-corrosion composition, which contains nitrolignin (49.50-50.50%), gossypol resin (48.5 - 49, 5) and hexamethylenetetramine (0.5-1.0).

The data in Table 2 show the possibility of achieving reliable protection of the reinforcement in the processing of nitrolignin (49.5%), gossypolovoy resin (49.5.1%) and hexamethylenetetramine (1%) with its composition. This confirms the possibility of practical use of the phenomenon of synergism in the interaction of the components.

The data of table 3 indicate that the introduction of the concrete solution, discussed in tables 2, inhibitory composition does not adversely affect the strength of concrete. The strength of concrete even increases markedly.

Thus, the results of bench tests of reinforced concrete samples prepared on sand-cement mortar in conditions of Priaralie treated with the proposed composition given in Tables 2–3 confirm the validity of the conclusions made on this issue based on electrochemical measurements.

Table 2.

Comparative bench test of reinforcement bars on corrosion resistance in concrete in the absence and presence of inhibitor additives

№	The difference in the mass of rods, g (day)			Corrosion rate, g / m ² , 10 ⁻³ hours (day)			Protective effect,% (days)			Appearance rod
	7	28	90	7	28	90	7	28	90	
Without anti-corrosion treatment										
1	0,0105	0,0567	0,069	44,47	56,16	22,08	-	-	-	Strong corrosion

			6							
	Sodium nitrate									
2	0,0010	0,0089	0,013 9	4,03	9,22	4,35	90,6	84,3	80,1	Traces corrosion
3	0,0014	0,0067	0,014 2	5,91	7,13	4,48	86,4	88,2	79,6	Small corrosion
4	0,0001	0,0005	0,000 9	0,41	0,46	0,29	99,0	99,2	98,2	clean
	NL (49.50%) + HS (48.5%) + HMTA (0.5%)									
5	0,0028	0,0027	0,005 9	2,08	2,83	0,49	98,3	98,2	97,0	Traces corrosion
	NL (50.0%) + HS (49.5%) + HMTA (0.5%).									
6	0,0015	0,0073	0,000 1	2,89	1,35	0,39	98,7	98,1	97,5	Traces corrosion
	NL (49.5%) + HS (49.5%) + HMTA (1.0%)									
7	0,009	0,0009	0,000 4	0,37	0,47	0,24	99,6	98,9	98,7	clean

Table 3

Bench test for concrete strength in the absence and presence of inhibitor additives

№ samples	Additive% by weight of concrete	The tensile strength of concrete samples under compression depending on the duration of the test, MPa, (day)		
		7	28	90
1	without treatment	22,6	23,4	25,9
	Sodium nitrite			
2	1,0	22,5	24,3	25,8
3	1,5	25,0	25,9	25,9

4	2,0	25,5	25,9	26,0
The armature treated with the composition of the NL + HS + GMT				
8	49,5+50,0+0,5	23,5	24,3	25,7
9	50,5+48,5+1,0	24,0	24,9	25,8
10	49,5+49,5+1,0	24,5	25,8	25,9

However, these data are of direct practical interest, since they can be directly used in the technology of concrete production in the Aral Sea region.

The results of the tests performed show the possibility of achieving reliable protection of the reinforcement when processing its anticorrosive composition of nitrolignin, gossypol resin and HMTA. In these conditions, the effect of synergy. Such a composition allows to solve an important production problem - the fight against corrosion in the conditions of the Aral Sea region.

The effectiveness of the inhibitory effect of the products of oxidative destruction of hydrolytic lignin, gossypol resin, in particular, with hexamethylenetetramine on the process of corrosion of reinforcing steel in an aqueous extract medium from a concrete solution, has been established and gives the same inhibitory effect, which is used in reinforced concrete products 1.0-2.0% sodium nitrite . According to our recommendation, an experimental batch of reinforced concrete products was produced at the Urgench House-Building Plant for its large-scale testing in various construction sectors.

Thus, summing up the above, it should be noted that:

- large-scale waste of hydrolysis and biochemical plants - hydrolyzed lignin in combination with gossypol resin can be used as raw material for the production of anticorrosive materials for steel reinforcement of concrete on its basis;
- high anion-, cation-exchange and complex-forming ability of modified derivatives of nitrolignin and gossypolovoy resin, which we proved in the process of experiments, is the main factor in the synthesis of anticorrosive materials, compounds of complex action with synergistic properties;



- as a result of bench tests of the corrosion resistance of metal reinforcement in concrete, the optimal composition of an anticorrosive composition, consisting of nitrolignin, gossypol resin, and HMTA, was revealed in a ratio of 1: 1: 0.01
- developed inhibitor compositions and anti-corrosion agents were tested with a positive result in the conditions of the Aral Sea region, where the water and raw materials used in reinforced concrete structures are highly saline. The result was obtained on the basis of in-depth theoretical studies and large-scale scientific experiments, received confirmation at the Urgench house-building plant, and a pilot batch of reinforced concrete products was issued for extensive tests in various construction sites.

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MATHEMATICAL MODELS OF MULTI-COORDINATE ELECTROMECHATRONIC SYSTEMS OF INTELLECTUAL ROBOTS

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Abstract: In the article mathematic description of mechatronic module in intelligent robots and robotic systems are observed. To display the structure of mechatronic modules, which consist of interrelated different electrical, magnetic and mechatron components, mathematic models by the help of multiplication theory

based on relations and visualising lines and points are designed. Analytical explanation of mechatronic models in intelligent robots is provided.

Keywords: robotic systems, mechatronic models, mathematical models, intelligent robots.

Аннотация: В статье приведено математическое описание мехатронного модуля в интеллектуальных роботах и роботизированных системах. Для отображения структуры мехатронных модулей, которые состоят из различных взаимосвязанных электрических, магнитных и мехатронных компонентов, с помощью теории умножения, основанной на отношениях и визуализации линий и точек, разработаны математические модели. Дано аналитическое объяснение мехатронной модели в интеллектуальных роботах.

Ключевые слова: Робототехнические системы, мехатронные модели, математические модели, интеллектуальные роботы.

Аннотация: Maqolada intellektual robot va robototexnik tizimlarida mexatronik modulning matematik ta'rifi keltirilgan. Mexatronik modullarning strukturasini bir-biriga bog'liq bo'lgan turli xil elektr, magnit va mexatronik komponentlardan tashkil etish uchun o'zaro tahlillarga asoslangan multipleksiya nazariyasi yordamida va matematik chiziqlarni va nuqtalarni ko'rsatish orqali matematik modellar ishlab chiqilgan. Intellektual robotlarda mexatronik modelni analitik tahlil qilish ko'rib chiqilgan.

Калит so'zlar: robototexnik tizimlar, mexatronik modellar, matematik modellar, intellektual robotlar.

Introduction

The mathematical description of multicoordinate mechatronic modules (MMM) is the most important stage of the theoretical analysis and synthesis of modules of intelligent robots and robotic systems. At present, the absence of models suitable for a detailed description of the structures of such systems precludes the possibility of automating the design of specific structures.

An element of MMM can be identified with a system that has the properties of material reproducibility and repeatability; therefore, it is naturally possible to define a formal theory of MMM and its model in the language of set theory, as is customary in systems theory.

Literature Review

To display the structures of MMM, consisting of interconnected heterogeneous electrical, magnetic and mechanical components, in the work there are set-theoretic models operating with the following concepts: relations, mappings, unified relation, lines and points:

$$S = \langle L, P, R_L, \pi, R_{L\pi} \rangle,$$

$$S^{-1} = \langle P, L, R_L, \pi, R_{\pi L} \rangle,$$

where L, P - many lines and points; R_L - equivalence relation given in the set L ; π - combined relation given in the set P ; $R_{L\pi}$ - mapping of the set L in the set π .

Combined relations in the work are called the combination of binary and ternary relations.

S, S^{-1} models are transformed into other forms depending on the properties of the relations R_L, π of $IRL\pi$ mappings and the goals of the problem:

$$S_1 = \langle L, P, \mathcal{L}, P, \Gamma \rangle;$$

$$S^{-1} = \langle P, L, P, \mathcal{L}, \Gamma^{-1} \rangle;$$

$$T = \langle L, P, P, C, \Gamma \rangle;$$

$$T^{-1} = \langle P, L, P, C^{-1}, \Gamma^{-1} \rangle;$$

where \mathcal{L}, P - families of classes of lines and points, respectively,

$$L_i \in L, P_i \in P \text{ для } i = 1, n, \quad j = 1, m;$$

C - family of properties. C^1 - reverse family of properties; C_i - many properties,

$$C_i = \left\{ \{C_{iki}^j\} \right\}, k = \overline{1, l_{ki}}, j = \overline{1, p_{ki}};$$

C_{iki}^j - many private properties,

$$C_{iki}^j = C_{iki}^0 \cap P_i;$$

C_{iki}^0 - original line property l_{iki} .

Γ, Γ^{-1} - structural and inverse structural sets, respectively;

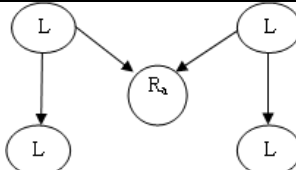
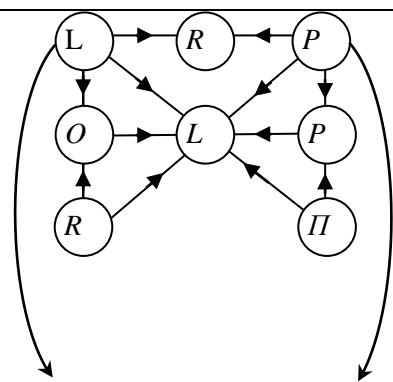
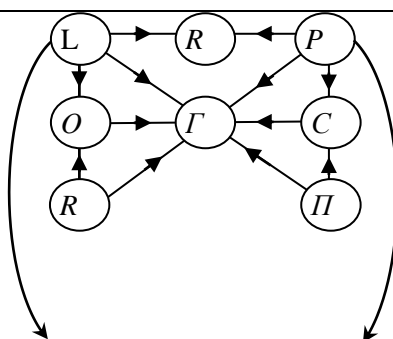
$$\Gamma = \{\Gamma_i\}, i = \overline{1, l}; \Gamma_i - \text{structural class}$$

$$\Gamma_i = \{\Gamma_{iri}\}, k = \overline{1, l},$$

$$\Gamma_{iri} - \text{structural element}; \Gamma_{iri} = \frac{\{c_{iki}\}}{l_{iki}}, j = \overline{1, P_{ki}}.$$

Three pairs of forms of models (S, S-1, S, S-1, T, T-1) are equivalent in the semantic content of the information presented by them about the system element and differ from each other only in the ways of representation. When operating with models, the interchangeability of components becomes important, which determines the possibility of excluding from consideration certain components of a model at various stages of its use. The latter becomes possible if the necessary part of information about the deleted components of the model is saved in the remaining ones. In models S, S1, T information about the set L is completely contained in the sets PL, RL π , Γ , \mathbb{E} ; information about the set of P- in the sets π R π L, G-1, P; information about RL is contained entirely in the sets \mathbb{E} , Γ , and partly in sets C. Information on RL π is partially contained in the sets Γ and C. This is shown in Table 1 by graphs whose vertices indicate the amount of information about the components inscribed at the vertices. Solid arcs indicate the complete inclusion of information about a component located at the beginning of the arc. Dotted arcs indicate partial inclusion of information. From Table 1 it can be seen that the exclusion of the component G from the model S1, the components RL π from the model of type T is impossible, since in this case the remaining parts of the models lose connectivity.

Table 1

№	Types of models	Model graphs
1	S $\langle K, P, R_L, \Pi, R_{L\Pi} \rangle$	
2	S _I $\langle L, P, \mathbb{L}, P, L \rangle$	
3	T $\langle L, P, \mathbb{L}, C, L \rangle$	

Research Methodology

Comparison of models shows a great flexibility of the type T model, which keeps the remaining parts connected even if the component T is removed with the largest amount (number of incoming arcs) of information, which is impossible in other models. This property of the model allows, in the intermediate calculations, to temporarily exclude some of its components and easily transform the structural set Γ , the family of the line \mathbb{L} or the family of properties C by removing one of the floors in the expression of the structural element. Based on these considerations, in the work of the model T and T-1 taken as the basis and called structural models.

Analysis of the models showed that all information about the components L, \mathcal{L}, C (components $P, P, C-1$) of the structural model T (models $T-1$) is completely contained in the structural set G (structural inverse set $G-1$). This allows us to uniquely find the expression of the components L, \mathcal{L}, C ($P, P, C-1$) of the structural model by the expression of the structural (reverse structural) set and reduce the task of representing the structural model to the representation of the structural set.

Definition The partition of the linear (point) property corresponding to the partition of \mathcal{L} (partition of P) is called the colored linear (point) property. Structural sets Γ can be linearly colored ($\Gamma\Delta$), point-colored Γ_T and linearly point-colored ($\Gamma\Delta T$) depending on the partitions ξ and P . Linearly - pointwise (LT) colored MMM structural sets have the form:

$$\Gamma^{\Delta T} = \{\Gamma_{\mathcal{E}}^{\Delta T}, \Gamma_M^{\Delta T}, \Gamma_{MX}^{\Delta T}, \Gamma_{B3}^{\Delta T}\}$$

where, $\Gamma_{\mathcal{E}}^{\Delta T}, \Gamma_M^{\Delta T}, \Gamma_{MX}^{\Delta T}$ - colored structures of the electrical, magnetic, and mechanical subsystems, respectively; $\Gamma_{B3}^{\Delta T}$ - colored structural sets of the relationship subsystem, which are represented as

$$\begin{aligned}\Gamma_{\mathcal{E}}^{\Delta T} &= \{\Gamma_{\mathcal{E}1}^{\Delta T}, \dots, \Gamma_{\mathcal{E}2}^{\Delta T}, \dots, \Gamma_{\mathcal{E}K}^{\Delta T} \dots \Gamma_{\mathcal{E}C}^{\Delta T}\} \\ \Gamma_M^{\Delta T} &= \{\Gamma_{M1}^{\Delta T}, \Gamma_{M2}^{\Delta T}, \dots, \Gamma_{MK}^{\Delta T}, \dots, \Gamma_{MC}^{\Delta T}\} \\ \Gamma_{MX}^{\Delta T} &= \{\Gamma_{MX1}^{\Delta T}, \dots, \Gamma_{MX2}^{\Delta T}, \dots, \Gamma_{MXK}^{\Delta T} \dots \Gamma_{MXL}^{\Delta T}\} \\ \Gamma_{l3}^{\Delta T} &= \{\Gamma_{l31}^{\Delta T}, \Gamma_{l32}^{\Delta T} \dots \Gamma_{l3K}^{\Delta T}, \dots, \Gamma_{l3c}^{\Delta T}\}\end{aligned}$$

$\Gamma_{\mathcal{E}K}^{\Delta T}, \Gamma_{MK}^{\Delta T}, \Gamma_{MXK}^{\Delta T}$ - colored structural elements of the electrical, magnetic and mechanical subsystems, respectively;

$\Gamma_{l3K}^{\Delta T}$ - the painted structural element of the relationship subsystem is represented as

$$\Gamma_{\mathcal{E}K}^{\Delta T} = \frac{C_{\mathcal{E}K}}{\ell_{\mathcal{E}K}}, \quad \Gamma_{MK}^{\Delta T} = \frac{C_{MK}}{\ell_{MK}}, \quad \Gamma_{MXK}^{\Delta T} = \frac{C_{MXK}}{\ell_{MXK}}, \quad \Gamma_{l3K}^{\Delta T} = \frac{C_{l3K}}{\ell_{l3K}}$$

Here $C_{\mathcal{E}K}, C_{MK}, C_{MXK}$ - a family of properties of the electrical, magnetic, and mechanical subsystems, respectively. C_{l3K} - family of properties of the relationship subsystem.

$$C_{\text{ЭК}} = \{C_{\text{ЭК}}^1, \dots, C_{\text{ЭК}}^2 \dots C_{\text{ЭК}}^j \dots C_{\text{ЭК}}^{P_{\text{ЭК}}}\}$$

$$C_{\text{МК}} = \{C_{\text{МК}}^1, \dots, C_{\text{МК}}^2 \dots C_{\text{МК}}^j \dots C_{\text{МК}}^{P_{\text{МК}}}\}$$

$$C_{\text{МХК}} = \{C_{\text{МХК}}^1, \dots, C_{\text{МХК}}^2 \dots C_{\text{МХК}}^j \dots C_{\text{МХК}}^{P_{\text{ЭК}}}\}$$

$$C_{l3k} = \{C_{l3k}^1 \dots C_{l3k}^2 \dots C_{l3k}^j \dots C_{l3k}^{P_{l3k}}\}$$

In them $C_{\text{ЭК}}^j, C_{\text{МК}}^j, C_{\text{МХК}}^j$ - family of particular properties of the electrical, magnetic, and mechanical subsystems, respectively; C_{l3k}^j - family of private properties of the relationship subsystem:

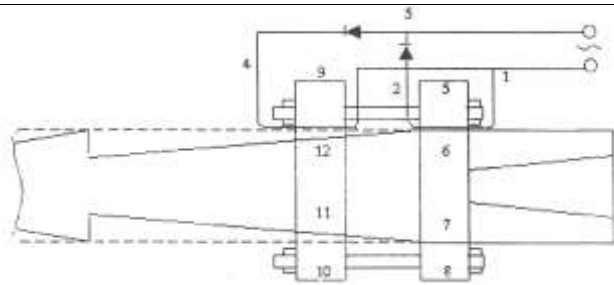
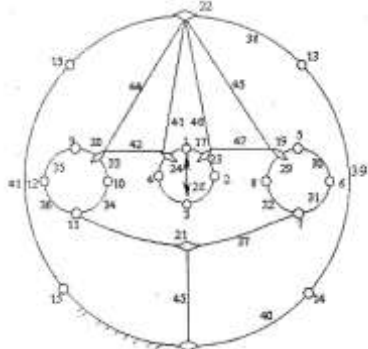
$$C_{\text{ЭК}}^j = \{P_{\text{ЭК}j}^1, \dots, P_{\text{ЭК}j}^2 \dots P_{\text{ЭК}j}^l, \dots, P_{\text{ЭК}j}^{P_{\text{ЭК}j}}\}$$

$$C_{\text{МК}}^j = \{P_{\text{МК}j}^1, \dots, P_{\text{МК}j}^2 \dots P_{\text{МК}j}^l, \dots, P_{\text{МК}j}^{P_{\text{ЭК}j}}\}$$

$$C_{\text{МХК}}^j = \{P_{\text{МХК}j}^1, \dots, P_{\text{МХК}j}^2 \dots P_{\text{МХК}j}^l, \dots, P_{\text{МХК}j}^{P_{\text{ЭК}j}}\}$$

$$C_{l3k}^j = \{P_{l3kj}^1, P_{l3kj}^2, \dots, P_{l3kj}^l, \dots, P_{l3kj}^{P_{\text{МХК}j}}\}$$

Table 2

Mechatronic module	1	
Topological image	2	

Analytical description	3	$\left[\frac{1/4/D18}{24}, \frac{1/2/D17}{25}, \frac{2/3}{26}, \frac{3/4}{27}, \frac{1/8}{28} \right];$ $\left[\frac{8/5/D19}{29}, \frac{5/6}{30}, \frac{6/1}{31}, \frac{1/8}{32}, \frac{9/10/D20}{33}, \frac{10/11}{34}, \frac{12/9}{36}, \frac{11/12}{35}, \frac{1/11/D21}{37} \right];$ $\left[\frac{16/13/D22}{38}, \frac{13/14}{39}, \frac{14/15/D23}{40}, \frac{15/16}{41} \right];$ $\left[\frac{D18/D20}{42}, \frac{D17/D19}{43}, \frac{D20/D22}{44}, \frac{D19/D22}{45}, \frac{D21/D23}{46}, \frac{D18/D22}{47}, \frac{D17/D22}{48} \right].$
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Here $P_{\exists K j}^l$, $P_{MK j}^l$, $P_{MXK j}^l$ - colored sets of points of the electrical, magnetic and mechanical subsystems, respectively;

P_{l3kj}^l - ΛT colored set of interconnection subsystem points:

$$P_{\exists K j}^l = \{P_{\exists 1}, P_{\exists 2}, \dots, P_{\exists n}, \dots, P_{[\exists P]}\}$$

$$P_{MK j}^l = \{P_{M1}, P_{M2}, \dots, P_{Mn}, \dots, P_{[MP]}\}$$

$$P_{MXK j}^l = \{P_{MX1}, \dots, P_{MX2}, \dots, P_{MXn}, \dots, P_{[MXP]}\}$$

$$P_{l3kj}^l = \{P_{B31}, \dots, P_{B32}, \dots, P_{B3n}, \dots, P_{[B3p]}\}$$

$$P_{\exists K j}^l = \{P_{\exists 1}, P_{\exists 2}, \dots, P_{\exists n}, \dots, P_{[\exists p]}\}.$$

$$P_{MK j}^l = \{P_{M1}, P_{M2}, \dots, P_{Mn}, \dots, P_{[mp]}\}.$$

$$P_{MXK j}^l = \{P_{MX1}, P_{MX2}, \dots, P_{MXn}, \dots, P_{[mxp]}\}.$$

$$P_{l3j}^l = \{P_{B31}, P_{B32}, \dots, P_{B3n}, \dots, P_{[B3p]}\}.$$

In them $P_{\exists n}$, P_{Mn} , P_{MXn} points of electrical, magnetic and mechanical - subsystems, respectively; P_{B3n} - interconnection subsystem point; $l_{\exists K}$, l_{MK} , l_{MXK} - lines of electrical, magnetic and mechanical subsystems, respectively; l_{B3K} - interconnection subsystem line.

Table 2 shows the LD structural sets of a particular mechatronic module [3], which are compiled according to its topological image. In this case, the topological image of MMM is constructed using the abstract concepts of "line" and "dot".

In contrast to the usual ways of displaying MMM graphs of schemes (for example, pole graphs) [4], which do not allow to indicate the entire topology of

interconnections, the latter are described in terms by graphs with two- and three-dimensional points. The MMM graph (Table 2) contains mentally divided four subgraphs: electrical, magnetic, mechanical, and interconnections. Winding on the magnetic core in the MMM column corresponds to the line (25) connecting one-dimensional points (1 and 2)., At the same time. (No. 1-4) - points of the electrical subsystem; (№5-12) - points of the magnetic subsystem; (# 12-16) - points of the mechanical subsystem; (№17-18) - interconnection points (two-dimensional) of the electrical subsystem; (№ 19-21) - points of interrelations of the magnetic subsystem; (№22-23) - interconnection points of the mechanical subsystem; (№24-28), (№29-36), (№37-41) - lines of the electrical, magnetic, mechanical subsystem; (№42-48) - interconnection subsystem lines.

Conclusion

The set-theoretic description of the structures of multi-axis mechatronic modules of intelligent robots and robotic systems allows displaying structures from interconnected physical heterogeneous systems and determining the set of possible structures of modules.

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DEVELOPMENT OF LINEAR MATHEMATICAL MODELS OF THE TECHNOLOGICAL PROCESS OF CRUSHING SEEDS CRUSHING

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Annotatsiya – Yog‘ ekstraksiyasi zavodidagi paxta chigitini yanchish texnologik jarayonini tajribali-statistik izlanishlar asosida mazkur jarayonning soddalashgan chiziqli statistik modeli tajribani rejalashtirish metodidan foydalanib qurildi. Tajriba-statistik ma’lumotlar dispersiyasini bir jinsliligi, chiziqli modelning koeffitsientlarini ishonchliligi va modelning jarayonga adekvatligi tahlil qilindi.

Abstract - The simplified statistical linear model of the object under study is developed on the basis of experimental and statistical studies of the technological process of crushing the cottonseed of an oil extraction plant using the experimental

design method. The analysis of the homogeneity of the dispersion, the significance of the coefficients of the linear model and the adequacy of the resulting model.

Аннотация - На основе экспериментально-статистических исследований технологического процесса дробления семени хлопчатника маслоэкстракционного производства разрабатывается упрощенная статистическая линейной модель исследуемого объекта с помощью метода планирования эксперимента. Проведен анализ однородности дисперсии, значимости коэффициентов линейной модели и адекватность полученной модели.

Kalitso'zlar – jarayonitahlilqilish, korrelyatsiyavaregressiya, paxtachigitinimaydalash, chiziqli regressiya, dispersiyflarningbirjinsliligi, modelningadekvatliligi.

Keywords - technician process analysis, correlation and regression, cottonseed crushing, linear regression, dispersion homogeneity, model adequacy.

Ключевые слова - анализ процесса, корреляция и регрессия, дробление семени хлопка, линейная регрессия, равномерность дисперсии, адекватность модели.

INTRODUCTION: The statistical models of the technological process of grain crushing built in this paper can be the basis for the development of many models of deterministic, dynamic and stochastic models for planning and controlling the production process using fuzzy logic. To create a multi-level hierarchy of optimization algorithms for an oil extraction plant with a discrete-continuous nature of production, it is necessary to study the structural organization of the production and technological process and build a mathematical model of the control object.



LITERATURE REVIEW

Firstly, we give a qualitative description of the object, which then allows you to go to the analytical representation of the object model.

The object under study will be considered as a complex consisting of some set of technological installations (equipment) for processing cottonseed, warehouses of various types of raw materials and final products, intermediate storage of semi-finished products [1]. The input of the control object is a set of modifications of the initial raw material - cottonseed of various types of harvest and varieties. The output of the control object is a variety of end products - cottonseed oil, husks, meal, soap, etc., various types of waste. The main material flows in the studied enterprise with discrete-continuous technological processes are the flows of raw materials, intermediate and final products of processing cottonseeds.

The manufactured products of the preparatory workshop of the oil extraction plant, consisting of a seed warehouse, seed cleaning, peeling and separating workshops and roller section, are cotton mint.

The final product of the preparatory workshop is mainly cotton mint - it is a product obtained by grinding cottonseed kernels on roller machines. The grinding of the kernel of cottonseeds is carried out in order to achieve the maximum possible opening of the cells of the kernel of cottonseeds. It is allowed to add husk to the crushed kernel - the mint, bringing the total content of the husk in the mint obtained from a mixture of seeds of various varieties to 15-17%. The thickness of the petal of the mint determines the quality of grinding, it can be from 0.1 to 1.0 mm. The thinner the petal, the more opened cells.

When shelling (peeling) of cottonseeds, a whisker is obtained, consisting of a mixture of kernels, husks and whole seeds. The process of rushanka separation has

the goal of obtaining a kernel with a minimum content of husk with the lowest oil content.

Research methodology The number of whole seeds in a small hook after the first breaking (peeling) should be no more than 30%, after the second - no more than 0.8%. During the separation (separation) of the rushanka, two fractions are formed - the husk and the core.

The husk is a product whose content in seeds is 39-43%. Oil dust is finely crushed particles of the core contained in a whisker or husk. Usually, these particles are no larger than 1 mm.

The cottonseed kernel is a product that is subject to further processing to extract oil from it, so long-term storage is not recommended because it is devoid of a shell and the acid number of the oil quickly increases, destructive processes are observed, leading to loss of oil and reducing its output.

For the purpose of operational management of the production process, a simplified mathematical model of the technological process of crushing cottonseeds is being developed. The technological process of crushing cottonseeds consists of a number of technological installations (equipment), control and regulation devices, warehouses of various types of raw materials (modification of cottonseeds: a selection of cottonseeds, industrial variety, type of harvest, cottonseeds grade, contamination, humidity and etc) and intermediate products, semi-finished products (the core of cottonseeds, husks, unbroken seeds, etc.).

The developed mathematical model for creating algorithms for controlling the technological process of crushing cottonseeds is a formalized description of the structure of the technological process and characterizing its parameters.

The technological process of crushing cottonseeds consists of the following main technological operations: seed loosening, conveyor, drying, cleaning, crushing, seed peeling, the sieve of various sizes [1].

The purpose of this work is an experimental statistical study of the technological process of crushing cottonseed, as well as the construction of a simplified statistical linear model of the process under study. The technological process of crushing cottonseeds, as a control object, has dynamic properties, which imposes a number of difficulties in mathematical formalization. The effect of the object dynamics on the accuracy of the statistical model will be minimal in the case when the moments of data recording at the object input and output are separated by a time interval equal to the maximum shift of the mutual correlation function between the process parameters considered.

Statistical examination of the process of crushing cottonseeds also requires a preliminary assessment of the required number of observations. The amount of necessary statistical data can be determined by the method described in [2,3].

According to the considered methodology for collecting experimental data under conditions of the normal functioning of the technological process of crushing cottonseeds, the parameters of the crushing processes were recorded, considering the time shifts and the data collection interval calculated from the results of the preliminary experiment.

In this case, the readings of the recording and indicating instruments and the data of express analyzes specially organized in the laboratories (nuclei yield, husk, non-shredded seeds) were used.

All collected statistical material is presented in the form of tables of initial data (Table 1 and 2). The obtained experimental data were an approximate equivalent of

the object and were used in mathematical modelling of the technological process of crushing cottonseeds using the experiment planning method.

Based on the analysis of existing methods for constructing models of complex dynamic objects, for the technological process, experimental statistical methods of identification based on the methods of correlation and regression analysis are most acceptable [4,5].

A preliminary study of the crushing of cottonseeds, as well as an analysis of a priori information about the processes contained in the practical experience of technologists and specialists, made it possible to identify technological parameters telling the greatest influence on the process of crushing cottonseeds.

The entire set of parameters determining the current state of the technological process of crushing cottonseeds can be divided into two groups of parameters [6].

I. The set of primary (input) process parameters characterizing the quality and quantity of the initial processes:

a) input parameters of raw materials of cottonseeds for the crushing process $X = \{x_1, x_2, x_3\}$;

where x_1 - cottonseed contamination, in%;

x_2 - cottonseed damage, in%;

x_3 - cottonseed moisture, %.

b) The set of secondary (output) process parameters, characterizing those generalized technical and economic indicators that assess the quality and economic efficiency of the process of crushing cottonseeds $Y = \{y_1, y_2\}$,

где y_1 – yield kernel of cottonseeds (crushed seeds), in%;

y_2 – the output of the husk, seed seeds and cottonseeds not chopped, in%;

The levels of the factors $X = \{x_1, x_2, x_3\}$ were chosen in such a way that they covered the assumed range of optimal values of the factors, which follows from the table. 1.

Table 1.

The levels of the factors X

Factor's levels	designation	B %	B %	B %
		x_1	x_2	x_3
Main	0	6	7	11
The range of variation in	Δx	3	4	3
Upper	+1	9	11	14
Lower	- 1	3	3	8

Analysis and results

It was chosen that $X = \{x_1, x_2, x_3\}$ were the levels of the factors. one.

The coded value of the factors z_1, z_2, z_3 was determined by the known formulas [7].

As a mathematical model of the object of study, choose a first-order polynomial that is linear in all variables:

$$\hat{y}_2 = b_0 + b_1 z_1 + b_2 z_2 + b_3 z_3 + b_{12} z_1 z_2 + b_{13} z_1 z_3 + b_{23} z_2 z_3 + b_{123} z_1 z_2 z_3 \quad (8)$$

where z_1, z_2, z_3 — coded values of factors; b_0 - free member; b_1, b_2, b_3 - coefficients showing the degree of influence of each factor on the optimization

parameter; $b_{12}, b_{13}, b_{23}, b_{123}$ are coefficients showing the degree of influence of the interaction of the relevant factors on the optimization parameter.

Table 2

Planning matrix 2^3

The real importance of the factors				The coordinates of the factors without a unit				Output
The number of experiments	x_1	x_2	x_3	z_0	z_1	z_2	z_3	y_2
1	4	4	7	+1	-1	-1	-1	31.6
2	8	4	7	+1	+1	-1	-1	31.2
3	4	10	7	+1	-1	+1	-1	30.6
4	8	10	7	+1	+1	+1	-1	29.8
5	4	4	13	+1	-1	-1	+1	30.4
6	8	4	13	+1	+1	-1	+1	29.8
7	4	10	13	+1	-1	+1	+1	29.1
8	8	10	13	+1	+1	+1	+1	28.9

We calculate the average values of y_2 in each row of the planning matrix, for this, we carried out additional experiments.

$$m (m = 3) \text{ times: } \overline{y_i} = \frac{\sum_{j=1}^m y_{ji}}{m}.$$

$$\overline{y_1} = 30.9, \quad \overline{y_2} = 30.9, \quad \overline{y_3} = 30.2, \quad \overline{y_4} = 30,$$

$$\overline{y_5} = 30.06, \quad \overline{y_6} = 29.7, \quad \overline{y_7} = 29.4, \quad \overline{y_8} = 29.1.$$

Then the line dispersions were calculated by the formula

$$s_i^2 = \frac{\sum_{j=1}^m (y_{ji} - \overline{y_j})^2}{m-1} \cdot s_1^2 = 0.24, \quad s_2^2 = 0.04, \quad s_3^2 = 0.08, \quad s_4^2 = 0.02,$$

$$s_5^2 = 0.05, \quad s_6^2 = 0.005, \quad s_7^2 = 0.045, \quad s_8^2 = 0.125.$$

Next, the experimental value of the Cochren criterion is calculated by the formula

$$\sigma_{pacu} = \frac{s_{i\max}^2}{\sum_{i=1}^n s_i^2} \cdot \sigma_{pacu} = 0.206.$$

At $f_1 = m-1$ and $f_1 = n$ from the reference tables [9], the value was taken to be 0.516. Since the line-by-line dispersions should be considered homogeneous, and the reproducibility of the experiment — satisfactory.

The variance of the optimization parameter in accordance with the formula is equal to:

$$s_y^2 = \frac{\sum_{i=1}^n s_i^2}{n} \cdot s_y^2 = 0.075, \quad s_y = 0.273$$

According to the corresponding formulas [3,4], the coefficients of the regression equation were calculated:

$$b_0 = 8.34, \quad b_1 = -3.86, \quad b_2 = -3.86, \quad b_3 = -3.775, \quad b_{12} = 0.35, \quad b_{13} = 0.15,$$

$$b_{23} = 0,35, b_{123} = 0.$$

The regression equations took the form

$$\hat{y}_2 = 8,34 - 3,86z_1 - 3,86z_2 - 3,775z_3 + 0,35z_1z_3 + 0,15z_2z_3 + 0,35z_1z_2z_3 \quad (5)$$

The dispersion of the coefficients of the regression equation in accordance with the formula was:

$$s_{b_j} = \frac{s_y}{\sqrt{NM}}, \quad s_{b_j} = 0,055.$$

The experimental value of student's criterion is equal to:

$$t_j = \frac{|b_j|}{s_{b_j}}. \quad t_{p_0} = 151,27, \quad t_{p_1} = 70,18, \quad t_{p_2} = 70,18, \quad t_{p_3} = 68,63, \quad t_{p_{12}} = 6,36, \\ t_{p_{13}} = 2,45, \quad t_{p_{23}} = 6,36, \quad t_{p_{123}} = 0.$$

When $f_1 = n(m-1) = 16$ and $\alpha = 0,05$, the table value is $t_{tabl} = 3,24$ with the number of degrees of freedom equal to 16 [10,11]. Comparing t_{ras} with t_{tabl} showed that ($t_{ras} > t_{tabl}$) only coefficients are statistically significant

$$b_1, \quad b_3, \quad b_{12}, \quad b_{23}. \quad \text{Therefore, the final regression equation is:} \\ \hat{y}_2 = 8,34 - 3,86z_1 - 3,86z_2 - 3,775z_3 + 0,35z_1z_3 + 0,35z_1z_2z_3 \quad (3)$$

Check the adequacy of the model. The variance of adequacy calculated by the

$$\text{formula } s_{ad}^2 = \frac{m \sum_{j=1}^m \left(\bar{y}_j - \hat{y}_j \right)^2}{n - q}, \quad \text{where } q \text{ is the number of members of the regression}$$

equation ($q = 6$) remaining after checking the significance of the coefficients b_j ; - line-by-line values of the optimization parameter, calculated by the final type of the mathematical model [12, 13].

To test the adequacy of the finally adopted mathematical model (3), the Fisher criterion was calculated using the formula

$$F = \frac{s_{a\partial}^2}{s_y^2}, F_{pac} = 3,75$$

When $f_1 = n - q = 2$, $f_2 = n(m-1) = 16$ and $\alpha = 0.05$, the table value $F_{tabl} = 4.49$ [2]. Since $F_{ras} < F_{tabl}$, we can assume that equation (6) adequately describes the technological process of crushing cottonseed. From this equation, it follows that, only the coefficients have a significant effect on the parameter y_1 . The coefficients $b_{12}, b_{13}, b_{23}, b_{123}$ on the technological process in the studied intervals on the indicator y_2 have no significant effect.

The results obtained can be applied:

- a) to select the optimal technological mode;
- b) in case of machine simulation for the purpose of checking and evaluating the process control algorithms for crushing cottonseeds, as well as for creating a process control system;
- c) to select an effective plan for the main production process of cottonseed processing based on simplified linear mathematical models.

CONCLUSION

Based on theoretical and experimental studies, the developed models and algorithms of the technological process of crushing cottonseeds (grains of various materials) by the production processes of cotton oil production will help to increase the efficiency of functioning under conditions of integrated systems of automated control of oil extraction enterprises.

As a result, the following results were obtained:

1. The analysis of the state of scientific and practical developments on the materials of the open press in the field of automation and construction of mathematical models of the technological process of crushing cottonseeds (grain of various materials), industrial control systems of oil extraction enterprises;
2. A linear and non-linear statistical model was developed by the least squares method and the model was analyzed for adequacy.

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ACTUAL PROBLEMS OF NATURAL SCIENCES

UDC 577.19

THE IMPORTANCE OF PISTIA IN PURIFYING RUNNING WATER.

(in the example of Andijan city, Uzbekistan)

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Annotatsiya: Mazkur tadqiqot ishida “Andijon shahar Suv Oqova tozalash inshooti” aksiyadorlik jamiyatida asosiy tozalashga kelayotgan shahar kommunal oqova suvlarini biologik tozalash usullarini takomillashtirish maqsadida, yuksak suv o’simliklaridan Pistia Telezorovidni qo’llash oqova suvlarni tarkibini zararsizlantirishda samara berishi bo’yicha takliflar berilgan.

Kalit so’zlar: Biologik tozalash, oqova suv, suv o’ti, pistia, biomassa, suv inshooti

Annotation

In current article the methods of purifying of sewage grey water plants with pistia telezorovid are given. The methods of efficient ways of analyzing in laboratory conditions are highlighted. The chemical and physical features of pistia plant are given.

Key words: biological purifying, dyke, grey water, water plant, pistia, irrigation.

Introduction

President of the Republic of Uzbekistan Sh. Mirziyoyev on the improvement of the ecological situation and protection of the environment in the Republic of Uzbekistan for 2017-2021 five priority areas of development ACTION STRATEGY IN 4.3. In accordance with paragraph Increasing public utility services, construction

of new wastewater networks, modern, efficient and efficient technologies step-by-step introduction in rural areas clean drinking water of the population and to improve their accessibility.

The regular observation or control of industrial and domestic grey water should be done according the list of program sources of polluting natural environment. Nowadays the content of harmful elements in gutter and sewage grey water are increasing regularly. In its turn it brings to several serious problems.

Large scale development of different industrial branches, increasing number of urban objects for citizens, appearing new towns also increases demand pf pure drinking water. That's ways in the purpose of rational usage of drinking a lot of irrigational channels are built for field and problems of providing with pure drinking water the citizens are solving. (P. Sultonov)

Even though a lot of unique measures are taken in Uzbekistan for protecting the natural environment the most urgent problems of current day still stays building special equipment which will provide more effective ways of purifying canalization waters. It takes much time and effort the cleaning of sewage grey water from different harmful wastes. During the purifying grey water different methods are used. Such as: mechanical, physical, chemical and biological methods.

Any changes occurring in environment influences to natural conditions. The most important of all natural resources is water. The level of pollution and number of canalization grey water which flows into natural water depends on kind of tired and content of additions, stage of technological processes. Kind of substances polluting more than 150 thousand in duct water but only 250-300 of them can be neutralized or disposed by modern methods of detecting and neutralizing. (Ergashev)

Material and research methods

In cleaning of canalization grey water by biological methods often used method of enriching duct water with green water plants (green algae). By using biological methods at about 80% of organic substances can be neutralized.

Taking into account the climate conditions of Republic of Uzbekistan the level of cleaning duct water with biological methods using different water plants which have high structure can be increased for 90-99%. (Shoyoqubov R.SH)

Except that the role of water is great in different industrial enterprises, in agriculture and domestic-sanitation branches. For example, only urban citizens of Andijan city spend at about 250 liters of water in a day and it will be 0.2 km³ of pure water in a year. In current days one of the priority ways of cleaning of water is purifying by different biological methods and using them in irrigation of agricultural plants and their conditions are required by norms. For purifying duct water of manufacturing enterprises and domestic canalization waters in our research we use the water plant *Pistia stratiotes*.

The scientist R. SH. Shoyakubov and his staff created biotechnological methods of cleaning grey from pig-breeding farms, poultry farms and flax reprocessing industry by means of a plant *Pistia*. (1987). In this process, the system, biology, morphology, anatomy of the plant *Pistia* and methods of its growing, usage in economy industry. The methods of biological purifying grey waters from industrial and domestic canalization in condition of Fergana valley, especially in Andijan district were not analyzed enough. That's why the scientific research on learning grey waters from manufactured plants of Andijan district is one of the urgent problems in protection of natural environment.

Results and discussion

The main goal of scientific research to create the technology of growing algae plant *Pistia* in domestic canalization grey waters of Andijan city and purify it from

organic and mineral substances. By means of hydrobiont living on biological water plants, microorganisms and zoo plantations in their living process produce special chemical substances which destroy pathogenetic bacteria spreading different diseases in grey waters.

Deep and surface plants on biological basins have great role except microorganisms. At the result of photosynthetic activity addition to enriching water with oxygen they also participate in dividing substance by filtering they adopt formed mineral substances and accelerate the process of purifying of grey water.(Vinberg and others).The natural ways of spreading the water algae pictia and systematic place.

Pictia refers to the to the family of water cabbage and street flowers (pictia stratiotes) and is perennial plant, floating on the surface of water and forms water wine. Pictia is one of the ancient plants. Its remains are found in the South of France and in North America. (Angler, 1924). Current time it grows in Asia, Africa, Australia and Europe(Wolf, Malayeva 1966...). The fruit of pictia are dry in the form of unicellular capsule and it has several seeds. The crust of the capsule becomes thinner and gets light brown color. At last the capsule breaks down when the seeds are ripen and go off. One part sinks in the bottom of the water basin and others attach the roots of the pictia. The full ripen seeds are brown color but unripe one are green color, seeds have long cylindrical shape and of a size of 1.5 -2.0 mm. The weight of 1000 seeds is 2.2gr. The calm period of pictia seeds in introduction period as in natural conditions are very short. In favorable conditions (when the temperature of water is 25-26 °C and enough sunlight) the seeds after going out of capsule begin sprouting and growing. The critical factor in growing of pictia has the light, as far as in dark place they will not grow even the temperature of the water is normal. The seeds of pictia are persistent to long (till 60 days) cold temperature (3-5 °C), begins growing in 14-16-days. In laboratory conditions (in aqua distillate the temperature 26-28 and especially the light is needed) the sprouting of seeds consist 72%. In

botanic Parks the pictia is planted as decorative (Paramanova, 1961) and aquarium (Jdanov 1973). However biomass of pictia is used as a food for pig breeding (wolf.1969). Pictia is grown as a food for kettle of animals, grey water from domestic canalization and flax reprocessing industry, industry of producing mineral fertilizers, biochemical plants, silk producing industry, and meat reprocessing plants city enterprises of social – domestic services. (R.Shoyoqubov) According to the opinion of some scholars the Growth only content of basic environment and kind of a water plant algae but also from the density of planted seeds of primary. The density of primary seed sprouts should be 1m^2 depending from food concentration of canalization grey water 1-3 kg on the surface of 1m^2 grey water “in separate conditions 5 kg\m wet biomass. Pictia is grown efficiently on the grey water of pig breeding and poultry breeding farms. The harvest of biomass in such conditions for 1m^2 surface of grey water is 1400 grams of green wet biomass. (R.S.Shoyaqubov .1993-1997).Following is the photo of pictia plant. (1)



At the result of multiyear scientific researches the most efficient methods of purifying of agricultural gray waters were worked out. They are pictia stratotesz, eyhoriya (azolla carolina wild).

Conclusion

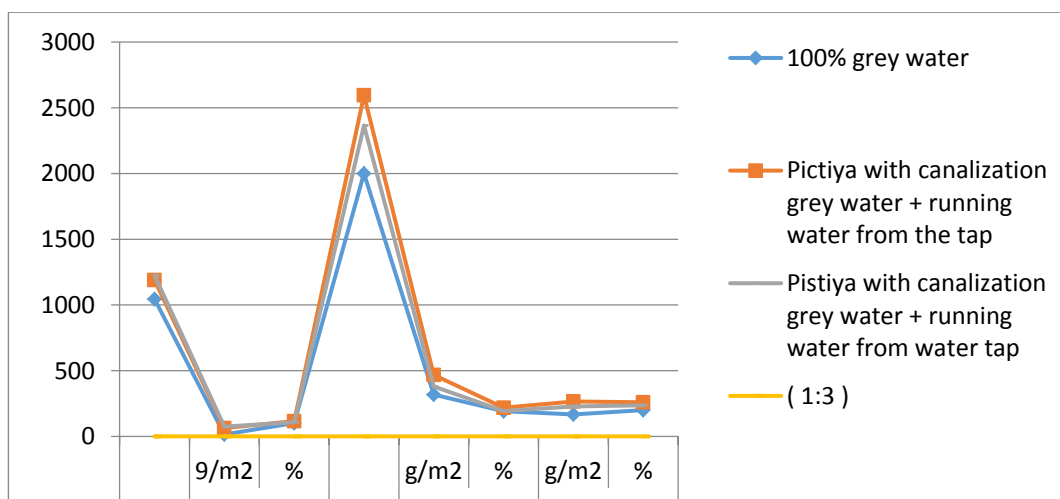
The growing and multiplication of process of algae pictia from seeds in laboratory conditions in the small water basins covered surface with plastic transparent material.

The goal of our current research is to use the water plant pictiya for purifying the grey water in different concentrations (25%, 50%, and 100%) of liquid and experimenting its growths and crop yield.

Crop yield of pictia on the canalization grey water of Andijan city.

Experiment variants	Biomass g/m³						The growth of mass at the end of experiment	
	In three days			At the end of research				
	Wet bio mass	Daily growth		Wet bio mass	Daily growth			
		g/m²	%		g/m²	%	g/m²	%
100% grey water	1045	15,0	101,5	2000	318,3	191,3	166,7	200
Pictia with canalization grey water + running water from the tap	1190	63,3	116,3	2595	468,3	218,0	265,8	259,5
Pictia with canalization grey water + running water from water tap (1:3)	1225	75,0	107,5	2365	380,0	193,0	227,5	236,5

At the end of our experiments coming from its results we come to conclusion that the crop yield of the algae pictia was in 25% suitable habitat consists 237,5 gr/m², in 50% grey, habitat 265,8 gr/m², and in 100% -166,7 gr/m² and the most suitable version is-50%.



Pictia on the canalization grey water of Andijan city .(Figure 1)

An analysis it gives us confidence to say that pictia can be grown in grey domestic canalization waters of Andijan city and it gives the opportunity of purifying the grey waters. In its turn it will protect environment by saving microflora in open water basins.

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**THE BENEFITS OF UTILIZING VIRTUAL EDUCATIONAL
TECHNOLOGIES IN THE DEVELOPMENT OF STUDENTS' SKILLS
IN MICROBIOLOGY**

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Annotation: The article discusses the benefits and prospects of virtual teaching technologies in the development of necessary learners' skills in microbiology.

Key words: Biology, microbiology, internet, virtual educational technologies, computer, skill, formation, individual, differential etc.

Аннотация: В этой статье обсуждаются вопросы и преимущества пользования технологиями виртуального образования в формировании понятий у студентов по предмету микробиологии

Ключевые слова: Биология, микробиология, интернет, технологии виртуального обучения, компьютер, способность, образование, индивидуал, дифференциал.



Аннотация: Ушбу мақолада талабаларнинг микробиология фанидан кўникмаларни шакллантиришда виртуал таълим технологияларидан фойдаланиш имкониятлари, уларнинг афзалликлари ҳақида фикр юритилган.

Калит сўзлар: Биология, микробиология, интернет, виртуал таълим технологиялари, компьютер, кўникма, шакллантириш, индивидуал, дифференциал.

Introduction: Microbiology is a part of biology which explores the relations of microorganisms with the environment and its development, as well as the microorganisms' properties, diseases they cause and microorganisms in the environment [1,2]. Therefore, profound learning of this subject and the formation of learners' skills are one of the topical issues of modern microbiology education. One of the ways to solve this problem is to create virtual microbiology platform for the global Internet by providing it with virtual science-related technology and implementing it widely in microbiology instruction.

Learners can achieve high efficiency and progress in their expertise, e.g., the knowledge and skills gained in microbiology via virtual educational technologies. Virtual educational technologies, considered as the product of creativity, are extremely effective for both teachers and students to develop their professional skills in their virtual world. The source of virtual learning creates a great deal of convenience equally for instructors and students in the learning process such as saving time and making independent work[3].

Virtual educational technologies designed for the global Internet are educational and scientific information tools integrated into the global Internet in electronic form to effectively organize the instructive atmosphere and complement good teaching methods. So, the use of virtual educational technologies in microbiology is an important measurement of the knowledge and skills of HE teachers such as having access to modern information resources and communication



tools, processing the information, creating personal information space and the integration of necessary information in higher educational establishments[4].

When applying virtual educational technologies to the teaching process of microbiology, it supports not only cognitive activity, but also learners' motivational, emotional and communicative environment.

According to the results of the research, students who deal with the required microbiology concepts will achieve great efficiency in the specific pedagogical technology, specificity, system of the parties, methods, factors and pedagogical conditions. Consequently, these factors will have a positive effect on their behavior, code of conduct, mentality, mindset and the way of thinking.

So, the question arises here, how students can develop the necessary skills for microbiology? Who creates the basis for the formation of skills in microbiology?

Based on the outcomes of our research, it was found out that the students' experience in microbiology is a key factor in education and upbringing of pedagogical and technological mechanisms, as well as their experiences in solving various oral, written, creative and technical issues of microbiology. Microbiology should constantly analyze the changes in the field of education [5]. At the pedagogical higher education institutions, the following tasks and requirements are to be put in front of the professors and students in order to form and develop their required skills in microbiology: training highly qualified personnel in the field of biology, demonstrating creative abilities in the developing society; preparing and training teachers of biology, that is, getting them all involved in modern teaching and learning processes of microbiology and being prepared for new developments in certain educational institutions; forming of the professional world of the future biological teachers; involving students in the process of formation as a person in the field of education; providing students with the accurate information about the main principles of microbiology and new technologies in the field of information



technology; strengthening students' theoretical and practical knowledge of their specialties, forming skills and abilities for independent work in solving basic pedagogical and creative problems; generalizing and classifying knowledge, skills, qualifications; implementing the gained knowledge in biological processes, organizing and designing the special courses on biology; forming and developing the required skills for biology and preparing students for independent work and activity in HEIs etc[6,7].

Literature review: V.A. Krasilikova expressed her positive opinions towards the computer technology as a means of modern communication and a new system aiming at modern didactic teaching methods which enable a new system of learning processes.

There are two ways helpful for students to develop their required skills in microbiology:

1. Individual - The study is unique to individual courses of all forms.
2. Differentiation - work in various groups based on opportunities, abilities, interests etc.

The content of individual student is simplified by the use of virtual educational technologies. Taking into account the individuality of the virtual educational technologies, the specific information should be selected in order to collect information units and form the students' content skills. Due to the fact that students have different interests it can help to find the optimum norm. The goal is revealed independently, providing additional insight into the collection of information and independent thinking in solving problems, seeking the necessary information, and presenting the results of work[8]. The program information should be oriented to the learners' ability to perceive themselves independently. Created virtual educational technologies serve not only as additional training in education, but also as the main learning tool to help further improvement of the quality of education.



Today, universities are equipped with different computer technologies connected to the global Internet network, and have the opportunity to organize lessons using virtual educational technologies and assess students' knowledge online. In order to develop students' knowledge in microbiology, these three-dimensional virtual educational technologies should be developed and introduced into biological education.

M.Kazaryan and M.A. Shakhramanyan thought that 3D modeling is the most up-to-date and promising technology and a modern tool for providing educational resources with 3D visuals [9].

Research Methodology: One of the most advanced types of innovative pedagogical technologies in higher education institutions is the introduction of 3D virtual educational technologies. Virtual education should be truly informative and developing. Introduction of 3D systematic virtual educational technologies in microbiology is a significant tool in building students' skills.

At the same time, modern computer technologies cover all aspects of human activity, including microbiology, and have contributed to modern education. One of these modern teaching methods is the three-dimensional virtual educational technology, with the following advantages: positive learning motivation; rational organization of the educational process; formation of independent research; effective organization of students' ongoing, mid-term and final assessments; increase the interest of students towards the teaching process[8].

The scientific-methodological data on microbiology are learned independently, if necessary, consulted with teachers and get acquainted with the results of individual knowledge. The use of virtual educational technologies does not imply writing, but it teaches students to explore different objects, understand the principles of process overviews, search and work with relevant information.



Students' information accepted through virtual educational technologies depends on students' responses and reactions. High-efficiency can be achieved by providing students with the necessary information without overloading it. In this way, a new feature of virtual educational technologies appears - the ability of a student to accept it individually. The key to creating it is to unite the support and make sure that students receive the information from the source. Virtual educational technologies between a student and a subject create an active "dialogue". The type, method and content should be relevant to the individual needs and characteristics of every student[10].

The most important task of virtual educational technology in microbiology is to create interactive scientific-methodical materials, which will contribute to the effectiveness of the learning process. The use of virtual science technology in this subject is a new stage in the use of computers for today's educational and training systems, therefore modern educational platforms for traditional and distance learning systems have been created and used. This creates enormous opportunities for independent learning of biology, as well as arranging effective communication between learners in the field.

Virtual educational technologies include didactic, technical, and organizational considerations, enabling the diversification of infinite pedagogical effects, as they involve the transmission of various types of electronic information (images, drawings, tables, diagrams, audio and video files, virtual presentations).

The most significant task of the teaching staff of HEIs is to form students' skills in microbiology. For students, educational resources on the global online education platform can be packed with graphics, animations, pictures, sound effects, and text items. In other words, the platform of virtual learning reflects the combination of different means of information united in one content. Sharing or merging of texts, graphics, video, audio presentations enable the transmission of



educational information in the most explicit and easy-to-understand format. The presentation provides motivation, communication skills, new knowledge and skills[8].

One of the ways in which microbiology can help shape students' skills is through the use of independent learning. The use of virtual educational platforms, which is placed on the global Internet network, is a good way to create independent learning. One of the vital aspects of networking is that students monitor their personal electronic portfolio reflecting the educational resources as a forum for their independent work and can make timely pedagogical changes.

Based on the virtual educational technologies, the student-oriented education is provided by day-to-day faculty or independent learning system, and designed to produce different forms of education, based on a well-defined curriculum, independent learning process which is carried out under the guidance of teachers.

Conclusion: In summary, in the pedagogical higher education institutions, the importance of microbiology education and the educational potential of students are enormous. In the microbiology lessons, students will be able to develop a science-based skill on the basis of virtual educational technologies, their diversity in nature, their role in the food industry, agriculture, pharmaceuticals, medicine, their proteins, physiological active substances, enzymes, vitamins and various organic substances etc.

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EXPERIMENTAL INVESTIGATION OF THE THERMOPHYSICAL CHARACTERISTICS OF THE MELATIC MEAT

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Annotatsiya: Ushbu maqolada qovunlarni issiqlik-fizik hossalarni aniqlash bo'yicha tajriba sinovlarning ba'zi natijalari keltirilgan. 20°C dan 70°C gacha bo'lgan harorat diapazonidagi turli navli qovunlar etining issiqlik-fizik hossalari aniqlangan. Aniqlanishicha, issiqlik o'tkazuvchanlik va harorat o'tkazuvchanlik harorat ortib borishi mobaynida deyarli chiziqli qonuniyatlar asosida o'zgaradi. Issiqlik o'tkazuvchanlik va harorat o'tkazuvchanlik koeffitsientlari uchun empirik (tajribaga



asoslangan) ifodalar keltirilgan. Ushbu ma'lumotlar qovun qoqisini ishlab chiqarishda quritish uskunalarini issiqlik-texnik hisobini bajarishda foydali bo'ladi.

Kalit so'zlar: qovun, harorat, koeffitsientlari, issiqlik-fizik, тажриба, тадқиқот, .

Аннотация: В данной статье приведены некоторые результаты экспериментальных исследований теплофизических характеристик мякоти дыни. Определены теплофизические характеристики мякоти дынь разных сортов в диапазоне температур от 20° до 70 °С. Установлено что теплопроводность и температуропроводность увеличивается с ростом температуры почти по линейным законам. Получены эмпирические выражения для коэффициентов теплопроводности и температуропроводности. Эти данные будут полезны при теплотехническом расчете сушильных установок при производстве вяленой дыни.

Ключевые слова: дыня, температура, коэффициент, теплофизик, исследование, эксперимент.

Abstract: This article presents some results of experimental studies of the thermophysical characteristics of melon pulp. The thermophysical characteristics of the pulp of melons of different varieties in the temperature range from 20 ° to 70 °C are determined. It has been established that thermal conductivity and thermal diffusivity increases with increasing temperature almost linearly. Empirical expressions for the coefficients of thermal conductivity and thermal diffusivity are obtained. These data will be useful in the thermal calculation of drying installations in the production of dried melon.

Key words: melon, temperature, coefficient, thermophysical, investigation, experiment.

Introduction: The thermophysical characteristics of the melon pulp characterize its heat storage capacity, the inertia of the temperature field distribution during heating,

and has a significant impact on the dehydration process. Knowledge of the thermophysical characteristics of the melon is necessary for analyzing the movement of heat and moisture inside the pulp and when choosing the optimal drying conditions. To calculate the heat and mass transfer process, generalize the results in the criterial form and mathematical modeling of the melon pulp drying process, it is necessary to have real data on its thermal conductivity (λ), thermal diffusivity (α), heat capacity (C) and density (ρ).

The object and methodology of research: The object of the study are some varieties of Karakalpak melons recommended for drying: Ich-kyzil, Non-gusht, Shakar-palak, Ak-Kaun [1].

The method for studying the thermophysical characteristics of the pulp is based on the use of an integrated rapid method developed by A.S. Panin and V.D.Skverchak and which allows to obtain the values of the thermophysical characteristics in the process of heating the samples [2].

The theoretical basis of the method is the solution of the boundary-value problem of heating a spherical solid placed in the test medium. This method is universal and makes it possible to obtain reliable data at once on the three characteristics of the material under investigation: density (ρ), thermal diffusivity (α) and heat capacity (C).

The express method is based on the use of the heat-inducing properties of a thermocouple sensor, structurally made in the form of a chromel-copelled pointed probe. In the course of the experiment, the thermocouple sensor at $t = 0$ °C quickly fits into the material under study and records its heating over time using a secondary recording device (automatic millivoltmeter with color indication of readings).

Practical implementation: To implement this method, we have made an experimental laboratory setup that provides a quick entry of a thermocouple sensor into a melon pulp sample under investigation (Fig. 1).

The experimental laboratory setup consists of a table-top 2 installed on platform 1, under which a heat-insulated container 3 is placed, where the sample of melon pulp 4 in volume of 3 cm^3 is placed. The container is heated by an induction coil 5 through a laboratory autotransformer 6 and has an external thermal insulation coating 7. A container 8 with thermal insulation is located on the table top and is equipped along the axis with a pipe 9 for passing the thermocouple sensor 10. The latter is connected to an automatic millivoltmeter 11, the scale of which isotted in degrees Celsius ($^{\circ}\text{C}$).

The principle of operation is as follows. The melon pulp sample is placed in the container 3 and the toggle switch 12 switches on the general power supply of the installation, then locking the clamp 13 and the thermocouple sensor 10 under the action of the load 14 rush down the pipe 15 and when the edge of the central pipe 9 reaches, the contactors 16 of the heating circuit of the thermally insulated container 3 turn on. the motion sensor breaks through the paper partitions 17 and pierces the melon sample under investigation to a certain depth. At the moment of sensor insertion, the cold ends of thermocouples are thermostated, since they were located in pipe 15, which is in water with melting ice. As the sample warms up, the millivoltmeter starts to show the temperature change over time.

Thus, four samples of melons in five repetitions were examined.

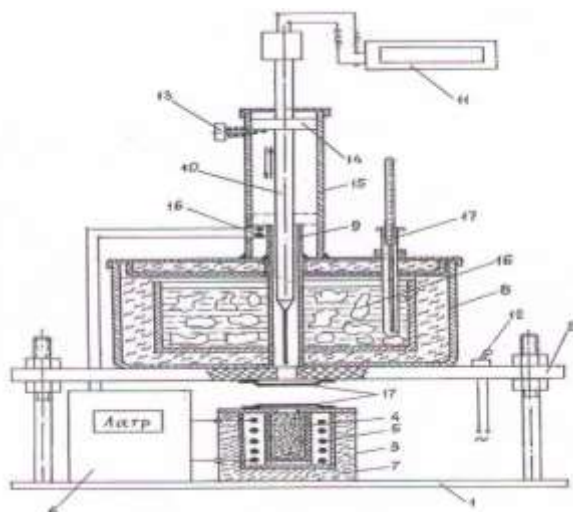


Fig. one. Experimental laboratory setup for determining the thermophysical characteristics of the melon pulp.

1-platform; 2-table top; 3-insulated container; 4-investigated sample melon pulp volume of 3 cm³; 5-induction coil; 6-laboratory autotransformer; 7-heat-insulating coating; 8-tank with thermal insulation; 9-pipe for the passage of the thermocouple sensor;

10- thermocouple sensor; 11-automatic millivoltmeter; 12 toggle switch; 13-clamp; 14-load; 15-pipe; 16-contactors; 17-paper dividers 17.

Results and discussion:The processing of the obtained experimental data and the analytical calculation of the thermophysical characteristics were carried out according to the method described in [2], using the least squares method [3].

The values of thermal conductivity λ , thermal diffusivity α and heat capacity C for four types of melons in the temperature range 20 °C-80 °C were experimentally determined and are summarized in Table 1.

Since the obtained calculated values of thermophysical characteristics for melons with white pulp (Non-Gusht, Shakar-Palak and Ak-Kaun) differ slightly, for these sorts of melons one can generalize the dependence of the thermophysical characteristics on temperature in the form of curves shown in Figure 2. At this sample was dried to standard humidity $W = 20-21\%$.

Table 1. Estimates of the coefficients α , λ and C for different types of melons

Estimated characteristics	Pulp of melons	Range of heating temperature, °C						
		20	30	40	50	60	70	80
Coefficient of thermal conductivity $\lambda, \left(\frac{\text{Вт}}{\text{м} \times \text{К}}\right)$	Ich-kyzil	0,085	0,09	0,098	0,011	0,012	0,013	0,13
	Non-gusht,	0,08	0,09	0,095	0,0108	0,0113	0,0125	0,13
	Shakar-palak,	0,082	0,084	0,088	0,011	0,0115	0,0126	0,1
	Ak-Kaun	0,081	0,083	0,085	0,011	0,0116	0,013	0,12
Thermal diffusivity,	Ich-kyzil	0,7	0,74	0,78	0,86	0,92	1,07	1,08
	Non-gusht,	0,7	0,75	0,8	0,87	0,9	1,05	1,17

$\alpha, (\text{m}^2 \times 10^{-7} / \text{C}^2)$	Shakar-palak,	0,695	0,76	0,79	0,88	0,91	1,055	1,172
	Ak-Kaun	0,67	0,765	0,76	0,87	0,9	1,04	1,18
Heat capacity coefficient, $C, (\frac{\text{kJ}}{\text{m}^3 \times \text{K}})$	Ich-kyzil	0,12	0,195	0,96	0,1	0,1	0,098	0,095
	Non-gusht,	0,1125	0,12	0,094	0,1	0,098	0,097	0,097
	Shakar-palak,	0,113	0,125	0,095	0,11	0,11	0,1	0,1
	Ak-Kaun	0,115	0,12	0,092	0,95	0,95	0,92	0,92

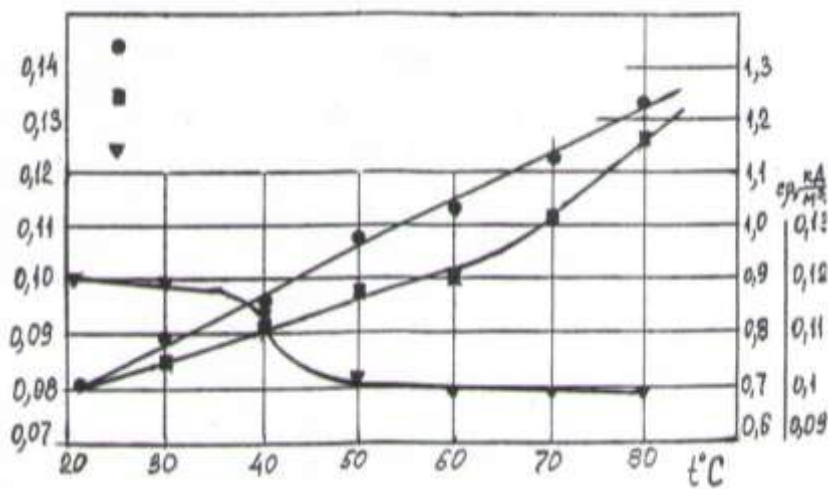


Fig.2. The average dependence of the thermophysical characteristics of melon pulp varieties Ak-Kaun, Non-Gusht and Shakar-Palak.

● – thermal diffusivity $\alpha, (\text{m}^2 \times 10^{-7} / \text{C}^2)$

■ – coefficient of thermal conductivity $\lambda, (\frac{\text{BT}}{\text{M} \times \text{K}})$

▼ - volumetric coefficient of heat capacity $C, (\frac{\text{kJ}}{\text{M}^3 \times \text{K}})$

Analysis of the curves shows that with heating the samples up to 600 C, the values of α and λ linearly increase, which can be approximated by the following functions:

$$\lambda = 0,072 + [(t-20) 7,24 \times 10^{-4}] \pm 2 \times 10^{-3} \quad (1)$$

and

$$\alpha = [6,36 - (t-20) \times 0,107] \times 10^{-8} \quad (2)$$

The volumetric coefficient of heat capacity at temperatures $t = 20 \dots 40^{\circ}\text{C}$ varies slightly and equals $c_p = 100\text{-}1150 \text{ KJ} / \text{m}^3 \text{ K}$, decreases sharply with increasing temperature from 40°C to 55°C and keeps to 80°C linearly, i.e. $c_p = 1000 \text{ KJ} / \text{m}^3 \text{ K}$.

Thus, it can be stated that the thermophysical characteristics of the pulp for many melon varieties depend on the heating temperature, which must be taken into account when carrying out the drying process.

Conclusion: 1. The thermophysical characteristics of the pulp of melons of different varieties are determined in the temperature range from 20°C to 70°C . It has been established that thermal conductivity and thermal diffusivity increases with increasing temperature almost linearly.

2. Empirical expressions for the coefficients of thermal conductivity and thermal diffusivity are obtained.

3. These data will be useful in the calculation of heat drying plants in the production of dried melon.

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ACTUAL PROBLEMS OF MEDICINE

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THE IMPORTANCE OF INTERACTIVE TEACHING METHODS IN IMPROVING THE LEVEL OF CLINICAL KNOWLEDGE OF STUDENTS

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Annotatsiya. Ushbu maqola ichki kasalliklar propedevtikasi bo'yicha "miya bo'roni" va "akademik polemika" ni o'qitishning interaktiv usullaridan foydalanish natijalarini taqdim etadi. "Miya bo'roni" ni o'rganishning interaktiv yo'li asosan I (tanishish) va II (nusxa) bilim darajasini yaxshilashga yordam berdi. Shu bilan birga, "akademik polemika" ta'lim o'yinlari orqali erishilgan bilimlar juda ham mukammal va III (bilim-malaka), hatto IV (bilim-transformatsiya) darajalariga mos. O'quv-klinik o'yin

davomida "akademik polemika" analitik fikrlashning salohiyatini ancha tezroq kuchaytirdi, bu esa ushbu o'qitish uslubining muhim va ayni paytda o'ziga xos ustunligi hisoblanadi.

Kalit so'zlar: o'rgatish, interaktiv usul, miya bo'roni, akademik polemika, klinik bilimlar

Аннотация. В настоящей работе приводятся результаты применения интерактивных способов обучения «мозговой штурм» и «академическая полемика» по предмету пропедевтики внутренних болезней. Интерактивный способ обучения «мозговой штурм» способствовал преимущественному совершенствованию I(знакомство) и II (копия) уровней знания. В то же время знания, полученные с помощью учебной игры «академическая полемика», были гораздо более совершенными и соответствовали – III (знание-умение), а то и IV (знание - трансформация) уровням. Примечательным является то, что по ходу проведения учебно-клинической игры- «академическая полемика» гораздо быстрее укреплял потенциал аналитического мышления, что является важным и в то же время отличительным превосходством данного способа обучения.

Ключевые слова: обучение, интерактивный метод, мозговой штурм, академическая полемика, клиническое знание

Abstract. The article discusses the results of application of interactive ways of training «brain storming» and «the academic polemic» in a subject of propaedeutic of internal illnesses are resulted. The interactive way of training «brain storming» promoted primary perfection I (acquaintance) and II (copy) levels of knowledge. At the same time the knowledge received by means of educational game «the academic polemic», was much more perfect and corresponded - III (knowledge-ability), and even IV (knowledge - transformation) to levels. That on a course of carrying out of educational-clinical game - «the academic polemic» the potential of analytical

thinking was much fast integrated that is important and at the same time distinctive superiority of the given way of training is remarkable.

Key words: education, an interactive method, brain storming, the academic polemic, clinical knowledge

Introduction. A traceable new development in streamlining the learning process is undoubtedly related to the growing interest of teachers in the forms of interactive learning, which play the role of a ladder conducive to the progression of students' knowledge potential (6, 7, 8). The interactive teaching methods (ITM) include those that require students to independently extract, process and implement the information presented in a didactic form. This type of training, in contrast to traditional ones, significantly enriches the bank of knowledge with a simultaneous increase in the potential of creative thinking of students (9).

It is established that the used interactive learning methods have a different impact on the formation of levels of knowledge. The long-term goal-oriented work of the institute's team to study the strength of learning and skills of students formed in the learning process and their results, as well as the desire to make teaching interesting, rich and, most importantly, effective, change the training methodology, introduce a special style of pedagogical communication student development and optimize the learning process (11).

Literature review. Interactive forms of education can be divided into imitational and non-imitational. Simulation methods, which include educational clinical games (ECG), immerse students in an atmosphere very close to the practical work of a doctor. Moreover, they form and maintain the emotional intensity of the participants and increase the sense of responsibility for the fate of the patient, at least to her intellectual level. ECG allow systematic monitoring of the improvement in the quality of students' training and play the role of a barrier to their passage to the bedside of the patient, allowing only trained students to pass to patients (1, 2, 4, 5).

Given the above, this work was done, the purpose of which was a comparative assessment of the level of clinical knowledge of students acquired through interactive forms of training "brainstorming" and "academic controversy."

It should be pointed out that the "three-step interview" ultrashort study caused a heightened interest among students. The knowledge gained through this type of educational game was much more perfect and corresponded to III (knowledge - ability), and even IV (knowledge - transformation) levels. More than half of the participants in the game clearly formed the elements of III (knowledge - ability), and the rest of the IV level (knowledge-creativity) knowledge. At the same time, the bank of clinical thinking was enriched much faster, which is an important and distinctive superiority of this method of education.

Research Methodology. For the implementation of the tasks in practical classes on the subject of propedeutics of internal diseases (PID), the ITM-ECG ("academic controversy" and "brainstorming") were purposefully used for a number of years. The control served as the rating indicators of students, obtained using traditional methods of assessing knowledge. Groups of students involved in the study were representative of the number of students, stages and types of knowledge assessment, as well as their individual rating. The level of knowledge was systematically tested from assignments in the course of ongoing, intermediate and final tests. An interactive brainstorming game was used in a modified version, the essence of which was as follows: questions were divided according to the level of complexity into easy (L1), medium (L2) and complex (L3). Their ratio in the general bank of questions was 1: 2: 1. The magnitude of points allocated and the time available for the correct answers depended on the degree of complexity of the question and increased as the latter grew.

The value of brainstorming is that it unites the group. Each participant is given to feel that his proposal is worth it to write. This allows you to turn a solution to a

problem not into a competition (when participants claim that their own ideas are accepted), but into teamwork, when the main opponent becomes the problem itself and not another member of the group.

Analysis and results. In the course of the research the following results were obtained. It has been established that, in contrast to traditional ones, ICG generally more effectively influences the process of mastering a complex of clinical knowledge. In addition, they clearly differed in the individuality of the nature of the action on the formation of well-known levels of knowledge. So, if traditional teaching methods have influenced the development of mainly primary I (knowledge-acquaintance) and II (knowledge-copy) levels, then ICG has influenced more advanced III (knowledge-ability) and IV (knowledge-creativity) their forms.

The classes conducted with the use of the brainstorming training game were distinguished by the high activity of the participants, which is partly explained by the condition of its conduct, requiring the indispensable participation of all members of the group. At the same time, the possibilities of this game in terms of improving certain levels of knowledge turned out to be far unequal. According to the results of the ICG, “brainstorming” contributed to the improvement of the I (acquaintance) and II (copy) levels of knowledge. The formation of more advanced levels (W - skill and IV - creativity), it is not particularly affected. The latter significantly limits the use of brainstorming training games. To achieve the desired result, the choice of this educational game must be differentiated according to the specifics of a particular occupation. For the level of knowledge acquired with its help, especially from the private section of the subject of the propaedeutic of internal diseases, may end up being low.

The results obtained from the use of ultra short disciplines, “academic controversy” turned out to be somewhat excellent. This ITM has contributed to a significant increase in the baggage of both theoretical and practical knowledge of



students, maximum understanding of the meaning of the doctor's dialogue with the patient and the development of clinical thinking, as well as the ability to use theoretical knowledge in a timely manner. practical activities. It should be emphasized that for the successful conduct of an "academic controversy" a sufficiently large amount of knowledge in fundamental medical disciplines is required, as well as possession of a wide range of manipulations. This was obliged by the condition of collecting subjective and objective information, which is closest to the real clinical situation.

Another positive quality of the academic game "academic controversy" was also traced. Among the participants, the "players," the number of individuals with physical research methods increased steadily, and most importantly, the quality of their implementation improved, which corresponded to the goals and objectives of the subject of propaedeutic therapy (3.10). The only drawback that was noted is the lack of active participation of all members of the group.

The department developed scenarios of various clinical situations with a clear definition of the range of responsibilities of each participant in the educational game. Along with this, special conditions have been created with the equipment necessary for conducting an ultrashort pulse. The teacher keeps an eye on the course of the educational game, controls every action of the participant. In cases of tolerance slip meticulously corrects it. At the request of the situation, he often brings additional information that complicates the clinical situation. In the course of the participant's educational game, it is allowed to discuss the role of each symptom in the diagnosis of this disease, the plan for the upcoming examination of such patients. Summing up the lesson, the teacher gives an objective assessment of the actions of each participant in the game, comments on the answers, corrects the compiled survey plan. Speaking as an arbitrator, he dwells in detail on the admitted miscalculations and failures of students - "players" and advises ways to eliminate them.

On the basis of the conducted research, it can be concluded that the ISO “brainstorming” and “academic controversy” do not equally influence the formation of individual levels of knowledge. So, if the first of them contributed to the predominant growth of I and II, then the second - III and IV levels of knowledge. Taking into account the latter, the choice of the educational game method should be carried out in accordance with the goal and objective of each class, we consider it expedient to use the interactive game “brainstorming” in the course of learning the general classes, and the “academic debate” of the special part of the PID.

Thus, the use of USPs in the process of teaching the subject of internal disease propaedeutics substantially develops the baggage of clinical knowledge while simultaneously increasing the cognitive ability of students, gives them creative independence, expands and strengthens the range of acquired practical skills. The main thing is that they are not perceived by students. All this ultimately contributes to the assimilation of new theoretical and practical knowledge, improves the quality of training of future general practitioners.

Conclusion. 1. Interactive ways of learning "brainstorming" and "academic controversy" differentially affect the formation of individual levels of knowledge.
2. The choice of the type of educational game should be carried out depending on the specific topic of practical training.
3. The interactive game “brainstorming” turned out to be more effective in the course of learning the general, “academic controversy” - a special part of the subject of PID.

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ACTUAL PROBLEMS OF HISTORY AND PHILOSOPHY

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THE FOREIGN TRADE OF RUSSIA IN THE END OF XIX - THE BEGINNING OF XX CENTURIES.

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Аннотация: Ушбумақолада XIX аср охири – XX аср бошида Россия ташқи савдо алоқалари ривожланишининг асосий йўналишлари тарихий нуқтаи назардан кўриб чиқилади.

Калит сўзлар: савдо, иқтисодий алоқалар, Россия, экспорт, импорт, ташқи иқтисодий сиёсат, савдо айланмаси, жаҳон бозори, баланс (нисбат)

Аннотация: В данной статье с исторической точки зрения рассматриваются основные направления развития внешнеторговых связей России в конце XIX – начале XX веков.

Ключевые слова: торговля, экономические связи, Россия, экспорт, импорт, внешнеэкономическая политика, торговый оборот, мировой рынок, баланс

Annotation: The main directions of development of the foreign trade connections of Russia in the end of XIX - the beginning of XX centuries are considered in given article from the historical point of view.

Keywords: Trade, economic relations, Russia, export, import, the external economic policy, trade turnover, the world market, balance

INTRODUCTION: The historical development of Russia's economic connections with foreign countries is closely related in its content and method to

economic

theory.

Historical study of foreign economic activity, and in particular foreign trade policy, grows out of the specific practical needs of modern society, and must respond to these requests.

The history of foreign economic relations is considered in its main aspects. This, in the first place, is related to the evolution of foreign trade relations.

During the centuries-old history, the complex and controversial nature of the interaction of the processes of world and Russian trade development is traced, when periods of mutual cooperation are replaced by eras of intense competition. This, in turn, determines the main objectives and goals of studying the history of foreign trade relations of Russia.

The Russian economy is almost unchanged throughout the XIX century. by its nature, it could seek to exceed exports over imports by stimulating the export of agricultural products, timber and raw materials in order to finance the import of industrial goods. The system of these trade relations has a long history, during which the range of foreign trade turnover changed, but not its meaning. [1]

Russia in the post-reform period was not only an active participant in the European and world market, but was also a leader in selected exports.

LITERATURE REVIEW: Features of the economic development of Russia in the end of XIX - the beginning of XX centuries was the subject of constant discussion in historiography. The issues of development of foreign trade relations are reflected in the studies of historians and economists of various historical periods. Such authors include such researchers as: I.K.Babst, B.F.Brandt, I.V. Vernadsky, D.I. Mendeleev, P.B.Struve, V.Vitchevsky, I.M.Kulisher, A.I.Chuprov, A.I.Nikitsky, Yu.V.Gote, N.H.Bunge, M.N.Sobolev, N.P.Ionichev, B.C.Dyakin, Y.F.Subbotin, A.V.Ignatiev, S.A.Pokrovsky, T.M.Kitanin and others.



At the end of the 1850s, the problem of choosing ways of developing the Russian economy between the principles of free trade and the need for government intervention caused a wide discussion in scientific literature and journalism, in which economists, public and state figures participated. These publications laid the foundation for further research, both the theoretical foundations of the country's trade and customs policy, and the study of the development of relations with Russia's trading partners.

The works of scientists of the end nineteenth and the beginning of twentieth centuries were aimed at substantiating their own scientific positions. At the same time, it was they who initiated the study of the history and practice of foreign economic relations of Russia and its foreign trade.

The status and development of historical and economic science, in turn, was determined by the peculiarities of the economic stages that Russia underwent after 1917. At each of the stages, the focus of the researchers was on its main problem, closely related to the need to solve specific political tasks, resulting in the formation of views and concepts, largely due to these features.

Since the 90s of the XX century, the attention of scientists has shifted to a more in-depth and comprehensive study of issues, directly related to solving specific economic problems.

At the same time, the problem of actually studying the role of Russia's foreign trade relations remains at the center of scientific research. How did international trade develop with the participation of Russia? This and similar questions of the history of Russia's foreign economic relations remain relevant for historical and economic science.

RESEARCH METHODOLOGY: The study of the development of foreign trade relations of Russia in the end of XIX –the beginning of XX centuries should be carried out on the basis of certain approaches.

Consideration of the history of foreign trade relations should be based in the relationship of the main aspects of the evolution of the country's foreign economic activity as a whole and taking into account the conditions of a specific historical period.

In our opinion, the dynamics of foreign economic relations, including foreign trade, the complex mechanism of the formation and development of their leading forms, weave them at different stages. The specifics of the evolution of foreign trade can be studied and understood only in historical sequence and continuity.

The historical experience of the development of foreign trade relations of Russia is a part of the world economic experience.

The study of Russia's foreign trade relations with should not be limited only the accumulation of historical facts, turn into a simple description of events.

It should be consider that in the historical and economic literature many often the fundamental questions of Russian foreign economic history are debatable.

ANALYSES AND RESULTS: Russia's economic development gave rise to economic difficulties and contradictions, in overcoming which an important place was given to foreign trade.

Especially great was its role in solving the problem of the balance of payments.

Tight balance of payments of Russia, developing their own industry to a large extent at the expense of foreign investment, had to be offset by the active balance of foreign trade operations.

It was possible to achieve this in two ways: full expansion of exports and protection of the domestic market from the competition of foreign goods.

With the dynamic development of the Russian economy, above all industry, many countries of the world maintained intensive economic relations with it.

In the second half of XIX century, trade agreements were concluded on the principles of mutual favor with France - in 1857 and 1874, with England and



Belgium - in 1858, Italy - in 1863, Switzerland - in 1872, Peru - in 1874, Spain - in 1876, China in 1858 and 1862, with Japan - in 1867 and etc.

With Germany, England, Austria (Austria-Hungary), Italy, France, trade relations were built on the basis of conventional tariffs. Seven states, including China, Persia, Turkey, had bilateral trade treaties with Russia.

Foreign trade was conducted mainly by sea. With the growth of the railway network, the volume of trade across the land borders also increased.

Russia after the reforms of the 60-70s of the XIX century remained an agrarian country, exported, with some exceptions, agricultural products and imported industrial goods.

The turnover of foreign trade from 1860 to 1890 increased by more than three times. The structure of exports remained traditional: agricultural products 75-80%, more than half of it was grain. [2]

It should be noted that the study of Russia's trade policy is complicated the fact that before 1905 there was no special ministry for trade.

Those tasks were assigned to the Ministry of Finance. October 26, 1864 the Department of Commerce and Manufactories was established in the Ministry of Finance.

The department consisted of 4 offices. The third branch - Foreign Trade Relations - was in charge of communication with the consuls, foreign agents, dealt with issues of trade agreements, customs duties, business on the part of merchant shipping and shipbuilding.

In 1872, as an advisory institution under the Ministry of Finance, the Council of Commerce and Manufactures whose task was to represent the interests of Russian industry and commerce began to operate. [3]

In view of the fact that the Ministry of Finance in the end of XIX – the beginning of XX century had not only a great influence on the country's foreign



economic policy, countries, and participated in the discussion of foreign policy issues, that was reflected in the mechanisms for making foreign trade decisions.

The intertwining of competencies of the Ministry of Foreign Affairs and the Ministry of Finance has often not only in solving private issues, but also in determining the overall foreign trade rate.

Statistics show that in the second half of the century due to the excess export of goods over the import there was a constant tendency to increase Russia's income from foreign trade. By 1895, as compared with 1889, that income an average increased on 35 % per annum.

The development of Russian foreign trade was extremely uneven. Factors such as economic crises, the size of the harvest, the war, the protective nature of the customs policy of the government, increased competition etc. Russia's foreign trade sensitively responded to changes in the global economy. In the 60-70s, Russian imports outpaced exports. The rapid increase in volume of importation has been caused, first of all, enhanced purchases of transport and industrial equipment abroad.

In the 80s, imports declined. The export of goods from Russia was constantly increasing, especially rapidly after the second half of the 60s. In connection with this, the state of the overall balance of foreign trade also changed, which, since 1877, has been positive for Russia.

Russia traded with both European and Asian countries. The main share of its turnover was in European trade. The exclusive position in the foreign trade of Russia was occupied by England and Germany.

In terms of the value of exported goods, in the first place was bread, the second place belonged to wool, the third - to flax, then came the oilseeds, lard, hemp, and wood. As a result of the progress of the relevant Russian industries, the import of sugar, tobacco, butter, cotton fabrics and other goods has decreased.

A stable and highly profitable contribution of Russian industrial exports in the post-reform era is the export of oil and oil products from the Baku oil region to the world market.

Oil production here rose from 557 thousand poods in 1865 to 21.5 million in 1880 and to 489 million poods in 1898. [4]

Russia played an important role in the formation of the world grain market, occupied a dominant position among European countries-exporters of grain. During the period from 1866 to 1899, exports of bread grew more than second.

Russian wheat was imported into all Western European states, but England was the main consumer (a quarter of all exports). After Russia Germany, France, Italy, Holland, Greece etc.

Grain export statistics show that it actually grew faster than grain production. Between 1884 and 1904 grain exports increased by 3.5% per year, while the annual increase in grain production was 2.5%. [5]

The shift of the center for the production of marketable grain to the southern and southeastern regions in the 70-80s predetermined their transformation into the breadbasket not only in Russia, but also in Western Europe. If in the first half of the 19th century St. Petersburg was the main port for exporting grain, then in the post-reform period the role of the ports of the Black and Azov Seas increased significantly. Through them, the bulk of agricultural exports went to foreign markets.

The task of bringing out as much bread as possible to the external market in order to be able to make ends meet in the balance of payments becomes one of the main ones in the foreign trade policy of the tsarist government.

In the structure of Russian exports, manufactured goods accounted for only 3-4 percent, with most of them exported to the border countries of Asia.

The foreign trade policy of the Russian government at the beginning of the twentieth century was determined by two main reasons: the desire to create their own

industry and fiscal considerations. Along with the trade surplus, customs duties served as an important source of repayment of overseas loans.

In the beginning of XX century, Russia imported mainly industrial goods, which in turn meant, that the demand for consumer goods gradually began to meet the dynamically developing Russian industry.

The structure of foreign trade on the eve of World War I reflected the agricultural character of the country's economy. Among the exported goods from Russia, as in previous years, the leading place was occupied by the products of agriculture. The first place in Russian exports remained firmly for bread. In addition to grain products, Russia on the eve of World War I exported eggs, oil, flax, leather, furs, and a large amount of wood (mostly in unprocessed form). Timber removal was in second place.

Among industrial goods, Russia continued to export cotton fabrics, metals, petroleum products, manganese ore, metal products, and glass abroad.

The growth of exports led to an increase in imports of industrial goods, which served as convincing evidence of Russia's economic growth and expansion of its foreign economic relations, and active participation in the global division of labor.

Industrial goods and some types of raw materials — machinery and equipment, metals (ferrous and non-ferrous), coal, chemical goods, cotton, raw silk, yarn, tea — prevailed among imported goods.

As the industry developed, the demand for imports of industrial goods declined, and before World War I, Russia's dependence on foreign countries remained mainly in the supply of machinery and equipment, chemical products and certain types of non-ferrous metallurgy products.

CONCLUSION: Foreign trade relations of Russia have a long history. They originated in the form of international trade in the era of the formation of statehood of Eastern Slavic tribes and went through several major and lengthy stages in their

development, relevant historical milestones of the development of the Russian state and society.

In the second half of XIX century, external economic relations (trade, loans, investments) took a key place in the process of modernization of the Russian economy. A moderate "protective-prohibitive" customs policy was pursued.

As a result of the reforms of the 60-70s, Russia embarked on a long path of its historical development in the direction of creating an industrial market economy and breaking down the archaic social and state structure.

The dynamics of foreign trade relations depended on the development of the entire economy as a whole, determined by the role of industry and the improvement of the productive forces of society.

In the beginning of XX century, Russia's economic growth proceeded in the forms as the economy of the countries of Western Europe, the development of foreign trade relations was determined by the general laws inherent in the global economy. In turn, foreign trade activity had a great influence on the course of Russia's economic development.

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STUDYING KHOREZM LITERARY ENVIRONMENT OF THE XIX CENTURY IN RUSSIA

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Annotatsiya: Maqolada Xorazmda XIV-XX asrlarda yashagan va faoliyat olib borgan shoirlar va davlat arboblari, ushbu tarixiy davrning madaniy hayotini o'rgangan sharqshunoslarning ilmiy faoliyati o'rganilgan. A.N. Samoilovichning nodir qo'lyozmalarining topilmalari, adabiy muhit haqida haqiqiy faktlarni umumlashtiradi va taqdim etadi.

Kalit soʻzlar: Xiva, Xorazm, XIX asr, Said Muhammad Raximxon Feruz II, arxiv, qo'lyozma, “Turk etyudlari”, Xiva she'riyati;

Аннотация: В статье рассматриваются поэты и государственные деятели, которые жили и работали в Хорезме в XIV-XX веках, изучается научная деятельность востоковедов, изучавших культурную жизнь этой исторической

эпохи. Находки редких рукописей отраженные в работах А.Н. Самойловича обобщены и приведены реальные факты о литературной среде.

Ключевые слова: Хива, Хорезм, XIX век, Сеид Мухаммед Рахим Хан Феруз II, придворные книгохранилища, архив, рукописи, «Турецкие этюды», хивинская поэзия;

Abstract: The article deals with the poet and statesmen who lived and worked in Khorezm in the XIV-XX centuries, investigates the scientific activity of the Orientalists, who studied the cultural life of this historical epoch. The findings of rare manuscripts reflected in the works of A.N. Samoylovich are summarized and given real facts about literary environment.

Key words: Khiva, Khorezm, the XIX century, Seid Mohammed Rakhim Khan Feruz II, court book depository, archive, manuscript, «Turkish etudes», poetry of Khiva;

Introduction. Studying the works created by the Khorezm literary poets is one of the most important tasks of today's scientific thought and ideology of independence. Even though there are significant shifts in Khorezmian science in recent years, we can not say that all the creativity of the Khorezm poets has been studied, its works have been collected and published. The rich cultural heritage of our past, the advanced traditions of the Oriental thinkers, national values, the works created on the basis of the humanistic essence of the Islamic religion are examples of all forms of creativity. Studying, researching and popularizing this rare part of Khorezm poets' legacy is one of the criteria for spiritual upbringing. Therefore, manuscript sources, which have a wide range of creativity that overcomes the darkness of the past, should not only serve to decorate shelves. Today, the state-wide attention to spirituality and enlightenment issues is of great scientific and practical significance for today to learn

from the ideas of the poet's heritage and the rich heritage of Khorezm's literary heritage.

From the 14th century, Khorezm has restored its former position. As a result of the separation of Khorezm from the Golden Horde, it created a basis for further development of science, culture, literature and art. In the middle of the XIV century, Abu Abdullah Muhammad Batuta, who arrived in Khorezm, wrote remarkable ideas about the cities of Khorezm, their history, monuments and so on. Many scientists wrote about the restoration of their ancient traditions in the 14th century.

During this period, literature and art were dramatically revived. Khwarizmi's "Muhabbatnoma", Sheikh Sharifiy's "Minul Murid", Saifi Saroyi's "Suhayl and Guldursun", Rabguziy's "Qissai Rabguziy", Qutb Khwarizmi's "Khusrav and Shirin", by Maulana Ishaq Khwarizmi and Al-Khwarizmi's qaseeda, gazelles and a number of satirical poems were created in the XIV-XVI centuries.

Academic and university oriental studies in Russia grew out of a single root and throughout its history had a comprehensive, applied and research character. St. Petersburg was the city in which Russian science began and took shape, including oriental studies. Due to the geographical position, history, nature of the population, relations with neighbors, - Oriental studies became the focus of Russia's national interests and was one of the important factors of Russian culture. A.N. Samoilovich is a Russian Orientalist, an outstanding Turkologist, one of the scholars who studied the Khorezm literary environment of the XIX century wrote in his notes on the Khiva Khanate, he repeatedly noted that the current ruler of ancient Khorezm inherited from his father the gift of a poet. He was the last independent khan of Khorezm. In 1873, despite the resistance, the Khanate was under the protectorate of Russia. Since 1896, Lieutenant-General, since 1904 the general from the cavalry. Emperor Nicholas II in 1902 gave the khan the title of "Serene Highness". A.N. Samoylovich became the



authoritative organizer of linguistic studies in Russia. He was a member of the scholars invited by the Committee to study Central and East Asia on historical, archaeological, linguistic, and ethnographic issues. His main works are devoted to Turkic philology.

Literature review. Studying the archival works of A.N. Samoylovich, we witnessed a high talent of an orientalist scholar, a connoisseur of Turkic studies: a deep analyst, an academician who has his own unique method of presentation. Unpublished scientific research related to the literary environment of Khorezm of the XIX century is stored in the manuscript fund of the Russian National Library. Saltikova Shchedrin. (Archive of A.N. Samoylovich RNB F. 671). Archival data helps to provide a wider picture of the literary environment of Khorezm, reveal new facts in the study of the scientific and creative activities of a scientist in full, also allows to evaluate the prominent role of a wide-ranging Russian turkologist.

A.N.Samoilovich is a Russian Orientalist, an outstanding Turkologist, one of the scholars who studied the Khorezm literary environment of the XIX century wrote in his notes on the Khiva Khanate, he repeatedly noted that the current ruler of ancient Khorezm inherited from his father the gift of a poet. He was the last independent khan of Khorezm. In 1873, despite the resistance, the Khanate was under the protectorate of Russia. Since 1896, Lieutenant-General, since 1904 the general from the cavalry. Emperor Nicholas II in 1902 gave the khan the title of "Serene Highness".

From the report of A.N. Samoylovich's trip to the Turkestan region in 1908, it becomes clear that in the process of familiarization with the Khan's personal libraries, he was able to find and study several rare manuscripts. As a result of these studies, a scientific work called "Turkish Etudes" (1917-1918), unpublished to this day fully multi-faceted work of the scientist. This work, with a total volume of more

than 800 pages, along with numerous facets of Uzbek literature, also highlights the history of the literary environment of Khorezm of the 19th century. (Archive. F. 671 units.ed.00). Rare data on the palace literature of Khiva, on the Khan libraries, about the existence of Arab, Persian, Turkic manuscripts in them, about well-known and unknown to science poets, about the palace printing house. "Today, the hanantied Seid Mohammed Raheem II (1844-1910), the enlightened patron of Khiva science and art, showed full readiness to promote the scientific study of his country and opened me access also to his own personal book treasures". A.N. Samoylovich also reports: "My brief review of the Khiva court showed how fruitful were the seeds thrown on the Khiva ground by the first writers of the XIX century" (Archive. F. 671.145)

Research methodology. In the history of Uzbek classical literature, the 19th century is considered the Renaissance epoch. It was during this period that the development of lyrical genres was traced, the creation and correspondence of many historical, prosaic, poetic and translation works rich in content in Khorezm, it reveals the outstanding importance of this country in the history of the culture of Turkish peoples in general and in the history of the Central Asian-Turkish literary language in particular".

A.N.Samoylovich is the author of various books and articles describing the high attention paid to literature under the Khanate, the cultural life of Khorezm, and samples of literary works in Russian ("rubai", "gazelle", "muhammas", "mesnevi", "kyta), representatives of literature of the same time.

In the summer of 1908, A.N.Samoylovich met with the palace officials as Abdullajon Devonbegi, Muhammad Sharif Hoji Devonbegi and Bekjan Devonbegs. Later they sent letters to A.N.Samoylovich with high calligraphy samples. On September 27, 1910, Bekzhan Rahimov (Bekjan Devonbegi knew the Russian

language and signed in Russian), wrote in his last letter the poem of the palace poet Ahmad Tabib on the occasion of the death of Muhammad Rakhimhan Feruz and the reign of Isfandiyyarhan and the chronograph of these two great events.

In the winter of 1913, A.N.Samoylovich heard the news about Ahmad Tabib's death and published the original version of the poem and chronogram of the letter in order to show his high regard for them, who had the positive qualities of Uzbek people, such as sincerity, humanity, hospitality - Muhammad Rakhimkhon Feruz, the Khiva Khan, who made a great contribution to the development of art and literature, the master of poet Ahmed Tabib, who was always ready to share his literary knowledge with Samoylovich.

Analysis and results. As it became clear from the above, the scientific and artistic, educational flourishing of Khorezm, which re-entered into force in the 19th century, gained an interest and comprehensive study, not only from domestic scientists, also did not leave Russian orientalists without attention. A.N.Samoylovich versatile creative figure, turkologist, one of the scientists who most studied the Khorezm literary environment of the XIX century. But the works of a scientist in this field are almost not studied. This information was also set aside, without due attention in the recently published volume of selected works of A.I. Samoylovich. There is a need to appreciate his contribution to the study of the literary environment of Khorezm. Since A.N. Samoylovich was more interested in the inexhaustible wealth of materials on Turkology, mostly unpublished and not surveyed, especially handwritten treasures. This indicates the relevance and novelty of this article.

Conclusion. In short, despite the difficulties of each era in the XIII-XX centuries, the literary process in Khorezm did not stop. On the contrary, the creators and writers created not only the Khorezm literary environment, but also invaluable and rare artifacts that contributed to the development of world literature. Who lived in this



land, this land, this invaluable heritage of classical thinkers, poets and writers to conduct research and learn scientific thinking from day to day in the current period is one of the important tasks facing the people of knowledge.

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A GREAT TRAVEL OR THE NEW VIEW ON THE SETTLEMENT OF MENNONITES IN KHOREZM

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Annotatsiya: Ushbu maqolada O'rta Osiyoda, xususan, Xorazm viloyatida istiqomat qilgan Mennonitlar haqida ma'lumot beriladi. 1881 yilning avgustida Toshkentga Trakt nomli Mennonitlar guruhi keldi. Ular Turkiston bosh gubernatori Kaufman tomonidan qabul qilingan. O'rta Osiyo mamlakatlarida ular mahalliy aholiga ko'plab foydali kasblarni o'rgatganlar

Kalitso'zlar: Mennonitlar, Xiva xonligi, Trakt, Oqmachit, Xorazm viloyati, O'rta Osiyo mamlakatlari, Klass Epp, gubernator Kaufman, cherkov, Vilgelm Penner

Аннотация: В этой статье приводится информация о меннонитах, которые жили в Средней Азии, а именно в Хорезмской области. В августе 1881 года группа меннонитов по имени Тракт прибыла в Ташкент. Они были приняты генеральным губернатором Туркестана Кауфманом. Во время своего



пребывания на территории Центральной Азии они обучали местных жителей многим полезным работам.

Ключевые слова: Меннониты, Хивинское ханство, группа по имени Тракт, Акмачит, Хорезмская область, страны Средней Азии, Класс Эп, губернатор Кауфман, церковь, Вильгельм Пеннер

Annotation: In this article is given information about Mennonites who lived in the Central Asia, exactly in Khorezm region. In August 1881, a group of Mennonites called Trakt, arrived at Tashkent. They were accepted by Turkestan General Governor Kaufman. During their stay in the Central Asian territory they taught local people many interesting and useful jobs.

Key words: Mennonites, Khiva Khannate, Trakt, AkMetchet, Khorezm region, Central Asian countries, Class Epp, Governor Kaufman, church, Wilhem Penner

Introduction Mennonites originating is connected with the Dutchman Menno Simons. Menno Simons, who lived in 1496-1561, was considered as a great philosopher and a religious scientist. He was born in 1496, in the Dutch city of Witmarsum. Menno Simons reformed Christianity in the early 16th century. According to the religious doctrines of Mennonites, against to obedience, oppression, evil and the power of violence, they propagated ideas of spiritual perfection. Mennonites regarded such things as obtaining weapons, taking part in wars, and killing innocents as non-religious phenomenon. His religious reform was strongly being harassed. The priests, the kings, and the military particularly confronted against to this religious current. Those, who were involved in this religious movement were exterminated and burned in the fire. Mennonites, who could not tolerate severe persecution and difficulties, decided to take a long and difficult journey.

Literaturereview Many Mennonites, in the mid-16th century, moved and

located in the Prussian region of Western Germany. At the end of the 18 and early 19th centuries, a group of Mennonites came and settled in Ukraine.

The Prussian government begins to prepare for the war with France from the second half of the 19th century. Mennonites refuse to give soldiers to the Prussian army. During 1853-1884, over 18,000 Mennonites settled down in Russia and the Canadian Canal through the Atlantic Ocean. From 1922 to 1926, they traveled through the United States to Kansas, Mexico, and Paraguay. In 1853-1861 Mennonites came to Russia's Volga River, Saratov, and Samara.

In 1874, Russia declared a total military obligation to all the citizens, regardless of their ethnic and religious beliefs. This law comes into force in 1880.

On July 3, 1880, a group of Mennonites called Khausan, consisting of 10 families, came by railroad car and settled in Kaplanbek village near Tashkent. They were here until October 18, 1880.

By the period of time August, 1880 till August 1881, over 6 groups consisting of more than 100 families, the Mennonites, called Medemtal, Valdekheim and Molotschna arrived by train at Tashkent and they lived in Kaplanbek till the end of November, 1889.

In August 1881, a group of Mennonites called Trakt, arrived at Tashkent. They were accepted by Turkestan General Governor Kaufman (1867-1882). Kaufman invites Mennonites to live in the vast territory of Turkestan.[1]

Research methodology They lived in the village of Awliyo Ata for a while. In September 1881, the group of Mennonites, named Trakt, due to the disturbances in Tashkent and Kokand Khanate on five railroad cars; moved to the village of Saraybulak, belonging to the Emirate of Bukhara. The Emir of Bukhara Muzaffarkhon strongly opposed them to live in Bukhara. In addition, the Mennonites are facing a serious oppression from a group of Muslim religious leaders in the Bukharan emirate, because the Mennonite women did not wear "parandji". After 9 months living in Sarabulak, following the invitation of Muhammad Rakhimkhon II, Mennonites go to Khiivakhon in

spring, 1882. At that time, 39 Mennonite families came to Lauzan village, near the Amu Darya River. Mennonites, who faced difficulties, decided to leave to America. Mennonite Emil Rayson came to the reception of the Khiva Khan Muhammad Rakhimkhon II, who referred to him with deep respect and promised them to protect.[2] As a financial assistance Khiva Khan gave \$ 2000 to Mennonites and peaceful, quiet, serene place for living located in the khan area 12 km from Khiva in the Southern-east on the shores of Shoirlake in the village of Chigirchi. On April 16, 1884, ClaasEpp, Emil Rayson, WilhemPenner, Jacob Jantzen, Michael Klaassen, and 34 other families settled in AkMetchet.

Results and discussion They lived independently and freely. Mennonites had their own administrative authority. Mennonites living in AkMetchet were led by ClaasEpp, in 1884-1913, who was born on September 21, 1838 in Furtsverder, Prussia. The AkMetchet was founded by ClaasEpp, who built a church in the area where he came to conduct religious services. The church was very high, white painted and served at one time to 25 Mennonites. The local people called the church " AkMetchet ", after that, the Mennonites's place have been named after " AkMetchet " by local people. Under the leadership of ClaasEpp housing, schools, hospitals, churches and other administrative buildings were built in AkMetchet. They have set themselves their own criminal and administrative cases. ClaasEpp died on 19 January 1913 in AkMetchet.[3]

The local population and a group of historians from Khorezm considered the Mennonites living in AkMetchet as "Germans", who originally were the Mennonites of the Netherlands. For a long time they lived in Prussia in Germany, this was the reason they spoke German.

The reconstructing work and parquet floor part of the "Nurullaboy" palace in Khiva khanate was built in the early 20th century by Mennonites in European style. In 1934, Mennonites celebrated their 50th anniversary at Whitehall.[4] During the jubilee, Mennonite schoolchildren's performances and musical performances were demonstrated.

They describe the martyrdom of the Mennonites from the great historical process starting from the 16th century in the Netherlands, and the painful, difficult life till 1934. Mennonites, who have lived 50 years, during the jubilee were photographed for memory.

The merit of the Mennonites, who lived in AkMetchet from 1884 to 1935, was enormous in the representation of the film-photography in Khorezm. From WilhemPenner, as the Khivans called him "PanarBuva", KhudeiberganDevonov learned photography, film art, and founded the first film-photography art in Central Asia.[5] In addition, Mennonites had done a great deal in the socio-economic life of Khorezm district. In particular, they helped local population in creating new types of cotton and shrubs, in medical care, home-locking, in the sphere of chemistry, photography, planting potatoes, tomatoes, cucumbers and other crops, cultivation. They brought European house heating system, had brought fireplaces, slopes and other European culture, music and art.[6]

In 1925, the former Soviet Union government adopted the markhian doctrine about the life of Mennonites. According to the doctrine the huge requires were put to Mennonites. After that, a group of AkMetchet Mennonites visited Moscow and signed the Kalinin agreement. In 1935, 10 people from the AkMetchet Mennonites opposed Kalinin's agreement and refused to comply with the terms of the contract. Mennonites who opposed the Soviet government's decision were arrested and shot dead.[7]

Conclusion It is also worth mentioning that the Mennonites were strong persecuted during the era of Russian imperialism. In the 1925-1930 period of water reforms, the period of community, was very expensive for AkMetchet Mennonites. [8]They instead of suggested forming of collecting farms gave a plan of creating a farming enterprise, which is a system of market-based systems. The Russian government denied their offer. In 1935, the Mennonites who lived in AkMetchet, were forced to abandon the AkMetchet.[9]

In summary, the Mennonites, who lived in Khorezm during 53 years (1882-



1935), left a great mark on the socio-economic and cultural life of Khorezm region. The Soviet government's totalitarian policy, along with the local people, also did not overlook the AkMetchet Mennonites. Thanks to independence, their bright memories are being restored.[10]

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HISTORIOGRAPHY OF THE FIRST STATEHOOD FORMATION IN KHOREZM

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Аннотация: В статье рассмотрена иллюстрация истории первого государства в Хорезме в современной историографии. И проанализированы идеи и комментарии учёных истории

Ключевые слова: Э.В. Ртвеладзе, А.С. Сагдуллаев, Кузаликир, Бактрия, Хорезм, Согдиана, Маргиана, Фергана.

Аннотация: Мақолада Хоразм воҳасида илк давлатчилик тарихининг ҳозирги замон тарихшунослигида ёритилиши қараб чиқилган. Бу борада тарихчи олимларнинг фикр ва изоҳлари таҳлил қилинган.

Калит сўзлар: Э.В. Ртвеладзе, А.С. Сагдуллаев, Кўзаликир, Бактрия, Хоразм, Сўғдиёна, Марғиёна, Фарғона.

Annotation: The article deals with the illustration of the first statehood history in Khorezm oasis in modern historiography. There were analyzed ideas and comments of historian scientists on the issue.

Key words: E.V. Rtveladze, A.S. Sagdullaev, Kuzaligir, Bactria, Khorezm, Sogdiana, Marghiana, Fergana.

Introduction: The study of the history of the first statehood in Central Asia began in Europe in the 60-70s of the 19th century. A number of orientalists, including M. Dunker, V. Tomashek, V. Geyger, E. Raysh, J.D. Prashek argued that there were ancient states in Central Asia before the time of Ahamanides on the basis of the information in “Avesto” and according to the Greek historians Gekatey, Herodotus and Ktesi[1, p. 187]. In the article by S.P. Tolstov “The Main Problems of the Ancient Asian History” published in 1938, there were analyzed some results of the study of the first statehood[2, p. 176-203]. This issue has hardly been studied in terms of historiography.

In the early 20th century, I. Markvart placed the country Aryonam Vajjo, mentioned in Avesto, in Khorezm oasis. In the 30s of the 20th century, I. Markvart founded the view of the Khorezmian kingship, which unites the great majority of Central Asia in the time of Ahamanides, based on the the idea of Herodotus about the use of the water in the Akes River by Khorezmians and other peoples [3, p. 9-10]. From the 50s of the last century, this problem has been interpreted as the “Big Khorezm” association.

S.P. Tolstov writes that “it is a political association that is a confederation of the military democracy and it became a state association, the history of which is peculiar to the 8th and 7th centuries B.C. and exactly during that period Khorezm's great irrigation system was erected” [4, p. 341].

Based on the story of Herodotus about the battle between the armies of Cyrus II and Tumaris, S.P. Tolstov made a conclusion that the massaget tribes had a large political military presence in Central Asia before the Ahamanides' era [5, p. 103-104]. The information about this association was reflected in the writings of the ancient Persian Emperors and it was also mentioned in the messages in Behistun writings about the attacks of King Darius I against the Saks [6, p. 231-250].

I. Matkvart and later S.P. Tolstov compared the borders of the Khorezmian kingdom with the territories of Parthia, Khorezm, Areia and Sogdiana, which were united in the 16th territory of state of the Ahamanides. V.B. Henning and I. Gershevich wrote that till the move of Persian king Cyrus II to Central Asia, the center of the Khorezm kingdom was situated in the oasis of Herirud-Tajan river and in Herat and Marv; and the center of Great Khorezm was Herat and Marv [7, p. 40-43]. Khorezm oasis was included into the composition of that state. This idea has been originated from the idea that Khoresmians were located in the south until the occupation of Ahamanides. It is well known that the ancient Greek historian Gekatey reported that people called “Khoresmians” lived in the territories to the east of Parthia. In Herodotus’ book “History”, the geographical location of Khoresmians is surrounded by the Akes River oasis surrounded by mountains.

Literature review: V.V. Struve noted that cultural and political effect field of Khorezm was extensive and Khorezm included feet of the Kopet mountain and the country Tajan [8, p. 560-591].

According to the ideas of V.M. Masson, in the territory of Khorezm oasis, the ruins of urban territories and houses and fortresses, built with wattle and daub and raw-brick peculiar to the 8th and 7th centuries, were not discovered and investigated. V.M. Masson denied the very early appearance of statehood in Khorezm [9, p. 125-126]. The researcher also made the following conclusion: “The primitive community relations in Khorezm collapsed and the union of the Sak tribes in the first half of the 6th century passed its political influence to some southern regions” [9, p. 127]. The Akes River on the geographical location and historical geography of Khoremians reflected in the Herodotus’ work was compared to Tajan oasis by V.M. Masson [10, p. 173-174].

Opinions about the political association “Great Khorezm” the center of which was Herat and Marv have been reflected in the publications of various scientists[11, p. 64-65].

I.M. Dyakonov writes that Girkania, Parthia, Areia and Khorezm were separate administrative districts of Midia [12, p. 349]. This idea denies the existence of Great Khorezm association because all the provinces that form this association were developed within the Median state.

In the late 40s of the 20th century, there began to be drawn the results of archaeological studies i.e. including archaeological materials, together with written sources with the purpose of studying the first statehood problem. Their analysis was illustrated in the following works: S.P. Tolstov's “Ancient Khorezm”, “Searching Ancient Khorezmian Culture”, M.M. Dyakonov's “Formation of the Class Society in North Bactria”, V.M. Masson's “Early Husbandry Culture of Marghiana” [4, p. 341].

S.P. Tolstov, being based on the information of archeological materials and written sources, said that the confederation of military democracy was organized before the period of Ahamanides and it gradually became a state association and he compared the fortress “vara” mentioned in “Avesto” with the ruins of the town of Kuzaliqir, which was surrounded by defensive walls[5, p. 93].

Formational approach (gradually exchanging of social-economic formations and methods of production) was superior in the illustration of statehood's history in the historical sciences of the Soviet era and they explained the emergence of the first states connecting with the aggravation of the struggle between opposite classes in society. According to the views of that period, the first state was a product of the class society and its class essence was the main indicator[13, p. 17].



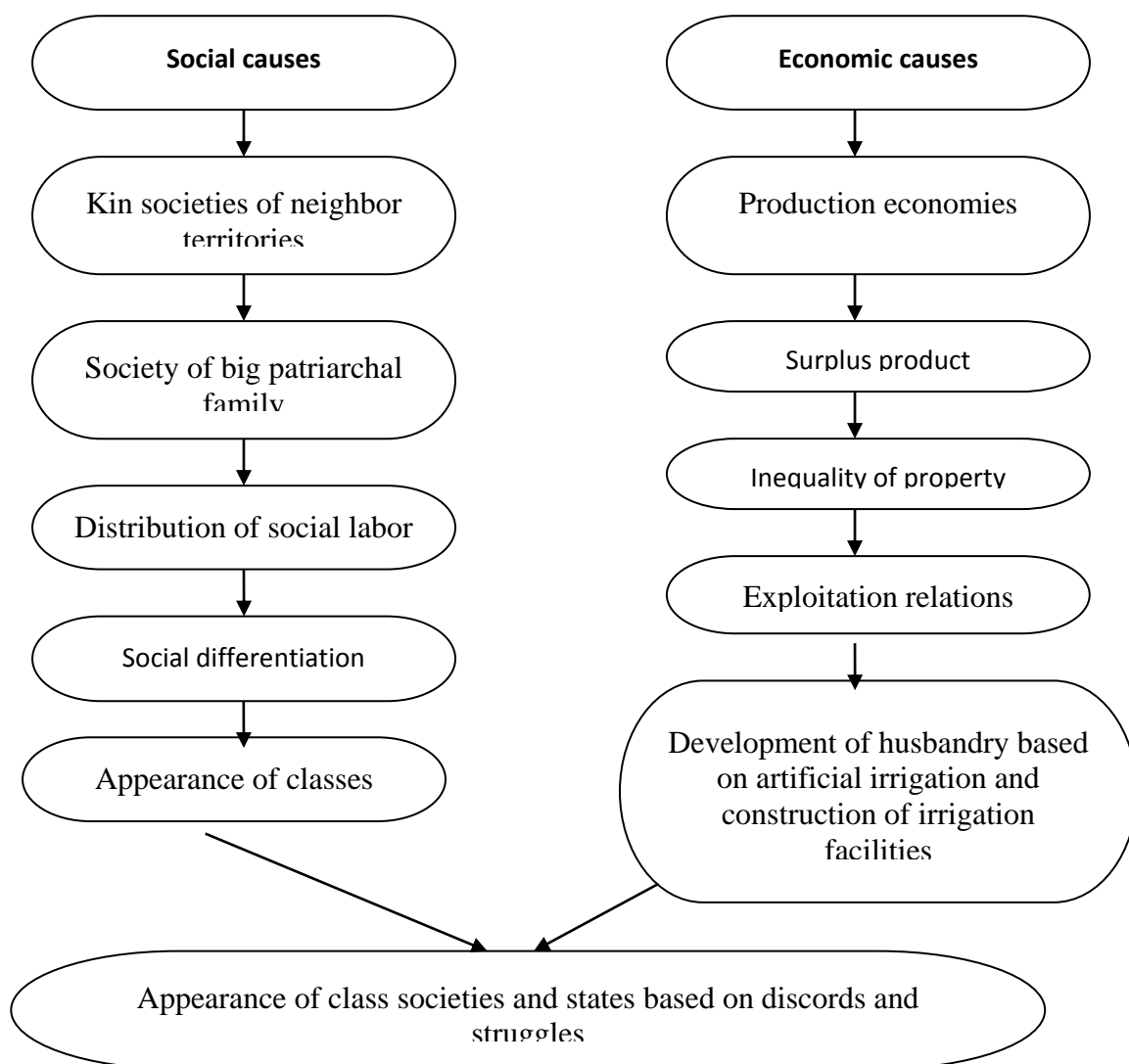
In the 30s and 50s of the 20th century, the question of the nature of the formation of statehood in Central Asia and the study of the laws of development became an important issue and there appeared a question what kind of socially-economic and political characters the first states had in the region. But due to the lack of historical sources, it was difficult to answer that question.

In the ancient East, farming based on artificial irrigation demanded more complex irrigation facilities and considering that fact, scientists have concluded that such similar processes had taken place in Central Asia and many people in the region were forced by the state to build irrigation canals. At first, this idea was developed by S.P. Tolstov and later M.M. Dyakonov illustrated the same reasons as the main factor in the formation of statehood[14, p. 75].

According to the theory that dominated till the 1990s, the causes and factors of the origin of statehood in Central Asia were described as follows:

Research Methodology

Causes and Factors of the Origin of Statehood in Central Asia



This table fully illustrates the sense of class theory, which was superior in the historical sciences of the former Soviet period.

Firstly, studying this issue according to the history of the first statehood problem in Central Asia was connected with the historical date – chronology of emergence of states in the region and the definition of their territorial location and the following issues are important in this direction:

1. To determine the historical geography and territorial location of Khorezm kingdom or Great Khorezm state.



2. To analyze the territorial structure of the political association “Aryoshayyona” mentioned in Avesto.

3. To prove the existence of the ancient Bactrian Kingdom and to determine its historical date.

In the early 60s of the 20th century, the issue of “Great Khorezm” was analyzed by V.A. Livshits [15, p. 151-154]. Also, this controversial topic is reflected in the investigations of I.M. Dyakonov, R. Fray, I.V. Pyankov and M.G. Vorobeva [16, p. 122-154].

S.P. Tolstov connected the existence of large irrigation canals in Khorezm in the 8th and 7th centuries with powerful central government policy and came to conclusion that if there had been no state organization in Khorezm, it would not have been possible to create such large irrigation systems [5, p. 103].

V.M. Masson noted that “Large irrigation facilities in Khorezm appeared in 6th and 5th centuries B.C. and in the 9th and 8th centuries, the culture of Amirabad cultivation and livestock farming in Khorezm was preserved and the features of the local Bronze Age culture continued to be preserved in the Khorezmian land, which consisted of half-cellar and ceramic bottles” [9, p. 126].

The theory of the Great Khorezm state, which included Sogdiana, Marghiana, Parthia and Aria, was also rejected and according to V.M. Masson, Sogdiana and Marghiana were historically and culturally closer to Bactria from ancient times.

In the history of that period, it was imagined that Khoresmians – people of Khorezm originally lived in the southern part of Central Asia and as a result of the ancient Persians Khorezmians were smashed from the south to the Lower Amu Darya or were forced to return to the Khorezm oasis by Persian king. Histology of this problem was fully illustrated by I.V. Pyankov [17, p. 1972].

M.G. Vorobeva examined the conclusions peculiar to the problem of Great Khorezm and revealed her following ideas: “Great Khorezm did not unite the territories of Kopet Mountain, Tajan-Herat and Marv oasis in the south. This was not confirmed on the basis of archaeological evidence; the Khoreemians were not moved from the south to the Lower Amu-Darya, but on the contrary, Khorezmians emerged particularly in Khorezm oasis as native people, the southern borders of ancient Khorezm reached the territories of the Middle Amu Darya” [18, p. 38-41]. I.N. Khlopin also wrote that the state founded by Khoresmians in southern Central Asia had never developed [19, p. 56-57].

Drawing his own attention to this issue, A.S. Sagdullaev came to another conclusion. According to him, at the beginning of the 1st millennium B.C., there began migrations of the population of Marghiana and Bactria to the Middle Amu Darya and Kashkadarya oasis. Groups of the southern population were located in Khorezm either. They were mixed with the local population and as a result of this process, the nation “Khoresmians” was founded, which was mentioned in written sources i.e. according to the researcher, Khoresmians did not reside in the southern part of Central Asia till the period of Ahamanides, but they appeared particularly in Khorezm as a result of mixture of the local population in Marghiana, Bactria and the Lower Amu Darya [20, p. 17].

During the years of independence a great deal of attention was paid to the study of the statehood processes in Khorezm oasis. Y.A. Rapoport and M.G. Veinberg’s information is remarkable on the issue [21, p. 31]. They have interpreted the statehood problem in a new way. Researcher L.T. Yablonskiy studied migration processes related to the confederation of nomads and Saks and their impact on the formation of statehood in Khorezm [22, p. 328]. V.N. Yagodin also drew his attention to this problem in his articles and put forward the idea that the center of Khorezm’s

statehood corresponded to the lake Sarykamish and the southern Khorezm region, where the main center was the town of Kuzaligir and Khazorasp[23, p. 70-78]. Later archaeological investigations by S.B. Bolelov, S. Baratov, Sh. Matrasulov, V.N. Yagodin, G.Kh. Khojaniyazov play an important role[24, p. 85-90].

I.V. Pyankov considered the issue of “Great Khorezm” state and analyzed the conclusions of I. Markvart, V. Khenning, I. Gershevich, S.P. Tolstov, I.M. Dyakonov, M.G. Vorobeva, I.N. Khlopin and other researchers. According to the Greek historian Gekatey, the scientist concluded that the Khorezmian territory was connected to the mountain foots in Turkmen-Khurasan and that the Khorezm people were moved from the south to the lower Amu-Darya territories during the period of Ahamanids and denies the existence of Khorezm state in the lower Amu Darya like V.M. Masson and M.A. Dandamaev[25, p. 239-241].

According to A.A. Askarov, “the first homeland of Khoresmain was to the south of Bactria, to the East of Areia – in the upper reaches of Herirud and Hilmend rivers, in the present Heart valley” [26, p. 113].

Researcher S.B. Bolelov agreed to the conclusion about the migration of Bactria’s population onto the territories of the Middle Amu Darya and Khorezm[20, p. 17] and wrote that this event happened in the first half of the 6th century B.C. [27, p. 90]. According to V.N. Yagodin, the archaeological evidence found in Khumbuztepa shows that the population of Bactria was migrated to Khorezm[23, p. 71].

In the Khorezm oasis, farming tribes inhabited the small riverbed oases, near the banks of river and nearby artificial structures. The population of Khorezm oasis might have built cities or states, such as the Kuzaligir because of military-political condition before the occupation of Ahamanides. New approaches to the issues of the first statehood and ancient government were reflected in the research works of Y.A.



Rapoport, L.T. Yablonsky, S.B. Bolelov, S. Matrasulov, S.R. Baratov, B.I. Veinberg and V.N. Yagodin[21, p. 31].

As a result of new archaeological surveys carried out in the ruins of Khorezm, new data that show the urban culture were collected and checked in the Lower Amu Darya. As a scientific hypothesis in the historical sciences of the 20th century, the formation of this culture is connected with the entry (migration) of the population of Bactria and Marghiana into Khorezm region. New archaeological discoveries confirm the statehood in Khorezm until the time of Ahamanides. According to Y.A. Rapoport, the ancient Khorezm state, was formed on the 7th and 6th centuries[21, p. 29-30]. According to V.N. Yagodin, the first hearths of statehood in Khorezm were formed around the cities of Kuzaligir and Khazorasp[23, p. 75-76].

E.V. Rtveladze made a conclusion that “Great Khorazm” association was a myth created by researchers of various generations. To clarify his point of view, the scientist cited the following facts:

1. The works of Herodotus do not contain any information about Khorezm kingdom or its composition – Heart(Areia) and Marv (Marghiana).
2. Herodotus’ reports do not contain information about the territorial boundaries, administrative apparatus and political institutions of that State.
3. The Greek historian did not write about Khorezm’s political leadership and the military alliance of various nations under Khorezm.

As can be seen from the Greek historians, Herodotus and Gekatey did not write about the state of Khoresmians and Khorezm kingdom, they just mentioned Khoresmians. This situation was not considered in the publications of the followers of the theory about “Great Khorezm”.

In recent years, the origins of the ancient Khorezm people and the problem of Great Khorezm were examined by Matyakubov Hamdam. According to the researcher, theories and views on Great Khorezm state, which has been widely covered in scientific literature for many years, have not been proved. These views are the hypothesis of scholars and it is desirable to abandon the idea of the Great Khorezm state. In fact, a number of scientists (V.M. Masson, M.G. Vorobeva, I.N. Khlopin, Y.A. Rapoport, A.S. Sagdullaev, V.N. Yagodin) denied this idea and no written evidence has been provided.

Also in scientific literatures, the problem of occurrence of wattle and daub walls and bricks and the emergence of architecture in Khorezm and the emergence of Kuzaligir culture in the region have been explained on new basis. According to the basic conclusions, there appeared new (had been unknown before) architectural traditions in the oasis (fortresses, defense walls, constellations and large buildings, usage of wattle and daub and raw bricks in building construction, the spread of practical knowledge and style of construction) because of the gradual migration of the population from Bactria and Marghiana and it is expedient to admit that the beginning of using wheel for making ceramics in handicraft and the widespread distribution of iron-made instruments were the results of the migration of southern populations [14, p. 75].

Conclusion: In Khorezm oasis, by the end of the seventh century, the formation of Kuzaligir culture resulted from the regional expansion of the implementation of cultural achievements and progressive traditions in different parts of Central Asia due to the migration from Bactria to Marghiana. In the southern part of the Aral Sea, Khorezmian's location emerged due to the mixing of the population of the southern and native population of the region (people of Kuyisay, Khorezmians – Saks). There has been made the following conclusion about this that the stories of Herodotus and



Gekatey peculiar to the history of Khoresmiens were based on the memory about the southern country of people of Bactria and Marghiana which comprised the population of Khorezm in the oasis [14, p. 75].

There are some controversial issues and sufficiently learned problems on the history of the first statehood in Khorezm oasis. At the beginning of the 21st century, new scientific views on the subject appeared and yet the following facts haven't been proved – the appearance of slavery relations in primitive society at the last stage of Amirabad's civilization (8th century B.C.) or the emergence of the formation of a new social form of government – the stage of transition to slavery system.

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IMPORTANCE OF ECOLOGICAL CULTURE IN FORMING CULTURE OF TOURISM

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Аннотация: Мақолада глобал туризм муҳитининг вужудга келиши, туризмнинг ҳозирги даврда ривожланиш хусусиялари, туризмнинг маданий функцияси ва туризм маданиятининг мазмун моҳияти ҳақида сўз юритилган. Шунингдек, мақолада туризм маданиятининг эволюцияси, структураси, намоён бўлиш шакллари, ҳозирги кундаги экологик муаммоларни бартараф этишга нисбатан оқилона муносабатни вужудга келтиришдаги аҳамияти ва уни ривожлантиришда экологик билимлар, хусусан шахс экологик маданиятининг аҳамияти муаммоси ёритиб берилган.

Калит сўзлар: глобал туризм муҳити, туризм маданияти, экология, экологик муаммолар, экологик маданият, экологик саёҳат этикаси.

Аннотация: В статье рассматриваются возникновение глобальной туристической среды, современное развитие туризма, культурная функция туризма и сущность культуры туризма. В статье также обсуждается эволюция культуры туризма, ее форма и важность экологических знаний, в частности важность экологической культуры в формировании здорового отношения к решению текущих экологических проблем.

Ключевые слова: глобальная туристическая среда, туристическая культура, экология, экологические проблемы, экологическая культура, экологическая этика путешествий.

Abstract: The article deals with the emergence of a global touristic environment, the current development of tourism, the cultural function of tourism and the essence of culture of tourism. The article also discusses the evolution of culture of tourism, the way it is formed, and the importance of ecological knowledge, in particular the importance of ecological culture in the development of a healthy attitude towards elimination of current environmental problems.

Key words: global tourism environment, tourism culture, ecology, ecological problems, ecological culture, ecological travel ethics.

Introduction: In the recent years of human history, the use of all opportunities to prevent from global environmental issues have become the items of the agenda of the world because they are increasingly aggravated by the collapse of the destructive world, and endangering the global community. Globalization of ecological problems lies in the fact that nature's self-restorative power decreases, its resources are exhausted, pollution and pollution of the environment, and nature's inability to create a perfect environment for human habitation. At the 2000 UN Millennium Summit, it was noted that ensuring environmental sustainability is a key to the future of humanity, and the announcement of 2008 as the "Year of Earth" indicates a major challenge to the environmental crisis. Today, environmental problems should be viewed as a threat to all humanity. In addressing this threat, first of all, it is important to change people's attitude to nature, to achieve an important place in the internal and external policies of the states, and to develop international cooperation in ensuring environmental sustainability.[1]

The ecological crisis of the planet is getting more and more worrisome. As environmental security is a key element of national security, it takes on all aspects of nature and society. Environmental safety and ecological thinking are closely linked to the natural and geographical conditions of the region, the way of life and



the attitude of the society to the nature and to its relationship with nature. So, human beings are in the spirit of moral and ethical attributes. The success of the environmental problem solely depends on the objective factors such as socio-economic, scientific-technical, demographic and environmental conditions, as well as the level of environmental awareness, the state of knowledge and outlook. Accordingly, it is assumed that in our country a wide range of measures and measures to address the institutional system of environmental monitoring, the regulation of ecological relations of individuals and societies, the continuous improvement of the ecological consciousness and outlook of the population, the elimination of the centuries-long values - is being implemented. [2]

"Ecological culture is a rational creative approach to cultivating the benefits of nature, the responsible approach is emerged by this in the development, distribution and use of ecological values." [3] In general, regardless of the interrelationships and differences in ecological culture and personality in the ecological world view, the importance of the people's mentality and socio-ecological need in the community in shaping these two concepts is crucial. The ecological culture and its formation are of particular relevance as a major factor in the regulation of nature relations with society. Therefore, raising environmental awareness among people has already become one of the most important tasks at the level of public policy. Elements of ecological culture: ecological knowledge, skills and skill, beliefs and beliefs, the necessity of enriching the consciousness and the worldview of the people, which govern the activities of each person in the natural environment, first of all, at the local level, and their priorities of universal values. For this purpose it is necessary to study the theoretical and practical issues of the ancient spiritual values of our people for the benefit of all people, and first of all the growing generation, to study the theoretical and practical issues of the current ecological problems and to introduce them to the worldview of people. In the

context of globalization, conservation of ecology and the environment remains an urgent problem. It is important to develop new approaches to addressing these issues, and consider this approach to be a complex, complex socioeconomic and ecological system. The driving force behind these problems is the tourism industry.

Materials and research methods: The ecology-related section of tourism is called ecotourism. The purpose of ecotourism is to preserve the flora and fauna, and to preserve for the next generation. Ecotourism is an important branch of tourism, which is directly linked to rare and endangered species, conservation of biodiversity, conservation of biological species. Ecological tourism is one of the types of natural tourism that unites people. The interest of tourists should be based on the nature of the environment and its preservation. In this type of tourism, protected areas are of special significance. Thus, ecological tourism is a kind of special type of service for research purposes.[4]

The concept of ecotourism is Russian experts I. Zorin and V. Kvartalnov interpreted ecotourism in two ways: the first form - ecotourism is the indirect use of wildlife as a place for tourists to stay and travel, but all the components of the species are tourism aimed at introducing ecological technologies. In this sense, ecotourism reduces harm to the environment and has an educational, recreational and cultural significance. The second form of ecotourism is a combination of ecological approach to nature. It is believed that it combines the benefits of new natural components and the study of the flora and fauna samples. The main sources of ecotourism are nature reserves, local and natural parks, unique, recreational, and simple landscapes. [5] To understand the concept of "ecological tourism", Igor Zorin and V. Kvartalnov proposed explanations, such as "ecosystem", "ecology", and "ecological travel ethics." "Ecological tourism" will be focused on adapting the minds of the population to the ecological requirements and developing the



knowledge of nature. This will gradually develop tourism activities without damaging natural resources. [6]

In addition, the Uzbek scientists have discussed socio-ecological problems, topical issues of social ecology, social foundations of healthy lifestyle, ecological education, Y.Sh.Shodimetov, H.Y.Salomova, A.Nigmatov, R.I.Mamatkulov, G. Pardaev , R. Khayitbaev, A. Kh. Pardaev, A.N.Norchaev, E.T. Rabbimov, I. Tukhliev, B.Sh.Safarov, G.Tursunova and other scientists have emphasized the role of environmental consciousness and culture in tourism and its development.[7]

Analysis and results: To achieve the goal of ecotourism, it is enough to present a plan of the Concept of the Development of Ecological Tourism in Uzbekistan". This concept emphasizes the importance of the following tasks for the development of ecological tourism in our country:

development of special laws and the creation of a legal mechanism for the formation of the ecotourism industry;

ecotourist science, theoretical knowledge and practice developing the basics;
ecological awareness and culture of the population through ecotourism cultivation;
Establishment of ecotourism education and upbringing;

Developing tactical plans and strategies and programs for ecotourism of states and the international community;

biodiversity conservation.[8]

While it is always pointed out that the ecotourism is always positive, the tour cannot lead to a more environmentally-friendly nature if it does not meet its environmental standards and the environmental norms. The negative effects of ecotourism may be:

The plants on the shores of the water basins are flooded; and will die; the rocks are stagnant or aggravated, and the animals are disturbed and prevented from opening the child; As a result of the hunt, the variety of species disappears; changes in eating habits; types were identical; animals are accumulated in the usual manner; the lifestyle of the animals living in water will change; water damage to water plants; leads to destruction and loss of nutrients; water pollution occurs; rare species are reduced; The coral reefs the rocks, and the type of fish declines.

Ecotourism, in its turn, is divided into several types. One of the varieties is hunting and fishing tourism (Safari tour), which is a costly tourist destination, with a great deal of economic benefit, despite the relatively small number of tourists. In particular, considering the experience of the development of hunting tourism in the Central Asian countries, it is characterized by an unprecedented animal diversity in other parts of the world. The Bukhara gazelle and several other wild animals are forbidden because they are threatened with extinction. As a result of the increased use of nature over the last decades, many animal species in Uzbekistan have undergone a strong anthropogenic impact, their habitat has declined, and some have been completely exterminated. Specifically, large species of mammals and birds, which are of great practical significance as hunting sites, have been endangered by the limited and endemic species of ecosystems that have been exploited by human beings, which are less vulnerable to external influences. In particular, the animals, such as the turon tiger, the Cheetah, the Turkmen pig, and the Aral Sea Bullion have disappeared. tiger, slatlone, standing toilets, small and big furrows of Syrdarya and Amudarya, and the Aral Sea Grass - are on the brink of extinction. [9] Hunting tourism is a major source of economic incomes, but should not serve to eliminate wild animals. Foreign hunters are keen to hunt for wildlife that lives in another area. Money for hunting is spent on wildlife preservation. In some areas, it is important to note that wildlife is more harmful to the local population rather than foreign-born



hunters. In this regard, the ecological tourism in our country, the development of hunting tourism and the means to be spent on it, should be used by the government for the protection of wildlife and nature reserves, as well as for other environmental projects.

It is allowed to some tourists traveling on hunting tourism to Central Asian countries to hunt wild ram or Central Asian ibexes.

Some tourists traveling to hunting tourism in Central Asian countries are allowed to hunt or hunt the Middle Asian goat goats. [10]

Conclusion and recommendations: Ecological knowledge and ecological culture provide the development of ecotourism. Understanding the essence of laws of nature in the formation of ecological knowledge and ecological culture, and the fact that man himself understands the biological nature of nature.

It should be noted that, as we develop ecotourism in our country, first of all we need to develop tourism culture through the forming ecological knowledge of the local population, cultivate ecological culture and consciousness through ecotourism, and set up education and upbringing. If we want to enjoy nature, its benefits, and enjoy its beauty, we must not go beyond certain limits while accepting its conditions, taking advantage of environmental resources to meet our own needs.

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SOCIAL AND PHYSICAL EFFECTS OF PUBLISHING IN SOCIAL ACTIVITY EVOLUTION AND ITS USE

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Аннотация: Ушбу мақолада ижтимоий фаоллик эволюцияси ва уни ёшларда шакллантиришнинг ижтимоий-фалсафий асослари таҳлил қилинган. Ижтимоий ҳамкорликнинг тадрижий ривожланиш асослари ва унинг жамият тараққиётидаги ўрни ёритилган. Жамиятимиз ёшларида ижтимоий фаолликни шакллантириш долзар вазифалардан бири эканлиги кўрсатиб берилган.



Калит сўзлар: ижтимоий фаоллик, ижтимоий ривожланиш, касбий фаоолик, меҳнатга муҳаббат, меҳнат анъаналари

Аннотация: В статье анализируются социально-философские основы эволюции социальной активности и ее формирования в юности. Основы эволюции социальной сплоченности и ее роль в развитии общества. Показано, что формирование социальной активности молодежи нашего общества является одной из наиболее актуальных задач.

Ключевые слова: социальная активность, социальное развитие, профессионализм, трудовая любовь, трудовые традиции

Annotation: This article analyzes the socio-philosophical foundations of evolution of social activity and its formation in youth. The basics of evolution of social cohesion and its role in the development of society. It has been shown that the formation of social activity in the youth of our society is one of the most urgent tasks.

Key words: social activity, social development, professionalism, labor love, work traditions.

Introduction: Formation of social activity is a complex process. Particularly, this aspect of the modernization process of the society requires more cautiousness. In our opinion, the stronger the moral, moral, faith, conscience, hardworking, honesty, humility, sovereignty, humanism, patriotism, national and social pride and responsibility, the foundation for the growth of society. Thus, every stage of society's development depends on the spiritual well-being and activity of young people. In our opinion, the activity is a process that fosters without any fear of certain activities and fulfills its mission until it reaches its goal. Thus, socio-

philosophical analysis of the formation of social activity in the youth is one of the urgent tasks of the philosophy today.

Literature review: As a result of scientific research related to the social needs of working skills and culture of youth, D. Baubekova's dissertation research [1]. But since the present study was conducted in the light of the demands and ideologies of the former Soviet Union, its significance can not be underestimated.

After gaining independence in Uzbekistan, new research on philosophical, psychological, pedagogical and cultural approaches to the formation of professional culture has been undertaken. In the scientific researches of such scientists as MN Nurmatova, N.Muhammadiyev, E.G'oziev, M.Kuronov, M.Yuldashev, E.Asamaddinov, K.U.Najmiddinova [2] professional activity is moral and moral and as part of the educational and educational direction.

Although the institutional foundations and principles that negatively affect cultural development have been studied by scientists from different fields, the chosen subject has not been studied specifically in the context of cultural philosophy.

Research methodology: In the course of the research, the idea of scientific and philosophical principles such as systematics, theoretical-deductive conclusions, analysis and synthesis, historical and logic, hermeneutic analysis, inheritance, universalism and nationality, comparative analysis, and the idea of development.

Analysis and results: The philosophy is characterized by a specific form of activity that is human-specific and is aimed at the rational change of the outside world. The social philosophy of social activity is seen as a way of reaching out to the self-sustaining world of human beings [3]. The ability to engage in a particular type of activity involves the transition to its actual physical expression. This active

person can change the outer world and change itself. According to Forobi, "human activity can not stop, but any activity and activity can not man represent human beings. Because of their nature, the animals also act. The animal sees food and aspires to it and carries out this unconscious movement. What separates man from the beast is a specific will and it is called optional "[4].

The philosophical description of the activity is carried out through the concepts of behavior, behavior. This is not accidental. Society is one of the ways in which people act together, so human activities are always of a social nature, though they are directed to others, even if they are pursued for their own needs and egoistic understandings. It is a form of demonstration of a person's active involvement, which means that he is responsible for socially significant outcomes. In the same way, it does not matter whether these results are determined by the individual's specific goals or targets. A behavior is a conscious action (or inaction), the result of a person's spiritual self-awareness, which reflects the individual's personality and other people's attitude to nature and society as a whole. The system of actions committed by the person's moral goals defines his behavior. Behavior is an external indication of activity, so its internal mechanisms are indirectly manifested and do not always manifest motives acting in his or her activity.

From the point of view of today's doctrine, thoughts, remarks and works of the First President of Uzbekistan I.Karimov and President of the Republic of Uzbekistan Shavkat Mirziyoev are a methodological basis for this period and the future. In particular, as noted by Islam Karimov, "Every nation, every nation, as a child, is a symbol of the younger generation, able to demonstrate the noble qualities of the nation, capable of displaying courage and selflessness in implementing its noble desires, it is natural that he sees his support and support "[5]. This does not happen automatically. Teaching future young people to childhood activity will be



the basis for future success. It is possible to realize the spiritual world of young people from childhood through the formation and development of good ideas. At first glance, this problem may seem insignificant. However, given that each child first understands the world through the objects and objects, including toys, it becomes clear that their role in human education is immeasurable. The image of the toys is stamped on the stone for a child's imagination and remains in his mind for a lifetime. The choice of profession, the future of the future, and the ethical and moral foundations of the life style of the child are undoubtedly determined by what kind of toys he has in the future. "[6] So, in our opinion, activity begins with infancy.

When it comes to the question of the level of activity of the human mind, it is not a mistake to say that a person has good knowledge, deep knowledge of the subject, and a correct understanding of what he has learned. This is especially important for the school-led disciplines. When the educational aspects of science are top priority, the formation of high activity in the child is also easier. Especially when the subjects mentioned in the curriculum of the first and second-grade programs are carefully subverted to the children, their future outcome is not bad. It is one of the main factors in educating the children in these classes about teaching literacy, telling stories, introducing the activities of great figures, reading samples of literary literature on folk artistic works, reading poems, sampling of samples, expressing their emotions. It is noteworthy that in Avesto's teaching, it is noteworthy that in the early days and ends of the day, the knowledge of science and education in the early and late days of the early part of the day is the gradual acquisition of knowledge, reasoning and donation, that he should go to such a place on his way to praise the name of the gods, and to care for them with good words. And in that way he should increase his knowledge. " "... It is a great pleasure to rest in the middle of the day and midnight, and then he should pursue science so that he can learn from everything that the wise men of the past have left." [7]

In a society, family plays an important role in education, occupation, morals, and faith. The beliefs and national characteristics, the way of life and the level of parenting, which form the basis of the spiritual world of human beings. So no part of society can be compared with a family in the formation of a human being. There are such mysterious situations in the family that it is difficult to read and absorb from the outside. In this sense, some occupations will continue only in the range of specific families. Some have the opportunity to learn from specific families, from team to community.

In adolescents, the interest and need to work early are born in a family environment, and the working skills of school-aged boys and girls are considerably shaped. This is further compounded by the educational and teaching process. When these rare skills are timely educated and subordinated to a particular system, as we have already said, a well-educated, highly qualified member of society can be formed. It is the primary task for every young man and woman to live up to their dreams and aspirations for future dreams. It is important to keep in mind that young people need to be inspired by what they are encouraging to say about their future goals and dreams. For example, it is also necessary for children to repeat their best wishes for "always becoming a scientist", "you are a pilot", "you are a great man, a great teacher" and other similar inspirational and hopeful words. Because such incentives encourage young people to seek spiritual, physical, and spiritual beauty.

In his speeches and speeches, the President of our country Shavkat Mirziyoev underlines that the radical renewal and development of the society depends on a comprehensively-minded, intelligent, moral-matured, physically healthy, comprehensively-minded generation, and should support them in every possible way. In particular, the President said: "Every success, every success depends on labor and determination, courage and courage, and the honest work for the sake of

prosperity of the country must surely find its worthwhile value and value" [8]. Because the issue of supporting active young people has become one of the priorities of today. Taking this into consideration, our Honorary President Shavkat Mirziyoev supports the implementation of scientific and intellectual potential and innovative ideas of young people. It also implements large-scale reforms aimed at the efficient use of the created opportunities and the further socio-political activeness of the youth. The youth of our country have been united into the single union for the sake of the Motherland's prosperity and peace of mind. The «Kamolot» Youth Association has been dissolved for years. The Youth Union of Uzbekistan, which has a clear targeted agenda, has a program of harmonious development of the Homeland. All these creative youth of our republic were welcomed by such a positive change.

A number of examples of the great active activists who have been left in the history of our country can be taken as factors for the activation of the current age. Particularly, in the political sphere, the following views on the formation of his character, ethics and humanistic-ideological characteristics from the biography of Amir Temur can be made. "From the age of from seven to seventy years and throughout the lifetime, I spent the poor. I did not wear a second suit and then donated it to the beggars. When I was able to reach out, I raised all my best friends back to high positions, slaughtered sheep every day, and tied the sheep to seven of them. "[9] At the same time: ... "In all the countries that have been defeated, I have tried to earn a respect for the people. Good people, no matter what kind of nation they are, I have done good, and the cruelest and the traitors are expelled from my country ... In all countries, the gate of justice was open. "[10] Or "I have ordered mosques, madrassahs, monks in every city, building rabbis on the road for passengers, and bridges over rivers.

Future people, especially young people, depend on belief, faith, faith, piety, and kindness. In this regard E. Yusupov's remarks are remarkable: "Faith is not a specific quality but a specific system of mature moral norms. Thus, faith includes all the attributes that reflect perfect humanity "[11].

Naturally, no new society has become a non-working society. As a new society is being built in Uzbekistan, it is also connected with the outlook and spirit of the people. Otherwise, those who are fraudulent in the society, fraudsters, hypocrites, cloisters, cobblers, and those who can not see the development of society have a negative impact on it. That is why, as President Islam Karimov put it, "Now we have a very important task and our future is a decisive task. This task is to build up the spirituality of a free civil society, in other words, to educate the perfect people who live by their own rights and who live in their own power and intellect, while seeing their personal interests in the interests of the people and the Motherland. "[12] .

It is worth noting that academics Sharifhodjaev and professor Z. Davronov's ideas about upbringing high spirituality are remarkable: "Spirituality is embraced by high people and feelings emerge in the interests of society, society, state and family. Such a person is pure and clear thinking. It can handle a long distance "[13]. Hence, young people with these capacities make society's opportunities real.

Summary: Based on the above considerations, we want to emphasize that our ancient traditions, values, cultural heritage and statehood are theoretically important factors in increasing the activity of young people in order to increase the activity of our youth today. At the same time, it should be noted that the activation of youth activism can be a factor not only in our national traditions but also in secular democratic processes. So, in our opinion, the activeness of young people is not only in economic and political spheres, but also in being a civilized person and



active in the sphere of democracy. These facts inspire modern youth. As a result of the inspiration, young people make their own conclusions, apply the required fields to their activities and seek to increase their personal activity.

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8. Shavkat Mirziyoev. We will continue our path of national development with determination and bring it to a new level. TABLE 1 - Tashkent: "Uzbekistan", 2017. -B. 535



MODERN PROBLEMS OF TOURISM AND ECONOMICS

UDK. 339.187.62.04

ORGANIZATIONAL AND LEGAL MECHANISM FOR THE DEVELOPMENT SERVICES OF LEASING AND PROSPECTS OF LEASING SERVICES DEVELOPMENT.

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Annotatsiya. Ushbu maqolada O'zbekiston Respublikasida lizing xizmatlarini rivojlantirish tashkiliy-huquqiy mexanizmlari qabul qilingan huquqiy hujjatlar misolida yoritib berilgan. Mamlakatimiz lizing xizmatlari bozori tadqiqotlar asosida o'rganilgan.

Kalit so'zlar. lizing, lizing xizmatlari, lizing oluvchi, lizing beruvchi, lizing shartnomasi, mexanizm, lizing obyektlari, bojxona imtiyozlari, soliq imtiyozlari, lizing subyektlari

Аннотация. В данной статье рассматриваются организационно-правовые механизмы развития лизинговых услуг в Республике Узбекистан. На основании исследования рынка лизинговых услуг нашей страны.



Ключевые слова лизинг, лизинговые услуги, пользователь лизинга, лизингодатель, договор лизинга, механизм, объекты лизинга, таможенные льготы, налоговые льготы, лизинговые активы.

Annotation. This article describes the legal framework for the development of leasing services in the Republic of Uzbekistan. The market of leasing services of our country has been studied.

Keywords. leasing, leasing services, lessee, lessor, lease agreement, mechanism, leasing objects, customs privileges, tax breaks, leasing assets.

Introduction. Leasing services in our country are developing and becoming one of the most important sectors of the economy. Leasing entities are exempt from VAT(Value Added Tax) on lease payments, as these payments are fully charged on the whole and reduce the tax base by income tax.

Leasing subjects are exempt from property tax on the subject of leasing according to Article 269 of the Tax Code "Property tax privileges". In calculating the property tax on legal entities, the tax base shall be reduced by the value of the leased property under the lease agreement. Imported technological equipment on leasing terms is exempt from VAT and customs duties during customs clearance.

Lessee will be able to accurately calculate the budget of their business and manage the cash flows of the enterprise over the term of the leasing agreement because the lease agreement provides monthly payments equal to the same amount. If actively investing in this sector, our country will soon become one of the leading countries in this area.

Analysis of topic material. The development of leasing services is represented by V.Gazman, V.Goremikin, A.Deniskin. In their monographs leasing services are illustrated well and clearly. Issues of developing leasing services in modern economy are shown and are taken action by the scientists.

As well as Uzbek scientists Abdurakhmonova M. Mo'minov A. have researches on leasing services. In this article datas of unit of uzbek lessors are also used.

Research methodology. In the study monograph, induction, deduction, economic analysis, observation and comparison research methods used.

Analysis and results. In our country, leasing services are becoming one of the most important sectors of the economy. This is due to the fact that a solid legal basis has been created and the state is supported by leasing objects (lessor and lessee): tax and customs privileges for lessee and lessors. Leasing services make companies more competitive in modern market. There are also benefits for government because of creating new work places for people.

The Law of Leasing, adopted on April 14, 1999, is a legal basis for this industry. The present Law consists of 25 articles, which cover the concept of leasing, leasing objects and subjects, leasing forms, leasing activities. According to this law, leasing is a separate type of lease, in which one party (lessor) submits the property (object of leasing) as stipulated in the leasing agreement from the third party (seller) on the instructions of the second party (lessee) and shall transfer it to the lessee for a period of more than twelve months in the possession and use of the remuneration in the conditions set forth in this agreement. A user of leasing shall be recognized as the person receiving the object of leasing according to the lease agreement for possession and use. In addition, the leasing contract is recognized as the lessor of the object of leasing in the future for leasing to the lessee. "In addition, the International Financial Leasing Convention adopted on 28 May 1988 was adopted. In addition, the Tax Code of the Republic of Uzbekistan exists on the reduction of the tax burden on leasing subjects. Leasing is the legal basis for reducing the tax base.

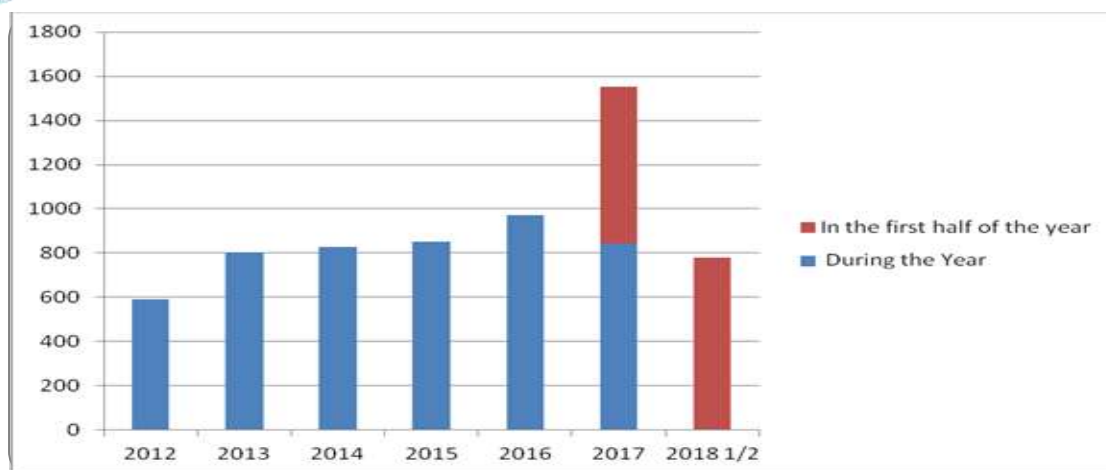
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Lessees will be able to accurately calculate the budget of their business and manage the cash flows at the time of the leasing agreement, as the lease agreement provides monthly payments equal to the same amount. Lessees will be able to purchase the products of world leading and local manufacturers without separating their working capital. Leased equipment not only covers itself, but also greatly increases the profit of the enterprise. Significant growth in the number and number of leasing transactions in our country is achieved. In the first half of 2018, the volume of new leasing transactions amounted to 779.6 billion sums, while the total portfolio of leasing operations amounted to about 3.5 trillion sums. However, 1 trillion soums in the joint portfolios belong to the leasing portfolio of the National Bank for Foreign Economic Activity of the Republic of Uzbekistan. The analysis of the leasing market of the Republic of Uzbekistan has been prepared by the Lessors Association of Uzbekistan on the basis of official data provided by leasing companies and commercial banks. During the preparation of the rating of leasing companies in Uzbekistan, leasing activities were defined by more than 50 leasing investors, of which 18 are banks.

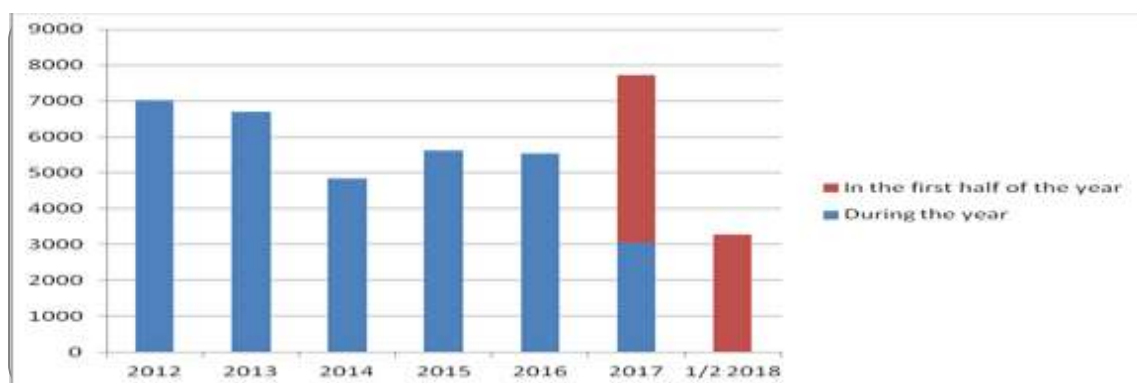
Table 1 The volume of leasing transactions(in bn UZS)¹

¹ [www.unit of the lessors.uz](http://www.unitofthellessors.uz)



In the first half of 2018, the volume of new leasing transactions increased by 9.7% to UZS 779.6 bn., Which is 68.8 bn. UZS in comparison with the same period of the previous year's. This is accomplished by the state-owned leasing company "Uzagrolizing", implementing government programs to support the preferential leasing provided to support the agricultural sector, as well as the traditional leasing companies and commercial banks the positive effects of deals on the market. In the first half of 2018, the agricultural sector became the market makers of real estate and motor vehicles, in particular freight cars. In addition, the record volume in the market has also had a significant impact on the growth of the technology sector.

Table 2 The number of leasing transactions



The number of leasing deals concluded in the first half of 2018 has dropped and amounted to 3280 transactions. Compared to the first half of 2017, the number of

new leasing transactions decreased by 30%, which is by 1394 deals less. The tendency of new leasing deals to increase in the leasing market was distributed as follows:

Table 3 Leasing market distribution among lessors²

	2014	2015	2016	2017	½ 2018
Leasing companies					
amount of property, (billion sum)	592,6	668,2	630,8	963,8	681,0
Share	71,7%	78,5%	64,8%	62,0%	87,3%
Banks					
amount of property, (billion sum)	233,6	183,0	342,3	589,6	98,6
Share	28,3%	21,5%	35,2%	38%	12,7%
Jami	826,2	851,2	973,1	1553,6	779,6

In the first half of 2018, the tendency of the leasing market distribution among the lessors has changed drastically, and now 87% of the market belongs to leasing companies. As for commercial banks, the volume of leasing services provided decreased by 12.7% compared with the results of 2017. If the leasing portfolio is considered by lessors, its share is 53.3% of leasing companies. As of the first half of 2018, the amount of leasing portfolio exceeds 3 trillion sums. 504 billion sums

Table 4 Top-5 Leasing companies³

² www.unit of the lessors.uz

³ www.unit of the lessors.uz

№	Leasing companies	The volume of leasing services provided in the first half of 2018 (in billion sums)
1	“Uzagrolizing” SLC	229,0
2	“Uzbek Leasing International A.O” AS	90,7
3	“Uzavtosanoat-Leasing” LTD LC	87,0
4	“Uzmeliomashlizing” SC	44,0
5	“Qurilishmashlizing” RILK AS	37,0

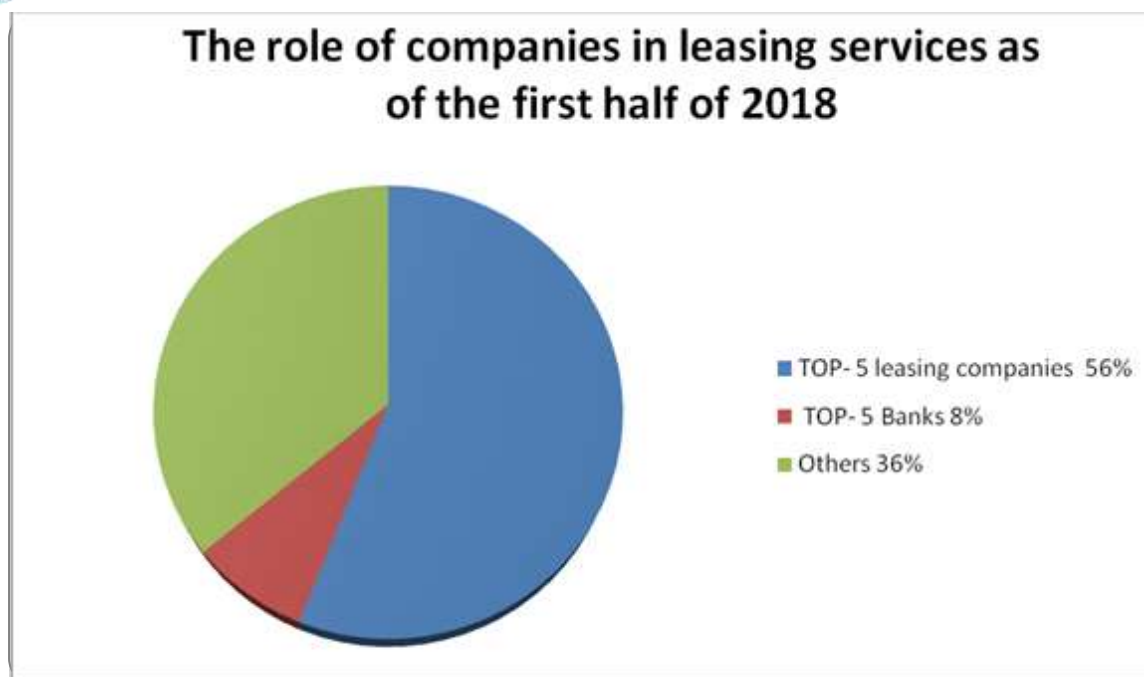
Table 5 Top-5 Banks

№	Banks	The volume of leasing services provided in the first half of 2018 (in billion sums)
1	“Ipoteka Bank” JSB	23,3
2	“Ipak Yo’li Bank” JSB	13,6
3	“Trust Bank” JSB	13,5
4	“KDB Bank Uzbekistan” JSB	10,1
5	“Davr Bank” JSB	9,6

In the first half of 2018, the total volume of the market's major leasing company made up 29.4% of the new leasing transactions, and by 2017 this figure was 30.5%. The share of TOP 10 of leasing companies made up 76.6% of the volume of new leasing transactions.

Table 6⁴

⁴ www.unit of the lessors.uz



he share of agricultural machinery in the first half of 2018 amounted to 30.7%, the share of technological equipment - 33.3%. This is evidence of the increasing demand for high-tech equipment in recent years in the modernization of industrial enterprises. In particular, the following technological equipment is in great demand in the market: construction materials production equipment - 62.3 billion sums; construction machinery - 59.9 billion sums; land reclamation techniques - 36.8 billion soums; equipment for food production - 17.5 billion sums. It should be noted that in the first half of 2018 a new leasing deal was signed in the technological equipment sector worth 256.3 billion sums. UzbekLeasing International AO (45.0 billion sums) is the leader among the leasing companies in the volume of leased technological equipment, followed by Uzmeliomashlizing SUE (41.3 billion sums)), and Rural Construction Enterprise ("JV" Qurilishmashlizing ") (34.7 billion sums). The amount of new leasing deals made in the agricultural sector made up 236.3 billion sums. Among leasing companies, Uzagrolizing, a state-owned specialized leasing company (229.0 billion sums), leasing services on preferential terms for the domestic farmers



in this sector, leads the above-mentioned UzbekLeasing International AO (3.7 billion sums) and Microcreditbank (1.4 billion sums).

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FACTORS OF INNOVATIVE DEVELOPMENT OF THE AGRARIAN SECTOR IN THE CONTEXT OF INSTITUTIONAL REFORMS IN UZBEKISTAN

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Annotatsiya: Maqolada agrar sohani innovatsion rivojlantirishda klaster tizimini qo'llashning O'zbekiston sharoitida o'ziga xos jihatlari yoritilgan hamda, uni keng joriy qilishda hukumat tomonidan yaratilayotgan chora-tadbirlardan oqilona foydalanish borasida nazariy jihatdan asoslangan ilmiy taklif va amaliy tavsiyalar berilgan.

Kalit so'zlar: innovatsiya, klaster, fermer xo'jaligi, raqobatbardoshlik, eksport salohiyati, import salohiyati, modernizatsiya.

Аннотация: В статье представлены теоретически обоснованные предложения и рекомендации по инновационному развитию аграрного сектора в контексте кластерной системы в Узбекистане и рациональному использованию мер государственного управления при ее широком внедрении.

Ключевые слова: инновация, кластер, сельское хозяйство, индивидуальное сельское хозяйство, конкурентоспособность, экспортный потенциал, импортный потенциал, модернизация.

Annotation: The article presents theoretically-based proposals and recommendations on the innovative development of the agrarian sector in the

context of the cluster system in the Republic of Uzbekistan and the rational use of government-led measures in its widespread implementation.

Introduction: Sustainable development of agriculture through the implementation of institutional reforms in the agricultural sector, effective utilization of farming and livestock activities, increasing productivity and competitiveness of production, and enhancing export capacity are being undertaken in Uzbekistan.

Of course, innovations have a great role. Transition to innovative development not only solves the problems accumulated in the agrarian sector of the Uzbek economy, but also solves the problems of agro-processing industry. Innovative activities are key factors in the development of agriculture and their maximum use is the only way to ensure sustainable development of agro-industrial complex in our country.

In the context of growing dynamics of socioeconomic changes and globalization of the global economy, the country is rapidly moving to an innovative way of agricultural development in the short run, with a high-quality new information- it will need to restore the technological base.

Materials and Research Methods. The article uses scientific conclusions, abstract logical, comparative and system analysis, methods of analysis and synthesis, methods of induction and deduction.

The necessity of the transition of Uzbekistan to innovative development, undoubtedly, is one of the key priorities of all levels of government. Transition from the technological degradation of the agrarian sector of the Republic's economy to industrial production is a very difficult task.

According to the estimates of various experts, at present, in the US, where the indicator is more than 50%, only 4-5% of the innovative potential of the agricultural economy of Uzbekistan is used. Scientific and technological progress and application of advanced technologies together with a complex of organizational and

economic activities serve as a basis for further development of agriculture in our country.

In particular, the Strategy for the five main priorities of development of the Republic of Uzbekistan for 2017-2021 launched a qualitatively new approach to the strategic planning system of the country's state and public development perspectives⁵.

The aim of the strategy is to radically increase the effectiveness of reforms in the country, to create conditions for the full and dynamic development of the state and society, modernize the country and liberalize all spheres of life.

Particular attention is paid to the modernization and accelerated development of agriculture. The most important is the urgency of deepening structural transformation and further development of agricultural production, further strengthening of food security of the country, expansion of production of ecologically clean products, considerable increase of export potential of the agrarian sector.

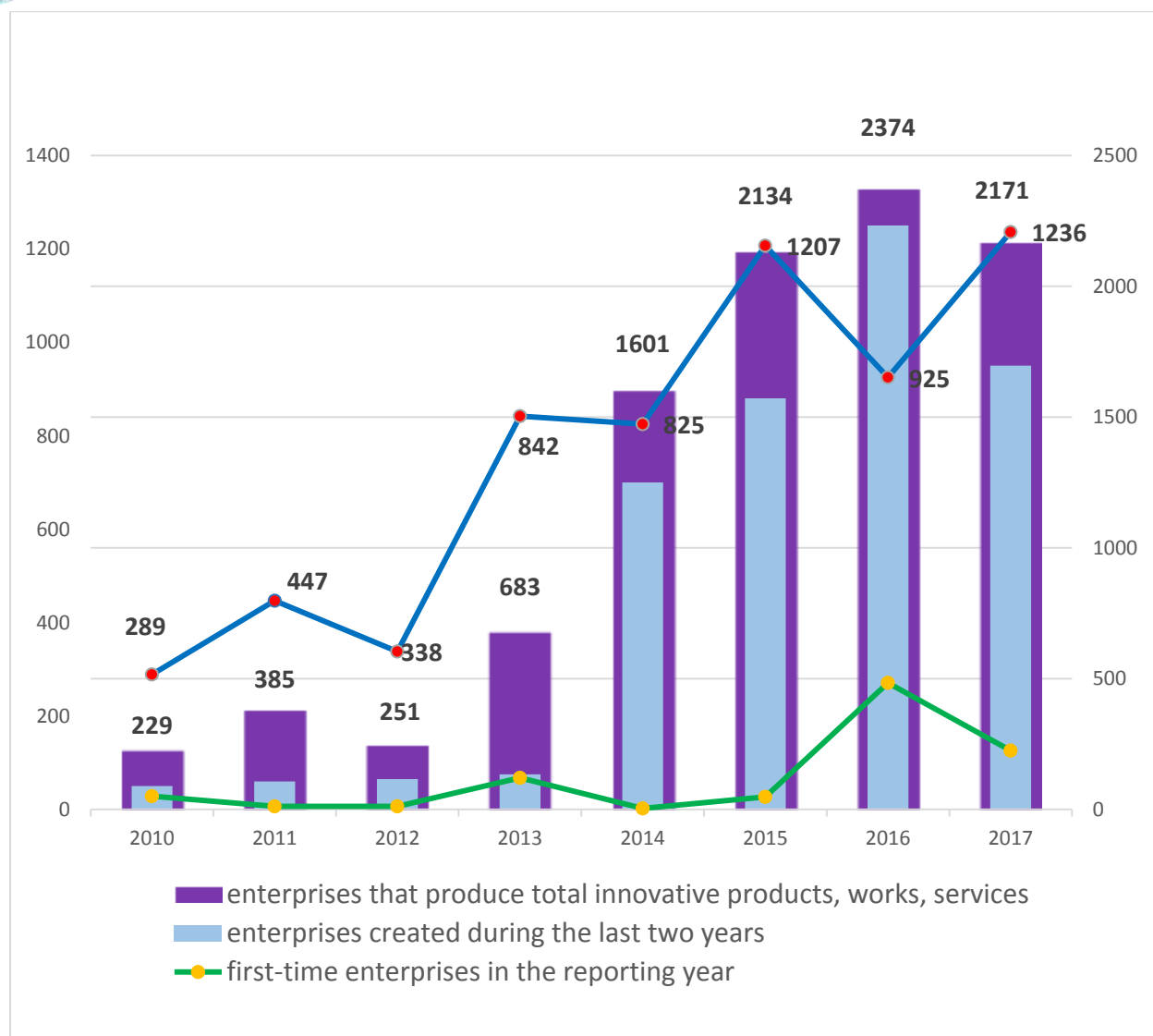
Discussion and results. Studying best practices of the world's leading agrarian sector in the modernization and accelerated development of agriculture, including the creation of intensive varieties of breeding areas, the use of innovative agro-technologies in the cultivation of crops, especially in the processing of agricultural products experiments gave the anticipated effect.

The following figure shows the dynamics of enterprises and organizations producing innovative products, works, services in the latest years(Figure 1).

Figure 1. Enterprises and organizations producing innovative products, works and services in the Republic of Uzbekistan for the period 2010-2017⁶

⁵Decree of the President of the Republic of Uzbekistan dated February 7, 2017 N UP-4947

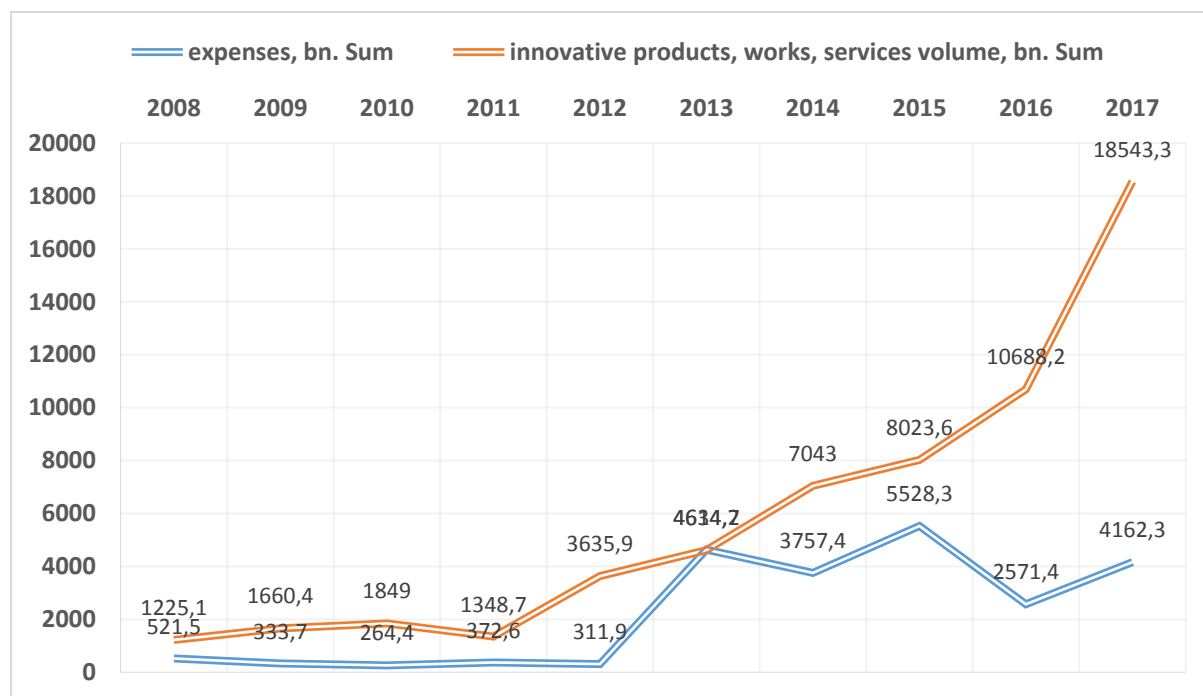
⁶Based on data from State Committee of Uzbekistan on statistics stat.uz



The number of enterprises and organizations producing innovative products, works and services has grown 7.5 times in the period of 2010 to 2017, from 289 to 2171. For the first time we can see that the number of enterprises that have opened the production of innovative products, works and services for the first time increased by 1007.

The following chart analyzes the dynamics of innovative products, jobs, services, and costs (Figure2).

Figure 2. Dynamics of innovation products, works, services volume and expenditures in the Republic of Uzbekistan for 2010-2017⁷



The volume of innovative products, works and services reached 18543,3 billion UZS in 2017, 1.7 times more than in 2016, 14 times more than in 2008. Innovation costs decreased by 8 times in comparison with 2008, and by 1.6% compared to 2016. In this regard, high efficiency is achieved through the use of innovations in the efficient use of opportunities in the agrarian sphere and the use of clusters to increase the competitiveness of the industry.

Numerous local and foreign literature studies have been made on clusters. The cluster's approach to determining the nature of the cluster is unclear and evolutionary. The fundamentals of the theory of cluster are the work of Austrian and American economist, political scientist and sociologist Y. Shumpeter. The term

⁷Based on data from State Committee of Uzbekistan on statistics stat.uz

"cluster" is a "cluster" by Professor M. Porter, a Harvard Business School of the 1980s, and describes as follows: "Cluster - geographically friendly partners and a common and mutually exclusive are complementary organizations" [3]

In contemporary economic literature, cluster is characterized by a network of specialized suppliers serving as an alternative to sectoral approach, based on the regional concentration of mainstream manufacturers and consumers connected to the technological chain and serves as an alternative to sectoral approach [2]. In this case the cluster has the features of mutual competition among its participants, cooperation of participants, the formation of unique powers of the region, the formation of enterprises and organizations in a particular area.

Analysis of Cluster Approaches by R.R.Tochchukov allowed to distinguish two main clusters in the cluster [6]. First, companies in the cluster need to be connected in the same way. In addition, the connections are not only horizontal, but also vertical. Second, clusters are geographically linked groups of companies.

Studying the theoretical aspects and practical significance of clusters, we believe that the experience of developed countries should add another characteristic to general terminology: this process should not only involve companies in a particular industry (relevant sectors), but also government agencies and academic institutions.

In our opinion, this component is described as organizations that combine different spheres of activity, including all production stages, from processing to production, from agricultural production to single-source reproduction, and has synergistic effect. It is important to determine the essence of the agribusiness industry.

Thus, the agro-industrial complex should be understood as the cooperation of the territorial industrial association, agro-industrial complex, financial institutions (e.g., commercial banks), energy supplying agencies and research institutions, their

combination of economic resources and strengthens the competitiveness of industries and regions and economies.

Although creation of agrocluster organization is a very complex and painful process, it is one of the most reliable ways to reduce labor costs in the regions of Uzbekistan, to reduce the value of existing resources, to the number of capital investments in unit production, and to reduce the labor costs of the workers.

One of the main advantages of the cluster approach for the development of the region's economy is to reduce the role of administrative factors - strengthening the role of economic factors. The role of regional authorities is only at the initial stage. For example, in the organization of new clusters, taking into account the interests of this region, the role of the provincial administrations in the selection of promising clusters is high. Subsequently, the role of regional authorities decreases, and the laws and factors of market economy are the locomotives.

Agroclusters are based on three specifications, as shown in Figure 3 below.

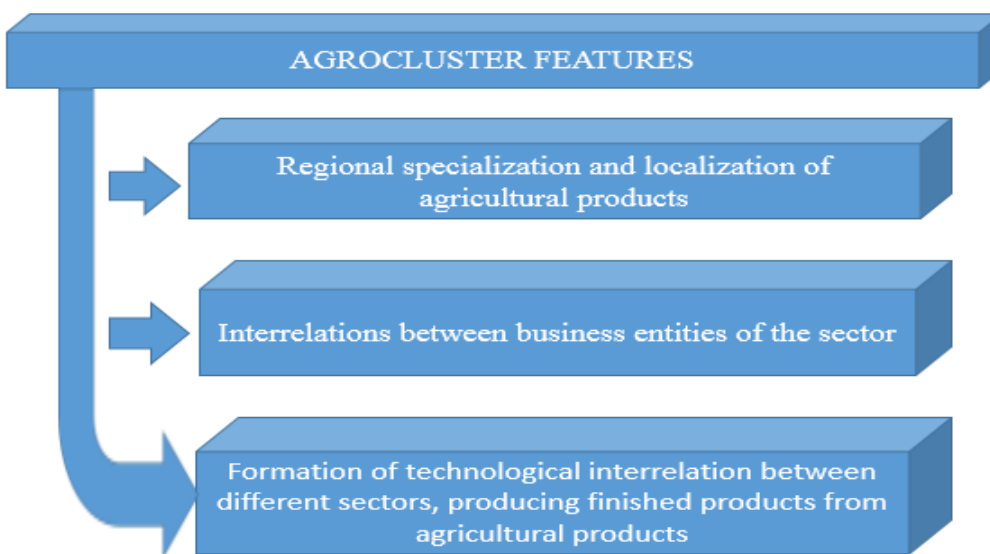


Figure 3. Agrocluster properties⁸

When agrocluster are organized, there is a possibility for regional specialization and localization of agricultural production, availability of links

⁸author's development

between business entities of the sector, availability of products from various agricultural products. The manufacturer is characterized by the formality of technological relationships.

In 2018, 17 cotton-textile clusters were set up in the country, with a total area of 140901 hectares. Starting from March 2019², the Cabinet of Ministers adopted a resolution "On Additional Measures for Organizing the Activity of Cotton-Textile Production and Clusters", which was attended by 13 heads of 17 cotton-textile clusters, cotton-cleaning plants and 68 cotton processing centers were transferred to these clusters on probation terms for a period of 5 years.

The first cluster in the Khorezm region of Uzbekistan was organized in Shavat- textile direction in Shavat district. This cluster includes a whole system of seeding, growing, harvesting, processing, deep processing, delivery of finished products to consumers.

In 2019, another three clusters will be set up in the Yangibazar, Bogot and Hanka regions of Uzbekistan. For these purposes 2596 hectares of 1096 farming entities are allocated, with a total area of 34.7 thousand hectares and 42% of the total area under cultivation of cotton in the region. In the long term by 2024 agro-clusters with other specializations will be created, including milk/dairy, goat, fruit and vegetables, beans, and the level of production, processing and production of finished agricultural products, will increase.

Summary

It is important to develop all necessary and sufficient regional legislative basis regulating the process of creating and developing clusters in innovative development of the agrarian sector and regulating the legal framework for cluster policy in the region.

Proper selection of crops based on local properties, adequate supply of organic fertilizers, rational use of scientifically-based quantities of mineral fertilizers



and pesticides, creation and development of resource-saving processing systems should be carried out.

The use of modern methods of calculating the optimal combination of crops and crops, optimization and improvement of their composition (including economic and mathematical modeling), and the use of environment-friendly resource-saving technologies for the cultivation of agricultural crops should be applied.

It is necessary to create a new product line for deep processing of agricultural raw materials and expansion of products range.

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MECHANISMS OF INCREASING TOURISM POTENTIAL IN KHORAZM REGION AND USING THEM

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Annotatsiya. Ushbu maqolada Xorazm viloyati mintaqasida turizm salohiyatini oshirish mexanizmlari qabul qilingan me'yoriy huquqiy hujjatlar va dasturlar misolida yoritib o'tilgan hamda ulardan samarali foydalanish bo'yicha muhim fikrlar bayon etilgan

Аннотация. В данной статье излагаются механизмы совершенствования туризма в Хорезмской области в контексте принятых нормативных правовых актов и практик, а также приводятся важные моменты для их эффективного использования.

Annotation. This article outlines the mechanisms for improving tourism in Khorazm region in the context of adopted normative legal acts and practices and provides important points for their effective utilization..

Kali so'zlar: turizm, turizm salohiyati, mexanizm, dastur, qaror, farmon, infratuzilma

Ключевые слова. Туризм, туристический потенциал, механизм, применение, решение, указ, инфраструктура.

Key words. Tourism, Tourism Potential, mechanism, application, decision, decree, infrastructure .

Introduction . The development of the tourism industry plays an important role in the modernization of the economy and the welfare of the population. It is well known that the development of the tourism sector is accompanied by an increase in the gross domestic product of the country and directly contributes to the growth of income. If we focus on the effectiveness of socio-economic development of developed countries, we will witness the fact that in recent years non-production sectors have become a major sector in the social division of labor. In particular, currently , more than 195 million people worldwide work in tourism, about 8 percent of the world's total employed⁹. This suggests that tourism opportunities are very high in terms of creating new jobs.

The employment of the population in the tourism industry, meanwhile, is becoming an important source of regional economies. At the same time, as a result of the development of tourism and hotel management, more than 500 different types of property and accommodation facilities operate in our country. Because in Uzbekistan the majority of tourist flows belong to the cities of Samarkand, Bukhara and Khiva,

⁹ www.unwto.org

with high tourism potential and high tourist infrastructure. The tourism is limited to ancient cities in the context of historical and cultural monuments. However, there is a great potential for the development of tourism in the unique nature of our country, national reserves, mountainous regions¹⁰. Therefore, it is necessary to create opportunities for tourism development in Khorazm region. However, the legal and regulatory framework adopted in this regard, the legal mechanisms, leads to the resolution of these issues.

Analysis of topic material . The development of the tourism industry, which is the basis of its development, were researched by V.Senin, V.Bogolyubov, A.Durovich, M.Efremova, V.Kvartalnov, S.Julidov, S.Skobkin , E.Ilina. In our Republic these directions are studied by M.Pardaev, I.Tukhliev, G. Qudratov, A.Eshtaev, O.Khomidov, B.Turaev, D.Usmanova, N. Ibadullayev, R.Amriddinova, B.Safarov , M.Alimovas . Today, this issue is raised to the level of state policy and is reflected in the reports of the President of the Republic of Uzbekistan.

Research Methodology. In this article induction, deduction, analogy, comparative, economic analysis, observation, comparison research methods are used.

Analysis and results. It is well -known that the importance of tourism potential of Khorazm region and the city of Khiva in the development of tourism in our country , and the government's attention to the development of tourism in the region. This allows us to expand the tourism potential of the region and on the basis of the evaluation will be based on attention to the issues of increasing the number of tourists visiting. In this regard, the city has a rich historical and cultural potential and has over 300 historical and cultural monuments dating back to its 3000th anniversary.

There are 208 sites of cultural heritage, including 20 archaeological sites, 124 historical and architectural monuments, 7 ensembles, 28 sights and temples in

¹⁰President of the Republic of Uzbekistan Sh . Mirziyoev's Appeal to the Oliy Majlis . December 28, 2018. City of Tashkent. // www.president.uz

Khorazm region¹¹. In addition, The natural and climatic conditions of the region provide permanent tourist season at a certain time of the year.

At the same time, ecotouristic potential, medical tourism, desert tourism, horse and camel rides, hunting tourism, and agro-tourism potential can be used optimally. In order to implement these tasks, the implementation of state programs and resolutions on the development of tourism in Khorazm region and Khiva, the formation of tourism infrastructure, stages and trends of tourism services development, the number of domestic and foreign tourists visiting the region and their satisfaction with tourist services in the region should be avoided. For this purpose, the tourist attraction of Khorazm region and Khiva city should be used effectively .

In order to accelerate the development of the tourism industry in the region, it is necessary to involve investments, to apply innovative ideas and technologies to the sphere, as well as to enjoy the rich natural, cultural and historical heritage, resources and abilities of the country. For this reason, the wide-ranging tourism and tourism industry in our country is a key factor in further advancement in the future. Because one of the most important ways of achieving socio-economic development is directly connected with the effective use of tourist potential of the country¹² .

Tourism potential is a factor and category that determines the development of tourism, and it is manifested in different ways. In particular, the existing tourism potential for the ecotourism network of the region plays an important role in environmental protection, involvement of ecotourists in nature, solving the problems of preserving and reproducing the unique flora and fauna, improving socio-economic conditions and providing the population with new jobs.

¹¹Ruzmetov B., Matyakubov U., Khudoyberganov D. Prospects of tourism development in Khorezm region.: "Actualnye problemy turizm - 2009"

¹²Professors M. Pardaev and H.M Musaev. Development of services and tourism: problems and their solutions. Monographs. - T., 2008. - 87 p.

Legal mechanisms that enhance the tourism potential of the Khorazm region in the consistent implementation of these tasks are reflected in the form of normative-legal acts.. This mechanism will serve to ensure the development of tourism in the region. It is also seen as one of the important directions in the development of services, services and tourism, unemployment, increasing incomes, living standards and increasing the role of services in the region's exports . At the same time, it will ensure rapid development of the tourism industry, increase its role and share in the economy, diversification and quality of tourist services, and expansion of tourism infrastructure .

Resolutions, decrees and programs are aimed at raising tourism potential have been developed by the government, including the Law "On Tourism", Decree of the President of the Republic of Uzbekistan dated December 2, 2016 PF-4861 "On measures to ensure the rapid development of the tourism industry of the Republic of Uzbekistan", 2017 Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On the Program of Complex Development of the Tourism Potential of the Khorazm Region and Khiva City for 2017-2021" dated May 4, 2017¹³ .

In particular, on the basis of the Decree of the President of the Republic of Uzbekistan on 4 May 2017-2021 the Complex Development Program of Tourism Potential of Khorezm Region and Khiva City was adopted. Adoption of this document is to strengthen the influence of this sector on the development of the regions on the basis of sustainable development of tourism in Khorezm region and further enhancement of tourism potential. First of all, it is necessary to study and improve the tourism potential in order to fully address these opportunities. The Decree adopted by the President of the Republic of Uzbekistan creates favorable conditions for the development of the tourism sector by attraction of investments, the

¹³ www.lex.uz

introduction of innovative ideas and technologies, and the effective use of the rich natural, cultural and historical heritage of the country.¹⁴

Starting from February 10, 2018 citizens of Israel, Indonesia, Korea, Malaysia, Singapore, Turkey and Japan, as well as foreign airline companies regularly arriving to Uzbekistan, have been granted a visa-free regime for 30 days from the date of entry into the territory of the Republic of Uzbekistan for air crew members; a simplified order of registration of tourist visas for citizens of other 39 states has been introduced. Directly from these countries, Khorezm region has attracted a large number of tourists and took an important place in improving tourism.

In order to further simplify tourism formalities and enhance tourism potential, from May 1, 2018, 72-hour entry visas for foreign passengers on transit have been introduced in Uzbekistan. The occurrence of this opportunity is also an important area for tourism potential of the region, primarily for the types of tourist information, with the exit of tourists out of the border area of the airport. In this case, passengers must have air tickets and visas to third countries and pay consular fees. In addition, the Decree of the President of the Republic of Uzbekistan on attracting direct foreign investments to the development of the hotel economy was adopted¹⁵. This decree is directly aimed at improving the hotel industry in the region.

As a result of the implemented reforms, the region is gradually developing tourism and is divided into the following stages:

- *first stage (1992-1995)*. At this stage, it is planned to create a new system of management in the tourism sector, create additional business types that will facilitate tourist business, create banking, auditing, advisory services, create regional branches

¹⁴Resolution of the President of the Republic of Uzbekistan dated February 6, 2018 "On Measures for the Development of Access Tourism" No. PP-3509

¹⁵Decree of the President of the Republic of Uzbekistan from January 5, 2019 "About additional measures on accelerated development of tourism in the Republic of Uzbekistan" PF -5611

of tourism network in the region, advertise tourism products internationally, licensing privatized touristic enterprises a special attention was paid.

- ***second stage (1995-1999)*** . The changes that have been made at this stage have intensified the way in which the tourism industry accepts. In 1995, the President of the Republic of Uzbekistan, entitled "Restoration of the Great Silk Road and Development of International Tourism," had a strategic significance in the recovery of the Great Silk Road tourism product. This led to the second stage of the reform of tourism .

- ***third stage (1999-2005)***. At this stage of tourism reform , the Decree of the President of the Republic of Uzbekistan "On State Program for the Development of Tourism of Uzbekistan for 2005" was published on April 15, 1999. Based on this, the market relations in the tourism industry have been settled and the competitive tourism market around the world has begun, and the centralization of tourism management has been eliminated. And in 2003 Urganch Airport was converted to Urgench International Airport.

- ***fourth stage (2005-2016)***. At this stage of tourism reform, the Association of Private Tourist Organizations and other tourist associations have been established, and economic relations between them and tourist enterprises have been realized. Reforms in the field deepened and the "Tourism Development Program for 2013-2015 in Khorezm region" was adopted on 20 March 2013.

- ***fifth stage (starting from 2016)***. At this stage, the reform of the tourism sector has been fundamentally improved and the committee has been set up to improve the efficiency of tourism services in the country. The issues of accelerated development of tourism have been solved, and the most important one is the five-year program aimed at raising tourism potential in Khorezm region and Khiva.

During the years 2019-2021 within the framework of the program of the visit cultural-historical, archaeological, environmental, cultural, gastronomic, youth,

entertainment, sports, business, travel, agro, family, adventure, extremal remain, such as children and rural tourism grows steadily¹⁶. In order to fully utilize the tourism potential of these areas, it is necessary to organize various public and leisure activities, as well as to further the implementation and implementation of the set tasks. At the same time, legal mechanisms increasing the tourism potential in Khorazm region are influenced by the following trends (Figure 1):



Conclusions and Suggestions. Based on the above analysis and results, tourism potential in the Khorezm region provides for the broad development of modern tourism in the future. The tourism infrastructure of the Khorezm region and Khiva, as well as the tourism potential of the Khorezm region, will be further enhanced, the tourism potential and services will be improved, the tourism potential of the region will be promoted, and the quality of advertising will be improved, the infrastructure

¹⁶ www.uzbektourism.uz

¹⁷ Datas of Khorezm Region Tourism Development Department

of tourist infrastructure will be improved, The choice of touristic routes provides effective utilization of tourist resources. At the same time, the state programs and decisions are taken to increase the tourism potential of the region are the creation of an effective mechanism for the sustainable development of tourism as a result of the tourism potential.

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ORGANIZATIONAL AND ECONOMIC MECHANISMS OF TOURIST SERVICES DEVELOPMENT IN UZBEKISTAN

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Abstract. This article deals with organizational and economic mechanisms for the development of tourist services in Uzbekistan and the ongoing reforms in this area. At the same time, the article outlines the role of tourism in the national economy, the development of regions and the creation of new jobs.

Key words: tourist services, organizational-economic mechanism, internal tourism, tourism infrastructure, tourist product.

Annotatsiya. Mazkur maqolada O'zbekistonda turistik xizmatlarni rivojlantirishning tashkiliy-iqtisodiy mexanizmlari va ushbu sohada amalga oshirilayotgan islohotlar haqida so'z boradi. Shu bilan birga maqolada turizmning milliy iqtisodiyotda, hududlarni rivojlantirishda va yangi ish o'rinlari yaratishdagi roli ochib berilgan.

Kalitso'zlar: turistik xizmatlar, tashkiliy-iqtisodiy mexanizm, ichki turizm, turizm infratuzilmasi, turistik mahsulot.

Аннотация. В данной статье рассматриваются организационные и экономические механизмы развития туристических услуг в Узбекистане и проводимые реформы в этой области. В то же время в статье освещается роль туризма в народном хозяйстве, развитии регионов и создании новых рабочих мест.



Ключевые слова: туристические услуги, организационно-экономический механизм, внутренний туризм, туристическая инфраструктура, туристический продукт.

Introduction. One of the most important issues facing the economy of the country is the need growth for employment in the sphere of modernization of the economy and improvement of well-being of the population. In particular, it is important to identify prospects for enhancing employment in the service sector, to improve the organizational-economic mechanisms and to develop scientifically sound recommendations and practical recommendations on this issue, which are the main driving force of property.

At the same time, the main attention was paid to the last twenty years of the functioning of the tourism and hospitality industry. At the same time, the main attention was paid to the last twenty years of the functioning of the tourism and hospitality industry. In the course of the analysis, various factors that significantly influenced the development of the international market for tourist services were identified: climate change, natural disasters, currency fluctuations, changes in prices for petroleum products, political and military conflicts, terrorism, epidemics of dangerous viral and infectious diseases, financial and economic crises and a number of other factors. [5]

At present, both in the world and in Uzbekistan, attention to the economy of non-oil sector, especially tourism, is increasingly growing. People are trying to spend their leisure time on relaxing, restoring their health, learning the world, traditions and values of the people. These services are provided by tourism.

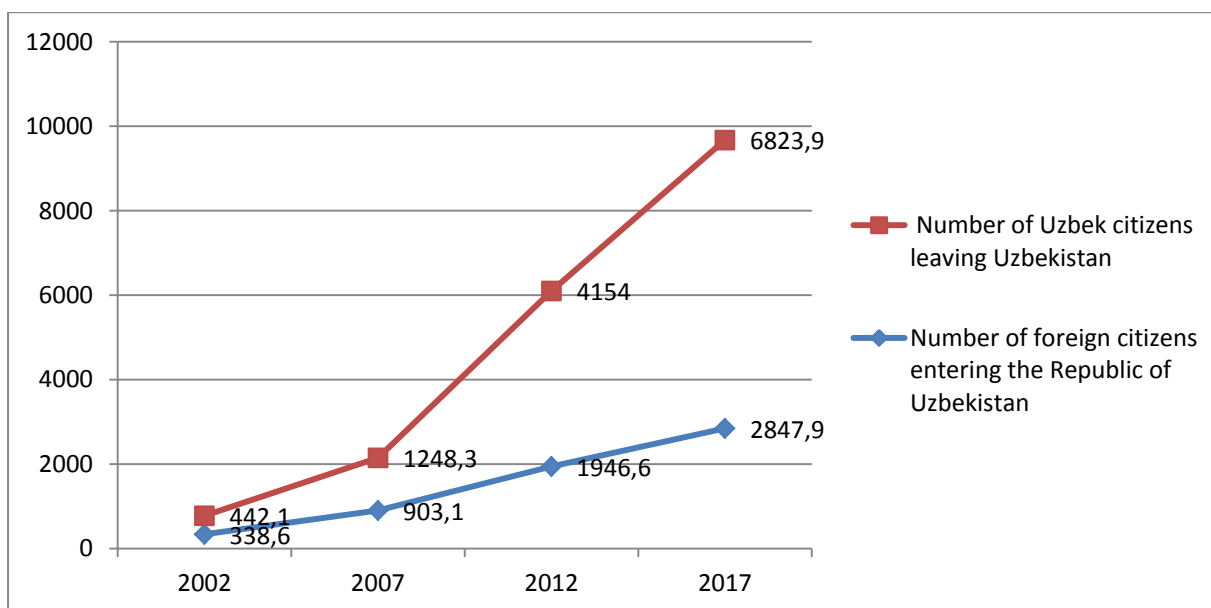
Materials and methods. Article 3 of the Law of the Republic of Uzbekistan "On Tourism" provides the following information on the concept of tourist services:

"tourist services- services of subjects of tourist activities for accommodation, meals, transport, information and advertising services, as well as other services aimed at meeting needs of tourists"[1]

Tourist service are outlined in following "Tourist services are the combination of actions in the field of service which are one purpose oriented and intended to the satisfaction and provision of tourist's needs, which should address the nature of tourism, its aims and the focus of touristic services, and should not be against the universal principles"[4] in scientific literatures, particularly in the book "Tourism: Theory and Practice," published in 2018 by authors M.R.Boltaboev, I.S.Tukhliyev, B.Sh.Safarov and S.A.Abduhamidov,

Results and discussion. In our country, prospects for the consistent development of tourism, the effective use of tourism facilities, improving the quality of services, increasing the flow of tourists to our country and accelerated development of domestic tourism are among the most important issues. Because, Uzbekistan has a considerable potential in tourism development. This is directly related to the existence of many unique natural objects, rich cultural and historical heritage. Every year the number of foreigners visiting the Republic of Uzbekistan is increasing. In the last 15 years, the number of foreign citizens visiting Uzbekistan has risen to 15.5 times or from 442.1 thousands in 2002 to 2847.9 thousands in 2017. Foreign visits of Uzbek citizens in 2017 made up 5,182.5 thousand people, which is 6.5 times more than in 2002.

**Number of foreign nationals and departing citizens of the Republic of
Uzbekistan in 2002-2017, thousand people(table1)**



Source: www.stat.uz

Subjects of tourist activity aim to provide the quality of tourist services to foreign tourists. It should be noted that the number of tour companies and organizations operating in this network and the number of customers using these services are increasing year by year.

The following data in the case of regions show that the main part of the total number of tourist companies correspond to this amount in Tashkent. In the next 2 places there are Samarkand region with 12.4% and Bukhara region with 6.2%. This data shows that in Syrdarya and Navoi regions there are few tourist business centres and there is a need for additional organizational and economic measures in these regions.

Distribution of tourist companies in all regions of Uzbekistan.

T/r	Areas	Quantity	Percentage
1	Tashkent city	634	66,2

2	Tashkent region	19	2,0
3	The Republic of Karakalpakstan	15	1,6
4	Khorezm region	29	3,0
5	Surkhandaryaregion	14	1,5
6	Qashqadaryaregion	12	1,3
7	Navoi region	4	0,4
8	Bukharo region	59	6,2
9	Samarkand region	119	12,4
10	Syrdaryaregion	4	0,4
11	Jizzakhregion	5	0,5
12	Andijan region	19	2,0
13	Ferganaregion	17	1,8
14	Namangan region	7	0,7
	Total	957	

Source: www.stat.uz

At the present time, the development of tourism services in our country has become a state policy as a priority direction of economic development. At the microeconomic level of the management system of the tourism complex there are organizations having different forms of ownership in the tourism industry, enterprises, regional branches and representatives of the State Committee of the Republic of Uzbekistan for Tourism Development, operating in different forms of ownership in the tourism industry. As a result of the reorganization of the tourism management system, new and more effective management methods are emerging. The protection of business and tourist rights and interests is enhanced and the optimal ways and means of



tourism development are identified. Obviously, the most important part of public policy in the field of tourism is to prepare a mechanism for its implementation. An analysis of the structure of the government's tourism services market shows that at present, there are the following economic and administrative mechanisms of government support:

- Tax exemptions, subsidies;
- National legislation and statutory acts that promote the development of tourism and the protection of the rights of consumers of tourist services;
- Reduce the passport records and visa restrictions on entry and exit from the country;
- Encourage non-formal tourism through the use of various pricing methods and incentives;
- Development and support of social tourism;
- Strengthening of tourist safety requirements;
- Strengthening the measures taken by the state for the protection of the environment, cultural, historical and other tourist resources.

The necessary legal and economic foundations for the development of tourism are created, and the government takes appropriate measures, issues, laws and decisions and ensures their implementation in real life situations

In particular, the Decree by the President of the Republic of Uzbekistan Sh.M.Mirziyoyev "On measures to ensure the rapid development of the tourism industry of the Republic in Uzbekistan" dated in December 2, 2016,[3] stimulates further stimulation of entrepreneurship activity in tourism, infrastructure development, granting additional benefits and preferences to tourism organizations.

In accordance with Presidential Decree of the Republic of Uzbekistan of August 16, 2017 "On Prior Measures for the Development of Tourism in 2018-2019", with the creation of a favorable economic, administrative and legal environment for the intensive development of the tourism industry, increase the number of ATMs and terminals that operate on international payment systems in airports, railway stations, hotels and other tourist destinations, as well as receive payments in foreign currency for business services, including additional facilities inunlinked electronic payments were created.

In addition, the Decree of the President of the Republic of Uzbekistan of February 7, 2018, PD-3514 "On measures to Ensure the Rapid Development of Domestic Tourism" was adopted in order for the domestic tourismdevelopment.

In accordance with the law, the plan of measures to implement the domestic tourism development program "Travel around Uzbekistan" has been approved to intensify the development of domestic tourism, providing citizens with the the cultural and historical heritage information and wealth of the country. [9]

These documents set priorities for the solution of the problems accumulated in the field, the development of tourism potential, and gave many privileges and benefits for the further development of domestic tourism.

In conclusion, it is necessary to say that there are certain tasks for the State Committee for Tourism Development in the Republic of Uzbekistan to entrust:

- advertising-oriented activities in the external and internal markets of tourism services, promotion of historical and cultural heritage, preservation and development of the tourism image in the Republic of Uzbekistan, entry of national tourism products and brands into international tourism markets implementing the policy;



- coordination and monitoring the implementation of national and regional programs for the comprehensive development of domestic, inbound and outbound tourism, intensive development in a wide range of tourism types, foreign investment for the tourism development infrastructure, according to international standards, as well as regulating the industry in cooperation with international financial institutions and other organizations attraction;
- optimization of the state and market relations to regulate tourism industry and development of competitiveness in the tourism service market, elaboration of proposals for the elimination of all barriers to tourism development, assistance in the development of entrepreneurship activity in the tourism sector, technology implementation and so on.

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MODERN PROBLEMS OF PHILOLOGY AND LINGUISTICS

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THE FORMATION OF SYNONYMS IN DICTIONARIES

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Аннотация: Ушбу мақолада синонимларни луғатларда ташкил топиши ифодаланган. Бизнинг замонамизда – буюк ижтимоий ўзгаришлар ва мислсиз илмий-техник тараққиёт даврида тиллар айниқса тез ривожланмоқда, фан-техника ва маданиятларнинг турли соҳаларида юзага келаётган янги тушунчаларни ифодаловчи турли сўзлар билан тўхтовсиз бойимоқда. Луғатларнинг сўзлар ва ибораларнинг қўлланишини назарий тадқиқ этишда ҳамда тилга амалий ўргатишда аҳамияти катта. Турли типдаги луғатлар тузиш умуммаданий аҳамиятга эгадир. Синонимлар луғати – тилнинг маънодош ва маъноси яқин сўзларни ўз ичига олади ва тавсифлайди. Бундай луғатлар, аввало, тилнинг синонимик бойлигидан, синонимларидан тўғри ва ўринли фойдаланиш учун хизмат қиладиган муҳим амалий қўлланмадир.

Калит сўзлар: синоним, синонимик қатор, луғат, алфавит тартиби, энциклопедик, филологик.

Annotation: This article describes the formation of synonyms in dictionaries. In our era, during the great social transformations and unprecedented scientific and technological advancement, languages are developing rapidly, with a variety of words that reflect the new concepts that emerge in various fields of science, technology and culture. The use of vocabulary is a great importance in theoretical

research and practical teaching of language. Creating different types of dictionaries is very important. Synonyms dictionary includes the meaning of the language and describes close words. These dictionaries are important as a practical guide for the correct and proper use of the synonymy in the language.

Key words: synonymy, synonymic row, dictionary, alphabetical order, encyclopedic, philological

Аннотация: В данной статье описываются формирование синонимов в словарях. В нашу эпоху, во время великих социальных преобразований и беспрецедентного научно-технического прогресса, языки быстро развиваются, и множество слов отражают новые концепции, возникающие в различных областях науки, техники и культуры. Использование словарных слов и словосочетаний имеет большое значение в теоретических исследованиях и в практическом обучении языка. Создание разных типов словарей имеет первостепенное значение. Словарь синонимов - значение и значение языка включает и описывает близкие слова. Эти словари являются, прежде всего, важным практическим руководством для правильного использования синонимии языка и его синонимов.

Ключевые слова: синонимия, синонимический ряд, словарь, алфавитный порядок, энциклопедический, филологический

Introduction. Word language is the most important means of communication between people and language. The assemblage of collected and sorted words are called dictionary. The field of theoretical and practical principles of formation dictionaries are called lexicography (Greek Lexicon- "dictionary" and graph- "I write"). Guidance specialists are called lexicographers. There are many types of dictionaries. They are the constant help and support of every civilized person. With the help of dictionary people aware of an unknowable word, the meaning of the word you know will help you to understand how correctly and properly it is used.

Glossaries will also be used if you need to find the right and appropriate words according to the context in a short time.

From the day that human came into the world, he confronts the world of words, he lives with them and brings to perfection. The little boy who still does not speak the language, listens to his lovely beard, after learning some words pays attention to the conversation between adults with pleasure, all learned words he keeps in mind. After going to school, it is time to study new, freshly words and there come across to the first school dictionary. The next step of human life is also directly related to the word world. Therefore, when it comes to maturity, the need for dictionaries is increasing at every step of life.

Literature review. It is difficult to understand the meaning of unfamiliar words and phrases without looking through the dictionaries.

The language is constantly changing and developing and its lexicons are the product of centuries. Each historical period and every social development stage will leave a trace. Each generation contributes to enrich the structure of vocabulary system. When language is passed from one generation to another, it enriches and elaborates itself. As time passes, many words are considered to be outdated or passively used words (in passive background). Sometimes the words that have passed to an outdated, forgotten, passive foundation are "resurrected", updated or activated. Many words have a new meaning, a new form, meaning loss or shape. At the same time, there are always new words in the language and all of these changes will reflected in a variety of dictionaries.

In our era, during the great social transformations and unprecedented scientific and technological advancement, the languages are developing rapidly, with a variety of words that express new concepts in various fields of science and technology. The usage of dictionaries are important in theoretical research and practical teaching of language. Nowadays creating different types of dictionaries are very important. The

dictionary is based on alphabetical order, informing the public as a handy tool, fulfilling cultural and ideological functions.

In a number of dictionaries (J. Fernald English synonyms and antonyms) there is no synonym of the verb "go", but in other dictionaries there are 11 synonyms of this word. (The Nuttall dictionary of English synonyms and antonyms 1999). The synonym of the word "annoy" is "irritation" in the Advanced English textbook, but in the textbook of I.R.Galperin this word's synonym is "bother". The synonym of the word "Damage" is given the word "spoil" in the "Advanced English" textbook, while in I.R Galperin's textbook has been given the words "spoil" and "damage", and there is no any information about the word "hurt".

In every language has its own synonymic dictionary, such as in uzbek language there is "O'zbek tili sinonimlarining izohli lug'ati" (1974) by A. Hojiyev, Russian dictionaries are "Kratkiy slovar sinonimov russkogo yazika " (1956) by V. Klyuyeva, " Slovar sinonimov russkogo yazika" by A.P.Evgeneva (1970-1971), English dictionaries are Webster's Dictionary of Synonyms (The Springfield, Mass 1951) and The Oxford English dictionary.

Research methodology. Dictionaries are subdivided into two types: encyclopedic and philological. Special dictionaries contain a variety of terminology dictionaries and encyclopedias. Philological (linguistic) dictionaries contain the general lexicon of the language. The object of linguistic dictionaries is a word. These dictionaries provide information on every word that makes up a linguistic union - its meaning, its scope, its relationship to other words, its grammatical, stylistic and other features. Synonyms dictionaries describe close words and include meaning of the language includes. First of all these dictionaries are important in practical guide to correct and proper use of synonymy in the language. For this purpose, the general meaning of the synonyms in each synonymic row is explained in the dictionary, while the specific

meaning each synonym is given. The synonyms dictionary describes the meaning of the word, the stylistic functions of each word that is in the synonymic line.

Modern English Dictionary contains literary and verbal groups of words. Literary texts are peculiar to the literary, oral texts are peculiar to the verbal communication and have the general peculiarities in word-of-speech lexicon. Each of these two layers have its own classification. Literary Speech Lexicon covers general literary designations, terms, poetic words, archaic words, new words.

Oral speech lexicon is a lexicon used in verbal speech. This includes slangs, jargonizes, professionalism, dialectics, and euphemisms, along with the words commonly used.

Analysis and results. Literary terms are especially used in bookish style, differentiated by either positive or negative meaning or neutrality. The difference between literary words and vocabulary is that they are identical:

Table 1

Common (neutral)	bookish	Colloquial
To begin	To commence	Bring about, get off
To dismiss	To discharge	To sack
To eat	To consume	To cram
Child	Infant	Kid
Food	Provision	Grub, fleshpots
Money	Cash notes	Beans, bucks, shekels
Prison	penitentiary	Jail, cage, can

Table 2

Common	Bookish	Colloquial
Бет	Юз, чехра, жамол	Афт, турқ, башара
Бола	Фарзанд	Тойча, болакай



Кулмоқ	Жилмаймоқ	Илжаймоқ
Гапирмоқ	Сўзлашмоқ	Лақилламоқ
Чиройли	Зебо, хусндор, гўзал	Кетворган
Қарамоқ	Назар солмоқ	Ўқраймоқ
Жаҳл	Қахр	Зарда
Лойик	монанд	Боп

The words are formed in dictionaries as:

1. For the words borrowed from other languages:

As for the borrowings of the English language, the sources are studied separately in accordance with different periods. The following periods are particularly distinguished by scholars based on the sources of borrowings in English language:

2. Germanic period
3. Old English period (600-1100 y.y.)
4. Middle English period (1100-1500 y.y.)
5. Early Modern English period (1500-1650 y.y.)
6. Modern English (1650-present)

On the contrary, Uzbek language native words consist in Turkic language family, which is based on the language family of Turkic. It should be stressed that Uzbek language extended by Persian, Arabic and Russian languages. In 500-300 BC, the Persian language developed in the territory of Uzbekistan because of getting in touch with the population of Iran. For this reason, the poetry and prosaic works were written in Persian language until XV century. As for Arabic language, its spread began in the VII century after the conquest of Central Asia. Therefore, Arabic language became predominant especially among scientists and scholars. It must also be stated that Alisher Navoi, contributed greatly to the development of Turkic language through writing the poetry in this language. Starting from XVIII century,



Russia began invading the territory of Central Asia and as a result, Russian language started influencing to all aspects of life in Central Asia and language.

Table 3

Old English	Borrowed from French languages	Borrowed from Latin languages
To ask	To question	To interrogate
Teaching	Guidance	Instruction
Fast	Firm	Secure
To rise	To mount	To ascent
Dumb	Mute	Inarticulate
To gather	To assemble	To collect

2. Many modern synonyms in English are abbreviations:

Vacation-vac	examination- exam
Earthquake- quake	preparation- prep
Bicycle- bike	laboratory- lab
Perambulator- pram	impossible- impos
Veteran-vet	public house- pub

3. The following synonyms are created using affixes:

Undaunted-dauntless
Changeable-changeful
Undefended-defenseless
Sincerity- sincereness
Anxiety-anxiousness
Effectively- effectiveness
Effective- efficacious
Righteous- rightful



Middle- midst

Meddling-meddlesome

4. In order to conversion

Commandment n. , command n.

Laughter n. , laugh n.

Trial n. , try

Saying n. , say n.

Conclusion. Determining the separation of the degree in synonyms always requires of their semantic functional aspects. According to Webster's Dictionary, synonyms constitute one or more words that express almost the same content. In fact, synonymic words are almost entirely form in the same context. From the interpretation given in the Webster Dictionary for synonyms, it is possible to conclude that only their functional essence is explained, and the differences of synonymic components in the content play a very important role. However, they can not always be used in context. It concludes that the use of synonyms depends on a particular context and is classified by proportionality. That is, they are meant to be a part of their substitution.

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THE IMAGE OF THE TIME AND SPACE IN THE STORY "AN ENCOUNTER" OF JOYCE'S COLLECTION "DUBLINERS"

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Аннотация

Мақолада Жеймс Жойснинг "Дублинликлар" тўпламидан ўрин олган "Учрашув" хикояси матни поэтикаси хусусида сўз боради. Хикоядаги макон ва замон хронотопи очиб берилади.

Калит сўзлар: макон ва замон, поэтика, персонаж, экспозиция, характер, интеллектуал, психологик мураккаблик.

Аннотация. Статья посвящена поэтике рассказа "Встреча" из сборника "Дублинцы" Джеймса Джойса. Художественное пространство и время (хронотоп) рассказа раскрываются в статье.

Ключевые слова: пространство и время, поэтика, персонаж, экспозиция, характер, интеллектуальной, психологическая сложность.

Annotation. The article deals with the poetics of the text of the story "An Encounter" of James Joyce in short story collection "Dubliners". The Chronotope of space and time of the story will be revealed in the article.

Key words: space and time, poetics, personality, exposition, character, intellectual, psychological complexity.

Introduction. “An Encounter” is one of the stories in James Joyce’s *Dubliners*, the 1914 collection of short stories which is now regarded as one of the landmark texts of modernist literature. “An Encounter” is not one of the best-known stories in the collection, but like many of the short stories that make up *Dubliners* the story shows Joyce addressing taboo issues, as well as the boredom and disappointment of everyday life, with consummate stylistic skill and attention to detail.

Literature review. “An Encounter”, in summary, is narrated by a man who is recalling an episode from his childhood, and specifically his schooldays in Dublin. The boy recounts how one of his school friends, Leo Dillon, introduced him and a number of other boys to the adventure and excitement of the Wild West, and how they would play cowboys and Indians together. However, the narrator yearned for real adventure, and, realizing that you have to go out and find it (rather than sitting at home and waiting for adventure to come to you), he and a couple of school friends, Leo Dillon and a boy named Mahony, decide to play truant for a day (‘miching’, as they call it), pretending to be ill and sacking off school. Leo Dillon (or ‘Fatty’, as Mahony unflatteringly refers to him) gets cold feet and bails on them, but Mahony and the narrator are quite pleased about that: each of the three of them had stumped up sixpence to pay for food and other provisions for their day off, and now they have a shilling and sixpence to spend between two of them rather than between three.

The two boys spend the morning wandering around Dublin, and cross the river Liffey on the ferry. They buy some biscuits and chocolate to eat, and some raspberry lemonade to drink. Mahony, armed with his catapult which he wants to use to attack birds, chases a cat down an alley. They then wander into a field where they meet a suspicious old man who strikes up a conversation with them. The boys are at first bored by the old man’s small talk. He asks them if they read books and tells them he

has all of the books by Sir Walter Scott and Sir Edward Bulwer-Lytton at home. The narrator pretends to have read them, which impresses the man. The man says that Mahony seems to be more into games than books.

He then asks them if they have any sweethearts, and Mahony replies that he has three girls, while the narrator says he has none.

The old man then starts talking about young girls at great length, before getting up and going to do something nearby (probably, although it is never stated, pleasuring himself), much to the boys' shock. The narrator and Mahony resolve to give false names, Murphy and Smith, if the man asks for their names. When the man returns to the boys, he talks of how wayward boys should be disciplined by being whipped, while Mahony goes chasing after the cat again and the narrator is left talking to the man. Going back on his earlier liberal sentiments, the man says that if any boy ever expresses any interest in girls, he should be whipped for it. Unsettled by this talk, the narrator gets up and leaves the man, calling out for Mahony (as the false name 'Murphy') to come after him. The narrator confides that he was relieved to get away from the man with Mahony safely in tow, even though he had always despised Mahony a little.

Research Methodology. Joyce's title, "An Encounter", obviously refers to the conversation the two boys have with the older man towards the end of the story. But what kind of an encounter is it? It's difficult to analyze or pin down, because, in true modernist fashion, Joyce offers us only hints and insinuations, gaps and silences, rather than explicit description of what goes on. Partly, as in "The Sisters", this is because the narrator was a young boy at the time of the events described, and didn't have an adult's knowledge of the real world.

The story "An Encounter" has direct link with "The Sisters", which both belong to story collection "Dubliners", in which the personage of the same storyteller is the leader, both his position in relation to the text and the reader, and the place of the

events there were the same. However, the storyteller is now a teenager, who got older.

In the story "The Sisters", as in the story "An Encounter", peculiar exposition in the structure of time seems to be exaggerated: the sentence is about the criteria by which the time is accustomed to spend, the established norm; the sight of the universe is squandered, and the hero-storyteller tries to pass through.

Initially, two layers of time in the story are put opposite: in the morning and in the evening. In the morning, the time is spent at school, subordinated to social order, in the evening it is the time of the game of Indians, the free time of adolescents. In essence, this confrontation scaled in relation to: the world of the child's dreams and real life will meet.

The first appeared thanks to books about traditional, self-willed and brave beauties' society, adventure about the Wild West, which gives permission to "move away from the existing life by giving vent to desire."¹⁸ The plot of the story is based on the desire to see in reality, to try to bask in the game, to face real life and try to experience true adventures.

The expansion of the space of the story space is based on this desire. The established order of the time spending forcibly loaded from the outside puts pressure on the story. He tries to break the rhythm of life in a mold and jump over these boundaries (Spatial Barriers) and find a way to freedom: "The evening war games became very boring to me, as if it were the morning hours at school: in the depths of my soul, I really dreamed of adventures. However, I thought that the adventure will not happen with the people who sit at home: the adventure must be sought in the distant from the homeland" [1, 17]. Joyce shows in a cynical way that this plan really leads to the fact that the personage missed one day from school, with a trip to the nearest sightseeing, Pidgin-House.

The main facets of the structure of space-time of the story shape the structure of adventurous narratives; a simple, habitual escape from life is carried out according to the scheme: first comes the space of house- the world of dreams, based on the births from books, stories and the older ones, the healthy – minded people, slandered adventures by the followers of social norms, then comes the path, the description of adventure " distant from the homeland ", and the adventure on the way itself.

The time of events in this story – the eve of summer holiday, spring, waiting time, as always, the rhythm of the season is important for Joyce.

Instead of the rhythm of social life ("the monotony of school life"), the heroes (for one day) go under the rhythm judgment of nature. The storyteller-the hero does not forget to take into account the natural daily changes, he and his friends feel a strong physical dependence on the movement of the sun in the sky.

Analysis and results. Joyce points out that with a sad irony their established order could not be released anyway until the end: "We had to return home until the four, otherwise they would find out that we were escaping"[1,20]. He detailed the development of the feelings of the personages: "It was a gentle sunny morning dawn of the first week of June. \...\ All branches of high trees along the canal are tilted to cheerful light green leaves. The granite of the bridge was slowly heated, and I, with my hands, in a way suitable for the rhythm that gave the jar in my head, I slapped it. My mood was great " [1,18]; "When we reached the river, it was the same lunch break: the workers were having breakfast and we were both...\ we sat on the iron pipes on the river to have a snack. \...\ School and home seemed to have stayed far away from us, and we felt ourselves totally free" [1,19-20]; "The air became stuffy, the sweet ashes with mold in the window of shopkeepers' stores were burned in the sun. \...\ We both get tired hard..."[1,20]; "it was too late and we were not in a situation where we thought we would go to Pidgin-House, we were very tired. \...\



The Sun went ahead of the clouds making us sad and thinking, and left alone with our blessed breakfast,” [1,20].

The story is built on the basis of the real essence of events and the conflicting laying of their reflections. The adventure happens when heroes are overwhelmed, within the minute they give up the goal they envisioned on their journey, and at the time “the sun is falling behind the clouds...”. Although this event draws attention to the word “all of a sudden”, which immediately begins to change from the box of events, but this unexpected change does not happen: meeting with an unfamiliar person is not underwent by a friend of the storyteller, he experiences only himself, neither time nor space does not turn into a “conspiratorial adventure”.

The place of the meeting is the field, “cursive slope, the river Dodder is seen hardly behind its humps [1,20], uninhabited open space. The heroes were brought to this place by a cat, one of them was running from behind the cat. The cat is not an accidental personage for Joyce: this is a creature that is a worthy guide to the hateful, risky space, a mysterious creature, an animal that does not belong to this world.

Thus, in the open field, heroes who are overwhelmed and whose spirits are drowning come across someone unfamiliar. “He would have walked slowly. His one hand is in his shink, in his second hand, there is a rod and he would beat the ground slowly with a rod. He was wearing greenish black suit, and on his head there is a high hat, when we call the night canvas. He seemed to me as he became older, because he had a white middle on his mustache” [1, 20-21]. An unfamiliar person who is stressed by the storyteller is said to have been reduced to even in details of his clothing, undoubtedly realistic, household plan. However, in the European (German) Romantic tradition, Satan is distinguished by such details. That's exactly what he says from the famous story of Adelbert Chamisso. The fact is that this man, whose heroes met during the whole story, was called “unfamiliar”, also serves in favor of this comparison. The “teeth of the Unfamiliar “are sparse yellow”, “eyes are green like

glass”, in the words of which there is already an "abstract mystery". The scale of those dreams that actually gave birth to the reader, referring to the path of the heroes, apparently seems to be related to this stranger: "He said that in his house there were all the works of Lord Litton and that reading them over and over again will never make him be fed up" [1,21], he also talks about books, including books that "boys cannot read" [1,21]. The green eyes like glass of an unfamiliar person underscore his aquatic romance in the context of the story, the tendency to the distant travelling. It seems as if he was born to play the role of a seductive devil.

However, this role is not performed by the stranger: he does not mislead anyone, and his speech is too abstract, his personal monologue satisfies only himself: I had such an impression that he repeated the rumors that he allegedly memorized, or a magnetized mind with his own words slowly circled around the orbit already motionless [1, 22]. "His mind revolves around a new center, as if his words were magnetized" [1, 23]. In front of the storyteller- hero, a mentally unhealthy person appears in place of a seductive devil. Instead of joining the world of adventures, interesting events, trials, he becomes a witness to the mind that has become nauseated, stuck in his shell, and gets acquainted with the sphere of mental illness.

The friends of the storyteller Leo Dillon and Mahony with an unfamiliar person in the story are compared. In search of adventure, they were all three (a lucky number in fairy tales) should come out together, but they turned out to be two people, and as a result of this disappointment, bad luck is inevitable.

The "frightened escaped" boy was given a beautiful name as Leo, and he was relative with Joe Dillon, who introduced that same, group of children to the Wild West, and the battle in the yard ended with his victorious dance. This heroic wreath of honor around the personage, highlighted in the narrative exposition, and the sharp difference between his cowardice, described in the story itself, arose from the inconsistency of children with the real life world of freedom and the game world of

the children. (Joe Dillon, brother of Leo decides to become a priest and tries to experience a real adventure. At the moment he "...addicted to the game by excessive hysteria" [1, 16].

Mahony, who is presented in the games, on the tramp with slingshot, does not like intellectual interests, is the representative of "ordinary people". The character who is fearing the world of mental illness, asks him for help: "I once again had to scream, and only the Mahony noticed me and responded to my call and answer. My heart beat so resounding when he ran through the field to the side I was standing! I was a bit ashamed, because I hated him somehow in the depth of my heart [1, 24]. In this respect, the psychological complexity that is typical for the style of Joyce, is revealed: salvation comes from the help of the expected one that he does not respect.

Conclusion. The image in the structure of the personality, acting in the story, Mahony is a rough, physically present, an image of an incompetent person to show some kind of spiritual influence. For this reason, even a meeting with an unfamiliar person for Mahony becomes inconclusive: he escapes from the stranger running behind the cat. [1, 33]; the necessity for physical activity is stronger for him than enthusiasm. In general, Leo Dillon avoids being faced with a mentally ill patient, he is fearful and he is addicted to a game of children and the world of Dreams, which does not turn into a real reality. among three personages, only the storyteller acts with the spiritual need for "real adventures" to move forward and for this reason the real world of mental illness is manifested in him.

Thus, in the story "An Encounter", the next stage of biological growth of the hero of the book, his adolescence is shown. It is represented the structure of risky adventurous story and trying to get out of the boundaries of social norms (peculiar to school and children's game). This movement leads to the discovery of a broken world of mental illness, which is wrapped in its own shell.



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DISTINGUISHING FEATURES OF SOURCES OF BORROWINGS IN ENGLISH AND UZBEK LANGUAGES

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Annotatsiya: Ushbu maqola ikkita farqli tillar bo'lmish, ingliz va o'zbek tillaridagi o'zlashma so'zlarning manbalari haqida. Shuni ta'kidlash joizki, Ingliz tili o'zlashma so'zlarining manbalari beshta tarixiy davrga tayanadi. Ingliz tilining o'zlashma so'zlarining manbalari lotin, fransuz hamda qadimgi Skandinaviya tillaridir, o'zbek tiliga o'zlashgan so'zlarning manbalari esa asosan arab, fors hamda rus tilidir.

Kalit so'zlar: o'zlashgan so'zlar, o'zlashma so'zlar, ingliz tili, o'zbek tili, lug'at zahirasi, manbaa til, qabul qiluvchi til.

Аннотация: В этой статье рассматриваются различные источники заимствований на двух разных языках, в частности на английском и узбекском. Следует отметить, что заимствования английских слов основаны на пяти разных исторических периодах. Исходные языки для заимствований на



английском языке в основном латинские, французские и древнескандинавские, тогда как источником заимствований на узбекском языке являются в основном арабский, персидский и русский языки.

Ключевые слова: заимствования, заимствования, английский язык, узбекский язык, словарный запас, исходный язык, язык получателя.

Annotation: This article deals with different sources of borrowings in two diverse languages, English and Uzbek in particular. It is necessary to note that borrowings of English words are based on 5 different historical periods. The source languages for English borrowings are mainly Latin, French and Old Norse, whereas the origins of Uzbek language borrowings are mainly Arabic, Persian and Russian languages.

Key words: borrowing, loanwords, English language, Uzbek language, word stock, source language, recipient language.

Introduction. The word stock of the particular language is of great importance of deep investigations. As the vocabulary is the basic aspect of each language, it is quite significant to analyze its features among linguistics.

It should also be mentioned that comparative analysis always are held between languages and within one language. For this reason, the theme of loan words, and their special characteristics in Uzbek and English languages are studied deeply. It must be referred that quite inadequate researches have been done on this topic, and it would be interesting and advantageous for the representatives of modern trends of linguistics as those two compared languages have totally different system and structure.

Enriching vocabulary is one of the most crucial aspects of linguistics and lexicology, in particular. On this occasion, enhancing the word stock of the target language with the help of loan words is considered to be one of productive ways of forming new words. It should also be inferred that the actuality of the research is

determined by growing interest of linguists in the investigation of the origin of the words of the particular language and the foundation of borrowings.

Literature review. Initially, it is expedient to mention that borrowings and loan words are quite identical terms denoting to the words taken into one language from another one. There are different scholars, who provide various definitions to these terms.

In this respect, it is expedient to refer to the fact that O. Jespersen emphasized borrowed word as the milestones of philological sphere. The reason is due to the fact that borrowed words provide the linguists with approximately dates of linguistic modifications. According to him, by means of borrowed words, the information and assumptions about the civilization of the nations became evident. As one of well-known linguists, Shuchard emphasized that no language is entirely pure, it is clear that nearly all languages have the word stock enriched by borrowed words. There is the evidence of the fact that borrowed words are penetrated as a result of primary two factors, such as linguistic and extra-linguistic.

According the viewpoint of Haugen (1950), borrowed word is a term that refers to the process of adapting the word from the donor language, into the recipient one. Here, the donor language is the language which the word originally come from, whereas, the recipient language is the one which adapts the particular word. It is necessary to state that borrowings can be resulted primarily due to the contacts among different nations, cultures and languages.

The scientist, Haugen also pointed out that borrowed words from one language to another is related to the mastery if bilingualism at two languages. In this respect, he provided definition that "...borrowing is the attempted reproduction in one language of patterns previously found in another"¹⁹. From the perspective of Haugen, it can be

¹⁹ Haugen, E. The Analysis of Linguistic Borrowing,. 1950. p: 212

known that due to the borrowings, three major results appeared such as loanwords, loan blends and loan shifts.

As can be seen, loan words appeared as the result of borrowings. It is also necessary to state the fact that loan words are classified on the degree of being adapted by recipient language. The classification, in its place is as follows: unadapted loanwords, quotation loanwords and compounds, partially adapted loanwords, fully adapted loanwords, loanwords taken over in plural form and abbreviation.

As etymology of the languages is quite fascinating topic, the borrowed words are of great interest of investigation. In this place, it must be noted that sources of borrowings of English and Uzbek languages are characterized by different languages. Borrowings of the compared languages are differently approached.

As for the borrowings of the English language, the sources are studied separately in accordance with different periods. The following periods are particularly distinguished by scholars on the basis of the sources of borrowings in English language:

- I. Germanic period
- II. Old English period (600-1100 y.y.)
- III. Middle English period (1100-1500 y.y.)
- IV. Early Modern English period (1500-1650 y.y.)
- V. Modern English (1650-present)

On the contrary, Uzbek language native words consist in Turkic language family, which is based on the language family of Turkic. It should be stresses that Uzbek language extended on the basis of Persian, Arabic and Russian languages later. In 500-300 BC, the Persian language developed in the territory of Uzbekistan as a result of getting in touch with the population of Iran. For this reason, the poetry and prosaic works were written in Persian language till XV century. As for Arabic language, its spread began in the VII century after the conquest of Central Asia. Therefore, Arabic

language became predominant especially among scientists and scholars. It must also be stated that Alisher Navoi, contributed greatly to the development of Turkic language through writing the poetry in this language. Starting from XVIII century, Russia began invading the territory of Central Asia and as a result, Russian language started influencing to all aspects of life in Central Asia and language, in particular.

Research methodology . The research provided in the article is based on the analysis of English and Uzbek languages and their word stocks. The researcher compared the various spheres of interest such as scientific works, articles, dissertations, and others.

In this investigation, the methods of descriptive and analytical analyses are used to examine the linguistic literature associated with the problems, which are great importance of discussion. Additionally, comparative analysis was also done on the basis of the vocabulary of two different system languages, in particular English and Uzbek languages.

Analysis and Results. Words of another origin, in terms of English language, are based on five historical stages as we mentioned above. It should be said that all periods are distinguished by adapting words from other languages such as Old Germanic, Latin, Celtic, Scandinavian, French, Greek, Arabic and other languages. As the period of modern English is highly influenced by many languages, this stage should be studied separately. In this respect, it is better to unite other four remaining periods in one table. Let us see them in this table

Periods			
Germanic period	Old English period	Middle English period	Early Modern English period
Languages influencing borrowings in English language			



Latin and Old Germanic languages: ancor-"anchor" butere-"butter" cycene-"kitchen" disc-"dish" piper-"pepper" straet-"street" weall-"wall" win-"wine"	Latin: casere-"caeser, emperor" ceaster-"city" cest-"chest" circul-"circle" maegester-"master" paper-"paper"	Scandinavian: anger, blight, clumsy gear, scorch, skin, skirt, sky, sly, they them	Latin: agile, abdomen, anatomy, compensate, gradual, meditate, orbit, peninsula, physician
	Celtic: brocc-"badger" cumb-"combe, valley"	French: <i>words related to law and government:</i> attorney, court, crime, judge, parliament; <i>church:</i> abbot, chaplain, saint, priest, religion; <i>military:</i> army, captain, enemy, marine, volunteer <i>culture:</i> art, bracelet, satin, fashion, fur	Greek: anonymous, atmosphere, climax, data, history, parasite, skeleton, tonic, tragedy
			Arabic: algebra, algorithm, almanac, alchemy, admiral, amber, cipher, saffron, sugar, zero, coffee

		and others.	and others.
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According to the graph above, it is evident to say that Latin was predominant language among others in the perspective of borrowing words from other sources. The reason is that majority of manuscripts written in Latin were preserved through the ages. Next, while the renaissance spread throughout England, many words were borrowed from Greek and Latin languages.

Huge changes happened during the period of Modern English. During this period, the world was evident for major colonial expansion, technological and industrial and American immigration throughout several centuries. Here, as a result of such occurrences, myriad words from European languages and from other parts of the world entered to the word stock of English language. The languages such as French (*ballet, saloon, infantry, garage, jeans*), Spanish (*armada, alligator, guitar, mosquito, tornado*), Italian (*balcony, casino, piano, opera, cappuccino*), Dutch (*cruise, landscape, cookie, waffle*), German (*kindergarten, wunderkind, U-boat*), Scandinavian (*ombudsman, ski, slalom*), Russian (*borscht, tsar, vodka*); Sanskrit (*yoga, avatar*), Hindi (*bungalow, jungle, shampoo*), Persian (*check, chess*), Arabic (*emir, harem, mosque, bazaar*), African languages (*banana, gorilla, jazz, zebra*), Chinese (*ketchup, tea*), Japanese (*judo, karaoke, sushi, tsunami*), Australia (*boomerang, kangaroo*) became the source languages for the borrowed words of the English language as a recipient one. As can be seen, English language has been influenced by many other languages and enriched its vocabulary by means of borrowed words.

Let us turn to the examples of borrowings in Uzbek language. As it is mentioned above, main examples of borrowings in Uzbek language are taken from Arabian, Persian and Russian languages. The examples are as follows:

Borrowings of Uzbek language		
Arabian	Persian	Russian
adib, aholi, ahvol, bino, darak, fan, firqa, harakat, hikmat, jiddiy, kamol, kamtar, kimyo, lug'at, mador, maktab, muallim, odam, oila, qalam, qoida, rais, sahna, talaba, tanqid, vaqt, xalq, xalifa, yaqin, zafar, shayx.	bahor, barg, bulbul, dasta, dehqon, devor, dono, farzand, gardun, gul, go'sht, hamma, istara, jang, kaptar, karaxt, murg'ak, nihol, olov, olcha, parcha, qonxo'r, ro'za, sust, taxt, xalta, g'isht, shakar, shirin, chiroq, chorva, chorpoya	kino, konfet, lenta, limon, parovoz, parta, patnis, poyezd, ruchka, soldat, stol, stul, tomat, tufli, shkaf.

According to the table above, the influence of Arabian, Persian and Russian languages is huge and enormous. As a result of historical invasion and settlement, myriad words were acquired to Uzbek language.

Conclusion

According to the comparison of the sources of borrowings, it can be drawn a conclusion that Uzbek and English, as different system languages, have totally distinctive features in terms of borrowed words. It must be stated that English language has the word stock which has majority of words that are borrowed. On the contrary, Uzbek language has the words originated from Arabian, Persian and Russian languages. Then, borrowed words of English language are studied by the division of five periods, but the ones of Uzbek language are not studied deeply. As this theme has not been studied well and thoroughly, many aspects should be revealed further.



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UNIVERSAL NAMES AND AFFIXOIDS WITH GENDER FEATURES IN KHOREZM EPOSES

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Abstract: This article clarified the specific features of the Khorezm eposes and proper nouns with peculiarities. This article highlighted the research results collected from more than fifty of Khorezm eposes. The author analysed the content and substitutional meaning of the constituent parts of the proper nouns, especially names of the people. Moreover, this article gave a wide range of information on the ethimology, usage, lexic, morphologic and syntactic peculiarities of the Khorezm eposes' language. Furthermore, the author analyzed the different names with gender features, the elements that expresses the people's gender by means of giving examples from the masterpieces of the Khorezm eposes, especially in dastans.

Key words: dastans, onomastics, gender features, affixoids, exaggeration.

Аннотация: В данной статье выяснены особенности хорезмских эпосов и имен собственных с особенностями. В этой статье освещены результаты исследований, собранные более чем из пятидесяти хорезмских эпосов. Автор проанализировал содержание и замещающее значение составных частей имен собственных, особенно имен людей. Кроме того, эта статья дала широкий

спектр информации об этиологии, использовании, лексике, морфологии и синтаксических особенностях языка хорезмских эпосов. Кроме того, автор проанализировал различные имена с гендерными особенностями, элементами, которые выражают пол людей, посредством примеров из шедевров хорезмских эпосов, особенно на дастанах.

Ключевые слова: дастаны, ономастика, гендерные особенности, аффиксоиды, перенапряжение.

Annotatsiya: Ushbu maqola Xorazm eposining o'ziga xos xususiyatlarini va o'ziga xos nomlarni o'ziga xos xususiyatlari bilan izohlaydi. Ushbu maqolada ellikdan ortiq Xorazm eposidan to'plangan tadqiqot natijalari aks etgan. Yozuvchi nomlarning tarkibiy qismlari, ayniqsa, odamlarning nomlari mazmunini va o'rnini baholashni tahlil qildi. Bundan tashqari, ushbu maqola Xorazm eposi tilining etiologiyasi, ishlatilishi, so'z boyligi, morfologiyasi va sintaktik xususiyatlari haqida keng ma'lumot olish imkonini berdi. Bundan tashqari, muallif turli xil nomlarni gender xususiyatlariga, odamlarning jinsini ifodalaydigan unsurlarga, Xorazm eposlarining asarlari misollari, ayniqsa, dostonlar ustida tahlil qiladi.

Kalit so'zlar: dostonlar, onomastikalar, jinsiy xususiyatlar, afsonaviylar, haddan tashqari bo'rttirish

INTRODUCTION: In the lexicon of Khorezm eposes, there are such anthroponyms that gender features appear in the universal form of such names, or we can met unnaturality from the point of view of sex. This situation is well-known in modern Uzbek anthroponyms. Some of the names of our language profiles are incompatible with current onomastic concepts. Examples of such names are:

1. **Kamalzhon** (name of female, dastan "Sayod and Hamra" on page 50);
2. **Kukgul** (name of male, dastan "Edigo", on page 198);
3. **Lola** (name of male, dastan "Asyl and Karam", on pages 259- 260);
4. **Oypora** (name of male, dastan "Ashik Garib and Hilola pari" on page 43);
5. **Oyhan** (name of male, dastan "Yusuf and Ahmad", on page 16);

6. **Agha Yunus** (name of female, dastan “Yunus pari”, on page 58);
7. **Tawka (King)** (name of male, dastan “Edigo” on page 204).
8. **Sanobar** (name of male, dastan “Gul and Sanobar”, on page 231) and others. Here we analyze some of the names used in the text of the Khorezm epos.

Masalan: “*Ammo Karamjonning bir hamrohi bor erdi, ul hamrohining oti **Lola** erdi. Anga aydi: san el oyog’i tingandan so’ng Asilxonning bo’gina borg’il*”.

The epos “Asyl and Karam”, included in the second book of “Oshiknoma” collections, contains the anthroponym of Lola (Tulip-the girl’s name). No one doubts that this name is certainly given for females in the category of gender-specific names in modern Uzbek anthroponyms and Khorezm regional anthroponyms. However, in the text of the above-mentioned poem, we can see that the name is used to call a man. For example:

...*Ammo Karamjonning bir hamrohi bor erdi, ul hamrohining oti **Lola** erdi. Anga aydi: san el oyog’i tingandan so’ng Asilxonning bo’gina borg’il*...

(But Karamjon had one companion, his name was Lola (tulip), He said to him: after people finish the working day, go to Asylkhan’s garden)

(See the poem “Asyl and Karam” on page 259);

or:

...*Kel o’zingni **Lolajonga** yor ayla,*

Kel, man olay sani Karam olmiydi...

(Let yourself be my beloved, Let me marry you, anyway Karam does not marry you)

(See the poem “Asyl and Karam” on page 260);

From the given fragments this will be clear that, Karamjon sends his fellow Lola in order to examine the love of Asyl by giving different questions.

The name **Sanobar** (the name of the flower) in the dastan “Gul and Sanobar”, which is included in the third book of "Oshiknoma" collection, can also be surprised

by today's ethnic Uzbek people in the way that it is used to determine a man's name. Let's look at the following passage:

*...Ammo roviyoni axbor va noqiloni osor va muhaddisoni dostoni bo'ston andog' rivoyat qilibdurlarkim, Chin shahrinda Xurshidshoh otlig' podsho bor erdi. Oning **Sanobar** otli bir o'g'li bor erdi...*

(Historians tell a story that in China there was one king named Khurshidshah. He had a son named Sanobar)

This unusual tradition can be seen in most of the above-mentioned names. For example: even though the name **Kamoljon** is seen as a male name and the names **Oypora** and **Ayhan** are determined as female names in Uzbek anthroponyms, it should be considered that they were used vice-verse in our national dastan's lexicon.

The name **Tavkais** also gender-oriented, first of all, as a woman's name. Because the name of the pretsedent of the famous epic "Alpomish" is all in our minds. However, in the language of Khorezm epics, we find that this name is used as a man's name.

We have already pointed out that the affixoid units employed in the names of dastans' lexion also have specific gender characteristics. Below we will try to analyze the unusual positions of these units.

Aga (Og'a-Brother). In the Khorezmian dialects and today's Khorezm anthroponymics, the element 'aga' is one of the common names of men. However, we can see this name was used as a female name in "Gurugli" eposes-**Aga Yunus Pary.**

Gul (Flower). This component is very active in forming proper nouns, and it is found in many names of epic dastans: **Gulasal** ("Yusuf and Ahmad"), **Gulrukh**, **Gulrukhipari**, **Gulrukhsor** ("Avaz uylangan"), **Gulandom** ("Gurugli"), **Gulshirin** ("Arab tangan"), **Gulikhiromon**, **Gulshan** ("Khirmondali"), **Guljon**, **Gulqiz**, **Gulnoz**

(“Gulqizoy”), **Guljamila**, **Gulsarvi** (“Edigo”), **Gulchehra** (“Oshiq Alband”), **Gulchaman** (“Oshiq Najab”), **Gulsutun** (“Shahriyor”) and others.

The element “gul”, which applies to nearly all the languages of the Central Asian peoples, can also be a part of the name and a root of the name: **Donogul** (“Donogul”), **Kukgul** (“Edigo”), **Lolagul** (“Gul and Sanobar”), **Novgul** (“Sayod and Hamro”), **Oygul** (“Avaz”), **Oqchagul** (“Yunus and Misqol”), **Olmagul** (“Zulfizar”), **Sarvigul** (“Khandon botir”), **Tutigul** (“Gurugli”) and others. There is a view that this affixoid can only be included in the name of women today. However, in the epos “Edigo”, which is part of the “Oshiknoma” collections, we can see that **Kukgul** is used as a man's name:

*...Ammo, **Ko'kgul** degan bola tamomi o'g'lonlarning ushoqlarini utdi...*

(But the boy named Kukgul win all the other boys' small coins)

Looking at the anthroponyms of Khorezmian dialects, we can meet the facts that nowadays **Gulmon**, **Gulimmat**, **Gulmir** are used as well as the names of men. So this element was also involved in making male names.

It is wrong to say that the element “gul” is only used to mean “flower, odour, beautiful”. Actually, in spite of the fact that the lexema “gul” was originated from Persian languages, it is considered as one of the most actively used common nouns among Uzbek language and a number of its dialects. Principally, while giving a name to the newly born baby, this morpheme is used to indicate its future beauty, charm, attractiveness, pulchritude, elegance, prettiness, allure and other features regarding mostly women's characteristics. As comparison:

Gulandom – odour of the flower, the scent of the blossom;

Guloro – decorated with blossoms;

Gulasal – The honey of the flower, sweet and tasty like honey, beautiful like flowers;

Guljamol – beautiful face, perfect girl;



Guljahon – the blossom of the world, the only beauty on the earth;

Gulniso – the prettiest of all the women;

Gulnor – the flower of the pomegranate;

Gulnoz – capricious, flirtatious flower and others.

The component “gul” is sometimes used together with Arabian units and sometimes can be applied with other words belonging to Persian and Turkish languages. For example, Persian + Arabian stemmed names: **Guljamol**, **Gulhadicha**, **Gulasal**, **Guliasror** and others; Persian+Persian stemmed names: **Gulandom**, **Gulanor**, **Guljahon**, **Gulchehra**, **Gulshirin** and others; Uzbek + Persian stemmed names: **Aqchagul**, **Guloyim**, **Oygul** and others.

At some points the lexema “gul” can be used without losing its connective bound - “i” in Persian stemmed names, for instance: **Gulisurx**, **Guliasror**, **Gulixiromon** and others.

We can see that the morpheme “gul” can be situated in different places of the words in our given examples. In some parts it is used before the main name and in other parts it is applied after the main name. However, the function of the lexema “gul” used in both ways is not the same. When it is used after the main name, the component’s function and meaning will be close to the affixoids and it nearly loses its lexical meaning. For instance: **Donogul**, **Oygul**, **Olmagul**, **Oqchagul**, **To’tigul** and others. On the other hand, it is not difficult to perceive that, when it is used before the main name, this word does not lose its lexical meaning. For example: **Guljamol**, **Gulxadicha**, **Gulasal**, **Guliasror**, **Gulisurx**, **Gulixiromon** and others.

Oy (Moon). This element is also one of the most active onomastic affixoids, which has been involved in the creation of names: **Oysulton** (“Bozirgon”), **Oypora** (“Oshiq G‘arib and Shohsanam”), **Oygulqiz** (“Gulqizoy”), **Oygul** (“Avaz”), **Oykhon** (“Yusuf and Ahmad”), **Oysanam**, **Oyjamol** (“Oshiq Garib and Shohsanam”) and



others. This item will also be used at the end of the names: ***Boloyim, Gulqizoy, Gulnozoy, Guloyim, Donoguloy*** and others.

The element “oy” in the content of these names were used not to describe the moon, but to express respect and loving. The affixoid *oy* is used in the form of a *oyim* (with the –im, which is the suffix of genitive case in Uzbek) and means ownership, expression of exaggeration in the sense of closeness, mastery.

The word *oy* is primarily a term used to refer to the name of women, however, its logical meaning is moon, sky and earth's natural satellite. However, in some cases it is added to the male names, meaning of "happiness, happy". For example, **Oybek** and **Oytemir**. This affixoid is also actively used in other Turkic languages.

All in all, the component “gul” and “oy” are considered to be one of the actively used onomastic units in the lexics of dastans, Uzbek dialects and Uzbek literary language, principally as a component of names. By investigating this unit more deeply, the new colourful meanings can become obvious. Summing up the above, it can be said that the study of the gender aspects of the names of the Khorezm epos can provide a better understanding of the contemporary Uzbek anthroponyms.

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MODERN PROBLEMS OF PEDOGOGY AND PHYHOLOGY

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CONTINUOUS FORMATION OF MEDIA COMPETENCE OF TEACHERS IN CONSTANT CHANGES IN INFORMATION AND EDUCATIONAL ENVIRONMENT

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Annotation:It must be noted that education, including media education of teacher in the modern world ceases to be the stage at the beginning of independent life, and becomes a continuous process accompanying the person throughout life. This means that the formation of media competence teachers you need to consider like the current task of continuing education. Specific condition for the formation of media competence of the teacher is the dynamic information and educational environment, the constant occurrence of certain changes that requires the teacher to

address new types of problems and therefore, inclusion in media competence new knowledge and skills.

Keywords: media competence, teacher, information, education, environment, continuous media education, media literacy.

Аннотация: Следует отметить, что образование, в том числе медиаобразование учителя в современном мире, перестает быть этапом в начале самостоятельной жизни и становится непрерывным процессом, сопровождающим человека на протяжении всей жизни. Это означает, что формирование медиа-компетенции учителей нужно рассматривать как актуальную задачу непрерывного образования. Специфическим условием формирования медиакомпетентности учителя является динамическая информационно-образовательная среда, постоянное возникновение определенных изменений, требующих от учителя решения новых видов проблем и, следовательно, включения в медиакомпетентность новых знаний и навыков.

Ключевые слова: медиакомпетентность, педагог, информация, образование, среда, непрерывное медиаобразование, медиаграмотность.

Annotatsiya: Zamonaviy dunyoda o'qituvchi media-o'qitishni o'z ichiga olgan ta'lim, mustaqil hayotning boshlanishida bir bosqich bo'lishni to'xtatib, inson hayotida davom etadigan uzluksiz jarayonga aylanadi. Bu shuni anglatadiki, o'qituvchilarning media malakasini shakllantirish ta'limni davom ettirishning dolzarb vazifasidir. O'qituvchining media malakasini shakllantirishning o'ziga xos sharti dinamik axborot-ta'lim muhiti, o'qituvchilardan yangi muammolarni hal qilishni talab qiladigan muayyan o'zgarishlarning paydo bo'lishi va shuning uchun ommaviy axborot vositalarida yangi bilim va malakalarni o'z ichiga oladi.

Kalit so'zlar: media vakolatlari, o'qituvchi, axborot, ta'lim, atrof-muhit, uzluksiz media ta'lim, media savodxonligi.

Introduction. In the modern social situation of high dynamism of the educational and information environment, reforming education, rapid changes in the teacher's competence requirements, the implementation of the concept of "lifelong education" is urgent, according to which the formation and development of media competence of a teacher should be viewed as a continuous process of media education in the context of solving continuous problems professional training. At the same time, it is necessary to ensure the continuity of various forms, levels and levels of education: vocational training (secondary vocational and higher education) - mentoring, methodological support for a novice teacher during vocational adaptation -the implementation of various forms of professional development of teachers - the organization of methodical work with teachers in school - self-education of teachers. [1,2]The specific condition for the formation of media competence of teachers is the dynamic information and educational environment, their constant changes. For a teacher, it is important to detect and identify such changes in a timely manner, to predict their impact on educational practice, taking into account the identified changes, to design their activities and personality, to master ways to solve new professional tasks, the knowledge, skills, abilities necessary for this. In this regard, it is necessary to include a new component in the structure of the media competence of the teacher - readiness for an adequate response to changes in the educational and information environment. The objectives of this article are: –identencing changes in the information and educational environment that have a significant impact on the activities of the teacher, the use of media in it; - justification for the inclusion of an additional element in the structure of media competence of the teacher - readiness for an adequate response to changes in the information and educational environment; - a description of the structure and content of such readiness, pedagogical conditions and tools for its formation in the context of the tasks of continuing education of the teacher.

Material and research methods. To solve the set tasks, the following methods were used: - analysis of the current informational and educational environment, changes occurring in them, their influence on the teacher's activities, interaction with students, use of media by the teacher; - designing the structure and content of the teacher's readiness to adequately respond to changes in the information and educational environment as part of its media competence; - simulation of the formation of such readiness in the system of continuous media education of the teacher. The implementation of the methods was carried out based on the following methodological foundations: - the theory of media education of the teacher and the formation of his media competence.[3,4]

Results and discussion. In today's information society, media education, the use of media in the educational process, the formation of a teacher's media competence are the subject of numerous foreign studies. The works reveal the essence of media education, media competence, pedagogical potential and conditions for the use of various media in the educational process (information technologies, the Internet, social networks, screen arts, reading, television, advertising, interactive games, computer animation, etc.), models and tools for the formation readiness of the teacher to use them. However, in existing studies there is practically no consideration of such a necessary component of media competence as the teacher's readiness to adequately respond to the constantly occurring changes in the educational and information environment, evaluate and predict such changes, improve their personal qualities, abilities, master new knowledge and skills in accordance with them. , ways to solve new professional problems using media. At the same time, in the educational and information environment, changes are constantly taking place related to the reform of education, the development of information technologies, and the expansion of types and sources of information. Thus, the analysis made it possible to identify the following key changes in the information environment that have a significant impact

on the components of a teacher's media competence: - an increase in the volume of transmitted data and models for their processing; - distribution of software that may be affected by a regular user; - development of human-machine interfaces, artificial intelligence technologies, semantic systems working with the meanings of natural languages, neural interfaces; - introduction of quantum and optical computers, etc.[5,6].

In response to changes in the information environment, the educational environment also changes: - innovative training tools are introduced using information technologies: online courses, simulators, simulators, online gaming worlds, etc .; - develop network forms of implementation of educational programs; - remotely used technologies, e-learning; - Robotics lessons are included in school programs; - in training, various forms of introducing students into productive states of consciousness are tested using information technologies (for example, the flow state, when a person is fully involved in the creative process and does not feel anxiety about possible success or failure); - the learning process adapts to the needs of a particular learner and his personal characteristics: the learner can choose the learning format and its pace, focus on a very narrow topic or, on the contrary, master an interdisciplinary program; - electronic educational environments are being created, incl. online platforms; - practice-oriented educational programs are increasing, the emphasis shifts from theoretical training to the inclusion of students in the development and implementation of real projects; - forms of mastering educational programs are being developed that allow combining training with labor activity ("dual training", training at the workplace). The question arises: how should these changes be reflected in the structure of the teacher's media competence? In accordance with the accepted understanding, media education is aimed at mastering the knowledge and skills that enable individuals: 1) to analyze, critically interpret and create media texts; 2) to determine the sources of media texts, their political, social,

commercial and / or cultural interests, their context; 3) to interpret media texts and values distributed by the media; 4) select the appropriate media to create and distribute their own media texts and find the audience interested in them; 5) to get the opportunity of free access to the media both for perception and for products. As we see, this definition does not include such a component as knowledge and skills that allow individuals to evaluate and predict changes in the media environment, the emergence of new media, use them in their own activities, design their activities and personality in accordance with such changes.[7].

The conceptual basis for building the model was the following ideas, which can also be viewed as conditions for the formation of a teacher's readiness to adequately respond to changes in the information and educational environment: 1. The teacher's professional development should take place in a rich media environment that encourages him to actively use media to solve professional and life tasks . Media technologies should be built into the process of continuing education and teacher self-education. [8]. Thus, in the period of university training and advanced training, this may be expressed in the use of IT tools for mastering professional competencies (computer testing, online simulators, computer simulators, computer games, etc.), creating online platforms with training courses, organizing role-playing and business skills. games using social networks, information and communication technologies, the use of e-learning, distance learning technologies, electronic library systems, databases, organization of topics eskih websites, Internet forums, conducting online surveys, using vuchebnom process for processing the results of research of modern software, including used in the industry, the organization of a point-rating system of evaluation by means of an electronic platform, etc. In the period of professional activity of a teacher at school, in a special organization, the teacher performs various professional functions by using media (maintaining various databases, including taking into account students' achievements, automated management of various



activities, filling in thematic plans, educational plans and other documentation on an electronic platform, electronic management students' journals and diaries, active use of interactive boards, media projectors, electronic presentations, educational software, computer games, the use of social networks for sharing information, organizing educational online forums, maintaining their own page on the school's website (the author's website), etc.). 2. Using media to solve pedagogical tasks will be more effective if the teacher masters new media, new ways to use them in solving professional and personal tasks together with students as subjects of informational and pedagogical interaction (here you can use the ideas of Waldorf pedagogy, where one teacher together with students "from scratch" studies all academic subjects). In this way, the role of the teacher changes from manager to co-activist. 3. Media sources should be for the teacher only a means to achieve the goals of education and training, but in no case the goal. Media is only a means of realizing the goals of a teacher, the effectiveness of their pedagogical use depends largely on the teacher's professional skills. 4. The main thing in building pedagogical interaction with the use of media and taking into account changes in the educational and information environment should be the teacher and students, and the media should remain a means of optimizing such interaction. The media should not be allowed to become an "idol" for a teacher or student. It is necessary to detect both the constructive, developmental and destructive influence of media on the development of the individual. 5. The teacher needs to take preventive, preventive measures to prevent the occurrence of students and dependent behavior in relation to the media (computer, Internet, gaming, television addiction, etc.). For this, it is necessary to use the means of complex prevention of social addictions. 6. The median should replace the live communication of the teacher with the pupil, but only enrich it. Priority should be given to live, not virtual communication subjects of the educational process. 7. The teacher should understand the essence and strategy



of the ongoing changes in the educational and information environment, interpret them from the standpoint of key spiritual and moral values and encourage students to make this understanding. In this case, the ability is formed not only to critically evaluate, but also to predict changes. 8. The teacher should be able to not only use, but also create media for solving the problems of training and education, i.e. possess the skills of computer programming, creating learning interfaces and programs. 9. The use of media should not come to the forefront as an informational, but rather a motivational function - to arouse in teachers an interest in social, professional and other personally significant issues. Accordingly, the teacher needs to master ways of motivating students to solve educational, social and other personally significant tasks using media. 10. The teacher needs to develop information and immunity in himself and students for the negative effects of the media environment on the spiritual and moral world of the individual. In the process of using media to solve pedagogical problems, it is important for the teacher to maintain his own creative individuality, individual style of professional thinking and activity, and pedagogical communication. Media should serve to enrich this style, its more optimal implementation, but should not level this style. Therefore, the teacher should not copy samples of the use of media by colleagues, as well as those presented in the methodological literature - it is necessary to adapt them to specific conditions and to the peculiarities of their own personality. 12. In the selection of media resources for their use in solving pedagogical tasks, the teacher must adhere to the principle of selecting means that correspond to a high cultural and intellectual level. 13. In the process of formation of the teacher's readiness for an adequate response to changes in the information and educational environment, it is necessary to ensure an optimal combination of individual, group and collective forms of work (individual counseling on overcoming barriers to the introduction of pedagogical innovations, tutor support for designing and implementing self-design programs for media competence, group

psychological pedagogical trainings, group design, collective workshops, webinars, eminary, round tables, etc.). 14. It is necessary to ensure the continuity of media education, the formation of the teacher's readiness to adequately respond to changes in the information and educational environment, continuity of content and means at various stages and levels of education and self-education.[9].

The theoretical model of the process of continuous formation of a teacher's readiness to adequately respond to changes in the information and educational environment reveals the goals, objectives, functions, stages, content, subjects, tools of this process through a system of goal-functional, structural-logical, informative, organizational and managerial, instrumental technological characteristics. The goal-functional characteristics of the model reveal: The general goal of the process being modeled is the formation and constant development of the teacher's readiness to adequately respond to changes in the information and educational environment as an integral component of its media competence. Objectives: - the formation of the teacher's ability to detect and predict changes in the educational and information environment; - development of skills to assess the impact of past and forecasted changes in the information and educational environment on teaching activities and pedagogical interaction; - preparing the teacher for the design of pedagogical reality, professional activity and his own personality, taking into account the past and forecasted changes in the educational and information environment; - development of the teacher's ability to adjust their own actions and personal qualities in order to adequately respond to changes in the information and educational environment. Functions of the process being modeled: - developmental - development of the personality of the teacher as a subject of innovation activity; - predictive - forecasting changes in the information environment and the educational system; - adaptive - adaptation of the teacher's activity to the changed conditions of the information and educational environment, adaptation of the teacher's personality to new professional functions

and tasks that have arisen in connection with the changes in the information and educational environment that have occurred; - optimizing - regulation of the teacher's actions in order to make optimal use of the media for solving pedagogical problems. The substantial characteristics of the model reveal the content of the process being modeled, including the detection of changes in the information and educational environment, their translation into pedagogical tasks, the analysis and solution of these problems, the analysis of the results obtained and the correction on this basis of their personality and pedagogical activity. Structural and logical characteristics of the model reveal the logic and stages of the simulated process. For their construction, a matrix was used that reveals the interrelationships of media competence invariants and the levels of formation of readiness for an adequate response to changes in the information and educational environment.[10].

Conclusions. Therefore, the following conclusions can be made that the teacher's readiness to adequately respond to changes in the information and educational environment must be shaped in the context of solving the problems of its continuous media education and continuous training, ensuring continuity of goals, content and means at its various levels: vocational training (secondary professional and higher education) - mentoring, methodical support for a novice teacher during the period of professional adaptation AI - Implementation of various forms of professional development of teachers - the organization of methodical work with teachers in school - self-education teacher.

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**FORMATION OF A PROFESSIONALLY ORIENTED FOREIGN
LANGUAGE COMMUNICATIVE COMPETENCE OF STUDENTS OF A
NON-LINGUISTIC UNIVERSITY**

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Annotation: The article considers the task of forming professional foreign language competence of non-linguistic specialties students as a part of their professional competence. The author describes system for using newly developed information and communication technologies in teaching foreign languages, such as wiki, blog, search engines, online translators, learning management system Moodle and others.

Key words: specialists, communication, media competence, teacher, information, education, environment, continuous media education, media literacy.

Аннотация: В статье рассматривается задача формирования профессиональной языковой компетенции у студентов неязыковых специальностей как часть их профессиональной компетентности. Автор описывает систему использования новейших информационных и коммуникационных технологий при обучении иностранным языкам, таких как вики, блог, поисковые системы, онлайн-переводчики, система управления обучением Moodle и другие.

Ключевые слова: специалисты, коммуникация, медиакompетентность, педагог, информация, образование, среда, непрерывное медиаобразование, медиаграмотность.



Annotatsiya: Maqolada lingvistik bo'lmagan mutaxassisliklar bo'yicha talabalar o'rtasida kasbiy yetukliklari doirasida professional tilshunoslikni shakllantirish vazifasi ko'rib chiqiladi. Muallif vikis, blog, qidiruv tizimlari, onlayn tarjimonlar, Moodle ta'lim boshqaruvi tizimi va boshqalar kabi xorijiy tillarni o'rgatishda eng so'nggi axborot va kommunikatsiya texnologiyalaridan foydalanish tizimini ta'riflaydi.

Kalit so'zlar: mutaxassislar, muloqot, ommaviy axborot vositalarining malakasi, o'qituvchi, axborot, ta'lim, atrof-muhit, uzluksiz media ta'lim, media savodxonligi.

Introduction. Learning problem of foreign language communication in educational institutions of various types is constantly in the center of attention of methodologists-theorists and teachers-practitioners. This question is relevant, as never before, since the requirements for graduates universities - specialists in various fields of professional activity are increasing.

The geopolitical processes that are currently intensively underway contribute to the intensification of the dialogue of cultures, the development of cooperation between Uzbekistan and various foreign countries: business relations of specialists of the widest profile become international. The problem of interaction and cooperation between countries and people speaking different languages and brought up in different cultures is particularly acute in the 21st century.

Foreign language communication is a part of the professional activities of a modern specialist who is needed to be able to build an oral presentation on the laws of rhetoric and ethics of communication, composition, correctly formulate the written text - report, article, essay, business correspondence, be able to competently formulate questions during presentations and press conferences, to be able to conduct a dialogue during interviews, etc. This knowledge and skills should become objects focused teaching students a foreign language as a professionally directed foreign language communicative activities. The result of this



activity is the formation professionally oriented foreign language communicative competence in the amount specified by the state educational standard and programs disciplines "Foreign Language (s)".

Material and research methods. The relationship between the younger generation and the professional community is defined through the concept of professional socialization, the possibilities of which, above all, has a university where a person joins the system of professional norms and values through activity, communication, and changes in self-consciousness [1]. Communication in the process of socialization plays a special, sometimes "preeminent» role [2]. On the one hand, in the process of socialization, the sphere of communication expands and deepens thanks to the emergence of professional contacts. On the other hand, verbal communication, even as an educational one, is itself the most important means of socialization (practical classes, extracurricular activities, etc.). The formation of a professionally oriented foreign language communicative competence of students with appropriate organization of the learning process in a foreign language can and should be used for the purpose of professional socialization trainees.

Thus, the problem of teaching students to professionally directed foreign language communication is currently relevant.

Results and discussion.

In the light of the above, the formation of a professionally oriented foreign language communicative competence of students, which is inherent to the specificity, is of particular importance. Despite the available scientific research on this problem, the expansion of educational services in this field and the increased interest in the methods of teaching foreign languages to students of these specialties, the problem of forming a professionally directed foreign language communicative competence of

students remains little studied. In this connection, a number of contradictions arise between:

- modern requirements of educational standards to the level of proficiency future foreign language specialists for special purposes (English for special purposes), programs defining the content of learning a foreign language in non-linguistic university, and insufficiently developed educational and methodical and didactic a base providing adequate training;
- the need of the media industry in graduates relevant universities that speak a foreign language as a means of professional communication, and the insufficient use of modern interactive technology teaching language and culture in non-linguistic universities;
- student interest in mastering practical skills of professionally oriented communication and traditional methods of teaching a foreign language in non-linguistic universities , poorly implementing the fundamental principle communication skills .[3]

By virtue of the above, dependence on the appropriate methodology of teaching, a future-oriented foreign language to future public relations specialists, journalists, becomes crucial. The choice of the research topic determined the urgency of the problem and the contradictions that arose.

The object of the research is the process of learning a foreign language as a means of professionally directed intercultural communication in a non-linguistic university.

The main goal of the research was the development of a methodology for the formation of a professionally directed foreign language communicative competence of students of a non-linguistic university.

In accordance with the goal, the following research tasks are defined:

- 1) to give a structural and informative characteristic of professionally directed foreign language communicative competence in the context of learning a foreign language in non-linguistic high school ;
- 2) to identify the social perceptual component of foreign language communicative competence and to reveal its specificity and significance for the professional activities of future public relations specialists and journalists;
- 3) to develop a methodology for the formation of a professionally directed foreign language communicative competence of students;
- 4) determine the role and place of the project method in the process of teaching professionally directed foreign language communication of students;
- 5) to develop the author's course of study of professional foreign language communication of future public relations specialists, journalists, and conduct its pilot testing.[4]

The undertaken research is aimed at testing the working hypothesis, which consists in the fact that the optimization of the process of forming the professionally directed foreign language communicative competence of future specialists can be achieved provided that:

- in the process of learning a foreign language, specificity is taken into account future students' professional activities;
- as a specific, integral and significant component of the content of professionally directed foreign language communicative competence is the social perceptual component that ensures the effectiveness of feedback in the professional intercultural communication of future public relations specialists and journalists;
- a course of professional foreign language communication is based on the project method, which stimulates cognitive and social activity of students.

To achieve the goals and objectives of the study, the following methods were used and research approaches:



- System-structural approach to the analysis of the studied phenomena;
- conceptual analysis of scientific literature on the methodology of teaching foreign languages in non-linguistic universities, Russian as a foreign language, pedagogy, psychology, psycholinguistics, communicative linguistics, sociolinguistics, philosophy, intercultural communication;
- Conduct a substantive analysis of the requirements for the training of specialists in public relations, journalists represented in the State Educational Standard of Higher Professional Education, as well as in standard curricula in foreign languages and major disciplines;
- prognostic methods (modeling of the educational process of the formation of the professionally directed foreign language communicative competence of students);
- experimental methods (conducting experimental training);
- statistical methods (questioning students, polls of colleagues teaching English for special purposes - English for special purposes).[5]

The scientific novelty of the study lies in the fact that it reveals the structure and content of the professionally directed foreign language communicative competence of future specialists; the role, essence and significance of the social perceptual component of the said competence are revealed; identified ways of formation skills and development of skills in demand in their professional activities.

The theoretical significance of the study lies in the fact that it developed a methodology for the formation of professionally directed foreign language communicative competence based on the method of project activity.

The study and analysis of research papers on the problem of teaching professionally oriented foreign language communication has established that professionally oriented foreign language communicative competence is a combination of linguistic, verbal, sociolinguistic, sociocultural knowledge,

communicative and pragmatic skills of professionally oriented communication and interaction culture in various fields and situations, as well as personal qualities: sociability, responsibility, tact, tolerance, reflection, identification, attraction, causal attribution, commitment.[6]

The concept of professionally directed foreign language communicative competence formulated in the study fully corresponds to the nature of the professional communicative foreign language activity of future specialists.

As indicators of the development of a social perception of a public relations specialist, a journalist, it is legitimate to consider the presence of a sustained interest in the personality of a communicator - a representative of a different linguistic culture ; longing for her in-depth understanding (from a psychological point of view); steady mastery of basic reflexive-perceptual skills, mechanisms of perception; openness to communicating with communicators- speakers of the language; cooperation position. For training professionally directed foreign language communicating future social relations specialists, journalists, the formation of social perception as a component of communicative competence seems to be relevant, as it will allow them to carry out adequate foreign language speech activities in a professionally directed interpersonal interaction.[7]

The process of formation of professionally directed foreign language communicative competence included sensitive training focused on the development of self-understanding, interpersonal sensitivity and empathy for partners in interaction. This is extremely important for the development of skills identified in the socio-perceptual component of communicative competence, which, in turn, has prepared future public relations specialists and journalists to participate in projects that simulate real professionally directed foreign language communication.

The dominant skills, the development of which was emphasized in the implementation of projects, include reproductive, productive and productive



skills. With regard to the formation of professionally directed foreign language communicative competence, such skills are the ability to determine the main themes of the information materials being prepared and their critical understanding, the ability of comparative analysis of information and facts, the ability of syntactic transformation and lexical paraphrasing of key information, the ability to use information in professionally oriented situations of real and language. communication skills of reflection, identification, attraction and causal attribution, the ability to predict the development of the process of professional interaction, the ability to achieve feedback with communication partners. The study found that in order to master the above-mentioned skills, which ensure a sufficiently high level of professionally directed foreign language communicative competence of future public relations specialists and journalists, a complex of specially designed tasks and exercises is necessary.[8]

Conclusion. In this regard, the goal of experiential learning was to establish the effectiveness of the developed methodology and technology for the formation of a professionally directed foreign language communicative competence.[9] The consistent presentation of the developed communicative-cognitive tasks and exercises, the inclusion in the experimental training sensitive training sessions, project assignments and monitoring the progress of experienced training showed methodical expediency of the developed technique. Confirmation of the correctness of the research hypothesis is supported by the results of the final student survey conducted after the completion of the experimental training. Project tasks and active forms of study have increased the motivation to learn a professionally oriented foreign language. Formation of such personal qualities as critical thinking, tolerance, respect for the national traditions and customs of other nations, openness and readiness specialist to interpersonal intercultural communication occurs in a cultural, political and economic context. The specifics of

the future professional activity of students has a significant impact on the content of training for professionally directed foreign language communication and the formation of students' abilities for intercultural communication in the context of a dialogue of cultures.[10]

Thus, perspective study also linked to the ability to use these theoretical positions a technique of formation of a professional orientation of foreign language communicative competence of students as a basis for the development of programs, tutorials, methodical recommendations, the purpose of which is the training of professionally directed foreign language communication.[11]

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**ACMELINGUISTIC COMPETENCE IN THE STRUCTURE OF
PROFESSIONAL EDUCATION (on the example of a foreign language)**

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Annotatsiya: Maqolada, acmelingvistika bilan xorijiy tilni o'rganishning samarali texnologiyasini ifodalovchi asoslar keltirilgan. Bu asoslar esa talabalarga motivatsion muhit, mustaqillik, ijodkorlik va bilim faolligini shakllantirishga zamin yaratishi yoritib berilgan.

Kalit so'zlar: Akmelinvistika, acmelingvistika printsiplari, samarali texnologiyalar, ijodkorlik, kasbiy ta'lim.

Аннотация: В статье рассматривается акмелингвистика как наука, представляющая продуктивные технологии освоения иностранного языка. Позволяющая сформировать у студентов мотивационную сферу, самостоятельность, креативность, и познавательную активность.

Ключевые слова: Акмелингвистика, принципы акмелингвистики, продуктивные технологии, креативность, профессиональное образование.

Annotation: The article deals with acmelinguistics as a science representing productive technologies of learning a foreign language. Allowing students to form a motivational sphere, autonomy, creativity, and cognitive activity.

Key words: Acmelinguistics, principles of acmelinguistics, productive technologies, creativity, professional education.

Introduction. Acmelinguistics is a sphere of not only scientific, but also practical activity of the teacher, which examines and uses the laws, factors and mechanisms of development and self-development of the student in order to achieve the highest results in teaching the language, that is, the language here acts as a means of achieving personal "Acme". Speaking of technology, we mean a system of actions that leads to the expected result. In the system of teaching foreign languages, methods have long been established that claim to be technology, i.e. with a high degree of productivity, reliability, stability and performance.

Productive technologies used in teaching a foreign language implement competency-based and personal-activity approaches that, in turn, contribute to the formation and development of:

- 1) multicultural linguistic personality, able to carry out effective communication with carriers of other cultures;
- 2) abilities of students to carry out various activities using a foreign language;
- 3) cognitive abilities of students;

The choice of productive technologies to achieve the goals and objectives set in the framework of the discipline "Foreign Language" is due to the need to form the student a set of general cultural competencies necessary for the implementation of interpersonal interaction and cooperation in intercultural communication, as well as to ensure the required quality of education at all stages.

Currently, there are many opinions about productive technologies in teaching a foreign language. This article will look at some of them. However, it is obvious that the use of any one technology of learning, no matter how perfect it may be, will not create the most effective conditions for the discovery and development of student abilities and creative search for a teacher. The complex combination and use of productive technologies in teaching a foreign language in the learning process intellectual activity, develops cognitive processes, contributes to the formation of competencies that a competitive specialist should possess. One of the ways to activate a student in the process of learning a foreign language is design (project technology), when a student independently plans, creates, protects his project, i.e. actively involved in the process of communicative activity. An educational project is a complex of prospecting, research, computational, graphic, and other types of work performed by a student independently in order to practical or theoretical solution of a

given problem. Currently, the world pays special attention to the mutual coordination of cooperation activities between customers and educational institutions in ensuring the quality of training and employment of personnel. The organization and development of cooperation in training on the basis of modern approaches creates a solid foundation for expanding the integrated pedagogical educational opportunities.

Research Methodology. In the pedagogical literature, the term acmelinguistics, which has recently appeared, is actively used. The name comes from the Greek "acme" - "peak" and the Latin "linguistics" - "linguistic knowledge." Historically, acmelinguistics arose from acmeology, a science that was formed at the junction of natural, social and humanitarian disciplines that study the laws and mechanisms of human development when it reaches the highest level. The latest achievements in psychology, pedagogy, sociology, psycholinguistics, linguodidactics allowed the formation of a new science, designed to solve actual problems of language teaching.

Acme linguistics is a sphere of not only scientific, but also practical activity of the teacher, which examines and uses the laws, factors and mechanisms of development and self-development of an adult student in order to achieve the highest results in language learning, that is, the language here acts as a means of achieving personal "Acme". The following main features of this concept can be noted: a) Acme linguistics "studies the laws of how a person achieves a level, productive manifestation in life of all the essential forces of an individual oriented to solving value-significant problems through the development of a language"; b) Acme linguistics "not only used the general methodological principles of modern knowledge, but also" sets "Acme-centric vector orientation, which is able to determine its interaction with other sciences" c) Acme linguistics "carries in itself some continuity of psychological categories of reflection in personality and activity student, carrying out a synthesis of psychology and pedagogy, however, in contrast to

them, acmelinguistics takes a "sub-eccentric" position, in which the learner from an object becomes the subject of learning with the establishment of integrative relations with all participants and components of the educational process. "Thus, the main features of acmelinguistics are recognized: the laws governing the achievement of acme by language through language, speech activity; subject-centric position of the learning process. The basic principles of Acmelinguistics are: a systematic approach to learning languages; accounting of psycho-physiological and other features of an adult learner; the observance of the irregularity in the supply of educational material; following acme etics.

The object of acmelinguistic is considered "linguistic activity, which is interpreted as a communicative relationship between subject-communicative and psycho-mental activity of a person, which depends on the vectorial orientation of the individual (that is, based on his world view, life principles and values).

Currently, the education of teachers of higher professional education, increasing their psychological and pedagogical qualifications is one of the priorities in pedagogical science. In this regard, there is a need to improve the content and structure of advanced training programs, taking into account the inclusion in them of issues of improving the cultural and speech component of pedagogical work. One such constituent, in our view, is professional-pedagogical communication, which involves the formation of the speech culture of all participants in the educational process. The need to comply with the norms of speech culture and speech etiquette is a necessary condition for an effective educational process, since it is through speech, correctly and correctly executed, that basic and necessary educational information is transmitted.

Analysis and results. This kind of professional communication involves a) a system of techniques and skills of organic socio-psychological interaction between teachers

and pupils, the content of which is the exchange of information, the provision of educational influence, the organization of relationships through various communication tools; b) a permanent solution by the teacher of communicative tasks using heuristic methods; at the same time, a professional teacher knows that communicative tasks are of two types - general communicative tasks (planned in advance) and current communicative tasks (arising during a lesson, events, etc.); c) professional communication of the teacher with students in a holistic pedagogical process, developing in two directions: the organization of relations with students and the management of communication in the student team. For productive professional and pedagogical communication, the following personality qualities that are formed during the period of training a future teacher are necessary: knowledge of the psychology of another person (his values, ideals, orientation, needs, interests, levels of aspirations); social orientation on a person (attraction); unconditional acceptance of the learner - the principle of anticipatory respect; developed attentiveness, observation, memory, thinking, intuition, imagination; education of the emotional sphere: the ability to empathize and sympathize - readiness for empathy; personality traits and individual psychological characteristics that determine the general pattern of behavior when communicating with other people.

Conclusion. Thus, acmelinguistic technology, being one of the innovative technologies of teaching foreign languages in a non-linguistic university. Acmelinguistics makes it possible to take a fresh look at the role and place of each type of speech activity in accordance with the real needs of the profession of the future specialist, i.e. It implies a restructuring of the goals and methods of training that would ensure that graduates achieve peaks in the professional, creative and spiritual-moral spheres of activity. Knowledge of the basics of the psychology of communication contributes to a more rapid entry of a young teacher in the educational process of the university, its better adaptation in the teaching staff.

Improving the preparation of students of medical education to acmeological competence in the process of teaching English is one of the neuro-linguistic programming techniques, based on identifying the correspondence of the Russian and English language structures and suggesting a change in the direction in which the process of teaching a foreign language traditionally begins, to the opposite, and to expand their knowledge, starting not from an unfamiliar foreign language, but from the familiar, native: if the student is maximally about quickly and competently learned to translate, the incoming skills in the communicative set of the native language, into a foreign language, he mastered a foreign language.

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PROGRESSIVE METHODS OF RESULTING EFFECTIVENESS OF ACCEPTED BALLS IN THE VOLLEYBALL GAME

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Аннотация. Мазкур мақолада, Волейболда ўйинга киритилган тўпни қабул қилиш самарадорлигини ошириш усулларини ўрганиш ва таҳлил қилиш орқали жисмоний тайёргарлигини оширишнинг самарадор шакллари топишдан иборат.

Калит сўзлар: машғулот юкламалари, жисмоний тайёргарликнинг ўсиши, индивидуallashtiriш, жисмоний ривожланиш, педагогик кузатув, машғулотларни ташкил этиш, воситалари ва методлар, таълим, технология, малака.

Аннотация. В этой статье рассказывается об эффективных формах повышения физической подготовленности спортсменов посредством изучения и анализа некоторых эффективных способов приёма мяча в волейболе при подаче соперника.

Ключевые слова: тренировочные нагрузки, повышения физической подготовленности, индивидуализация, физическое развитие, педагогическое наблюдение, организация тренировок, средства и методы, образование, технология, опыт.

Annotation. This article discusses the effective forms of increasing physical

readiness of athletes by means of learning and analyzing some resulting methods of receiving the balls served by the opponent team.

Key words: training loads, increasing of physical readiness, individualization, physical development, pedagogical observation, organizing training, means and methods, education, technology, experience.

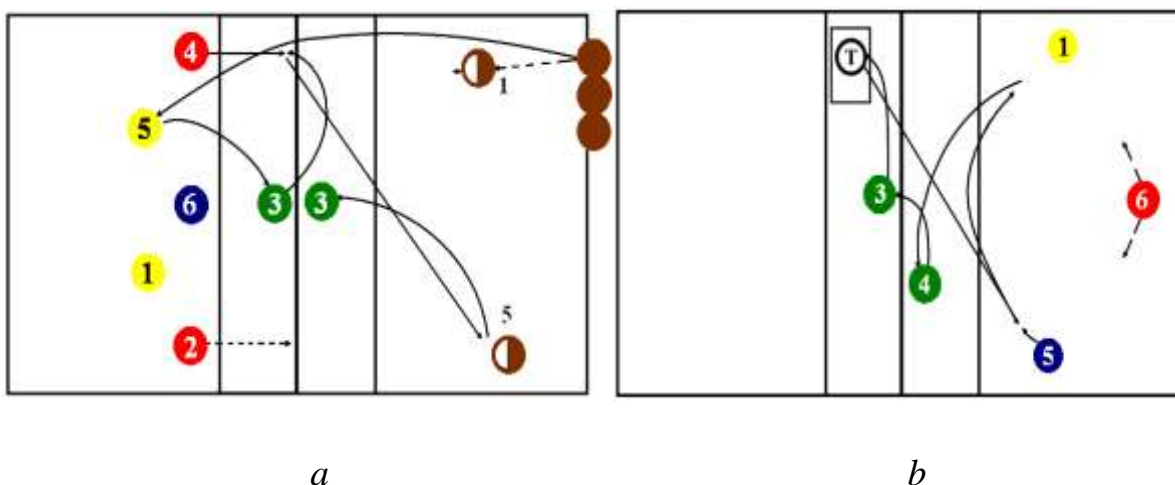
Introduction. Developing physical training and sport and bringing up perfect and unimpeachable younger generation is one of the state policies of our country. The laws of the Republic of Uzbekistan take important notice of improving effectiveness of physical training lessons in educational institutions. As a result of this attention great reforms are being done in the sphere of physical training and sport. Modern sport gyms have been built in every city, town and village of our country and the youth are training with their favorite kinds of sport. Sport is becoming necessity of their everyday life [1], [2].

In modern volleyball game effective performance and high results depend not only on physical readiness but also on highly developed technical and tactical skills[3].

Aim of the work. Aim of the work is learning and analyzing the methods of the effectiveness of receiving a ball in the volleyball game. The main aim of tactical movements of defense is to stop the attacks of the opponent and resist them.

Tactical movements of defense include team movement, group movement, and individual movement. Team movements can be seen in three situations: receiving the ball sent from the service area, receiving the opponent team's attack or the ball returning from the net not passing into the opposite court [4], [5].

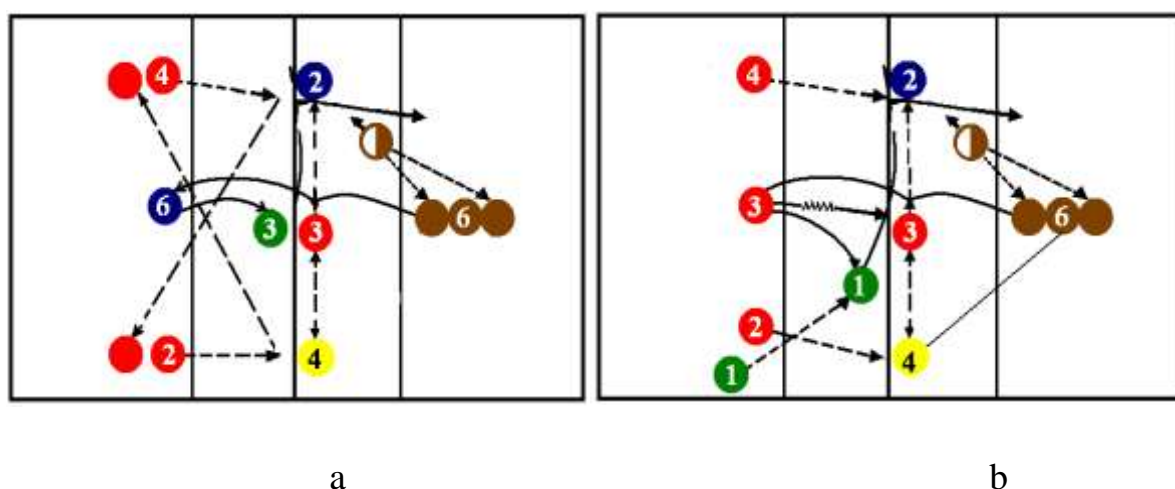
In modern volleyball game the team organizes its tactical defense as corner forward (picture- 1a) and corner backward system (picture-1b) .



picture – 1

According to the above mentioned factors and situations it is important to apply one of the acceptable tactics of defence in the game.

While receiving the ball the position of the players in the court is in two versions: linear version and stage version. Linear version (picture - 2) is applied when the players are qualified enough to receive the ball and when planning not difficult tactics during the attack[6],[7].



picture – 2

In this version players are placed evenly around the court. Stage version is practically observed in modern volleyball games. This version enables qualified players to receive the ball and organize successful attacks. If the player in the third stance is not skillful enough to receive the ball or if the player in the fourth stance is not skillful enough to attack well, this version is very acceptable [8],[9]. If the player in the third stance is skillful enough to receive the ball, he/she moves to the backward of the court.

Team position of the linking player moving from the fifth stance is also given. This position is a little bit difficult but is applied more frequently. In this position it is desirable that team apply 5+1 system.

There are three versions of organizing defense while receiving opponent team's attacks: along the line- in which one of the players in front defends the player blocking the opponent's attack. Front stage – in which the player in the sixth stance defends the players blocking. Back stage- in which the players in the first or fifth stance defend the blocking players. These are chosen according to the feature of blocks or attacks [10],[11].

According to the second table we can see that the total number of balls served during the game is -10, exactly received balls are- 7, lost balls are – 3, efficiency is – 70%.

The total number of balls served using oscillatory movement during one game is – 28, exactly received balls are – 15, lost balls are – 13, efficiency is – 53.5%.

Efficiency analysis of received balls of UrSU team during supreme league games

Table – 2

Ball serving types	Total number of balls during one game	Results of received balls		
		Exactly received balls	Lost balls	Efficiency %
Simple serving from standing position	10	7	3	70,0
Oscillatory movement	28	15	13	53,5
Jump serving with one or two steps	13	7	6	53,8
Jump serving with force	17	7	10	41,1
Total	68	36	32	52,9

The total number of balls served using jumps and one or two steps is – 13, exactly received balls are – 7, lost balls are – 6, efficiency is – 53.8%. The total number of balls using jump serving with force is -17, exactly received balls are – 7, lost balls are – 10, efficiency is – 41.1%. The total number of balls served by the opponent team is – 68, the number of received balls is – 36, lost balls are – 32, efficiency is – 52.9%.

We have conducted practical classes on ball receiving exercises with individuals, groups and teams, including sending and receiving balls upwards and downwards the wall using two hands, sending balls to a definite target on the wall and receiving them. We did this exercises ten times, playing ten minutes each time with two minutes.

Jump served balls are usually received from below using two hands as this type of serving is difficult to receive from above because of great speed. According to the type of serving different kinds of position, movements are chosen[12].

After applying different resulting methods, in the third table we can see that the total number of balls in three sets served simply from a standing position is – 13, exactly received balls are – 13, no lost balls, efficiency is – 100%.

The total number of balls using oscillatory movement is- 21, exactly received balls are – 18, lost balls are – 3, efficiency is – 85.7%.

The total number of balls using jump serving with one or two steps is –16, exactly received balls are – 13, lost balls are – 3, efficiency is – 81.2%.

The total number of balls using jump serving with force is – 13, exactly received balls are- 9, lost balls are – 4, efficiency is – 69.2%.

The total number of balls served by the opponent team is 63, the number of balls received by our team is-53, lost balls are – 10, receiving efficiency is – 84.1%

Table – 3

Efficiency analysis of received balls by UrSU team in one game

Ball serving types	Total number of balls during one game	Results of received balls		
		Exactly received balls	Lost balls	Efficiency %
Simple serving from standing position	13	13	-	100



Oscillatory movement	21	18	3	85.7
Jump serving with one or two steps	16	13	3	81.2
Jump serving with force	13	9	4	69.2
Total	63	53	10	84.1

Comparing the efficiency of received balls by UrSU team before and after the analyses we have observed the following results:

The total number of balls using simple serving from standing position before the research is – 10, after the research is – 13, exactly received balls before the research are- 7, after the research are – 13, lost balls before the research are – 3, no lost balls after the research, efficiency before the research is – 70%, efficiency after the research is – 100%.

The total number of balls using oscillatory movement before the research is – 28, after the research is – 21, exactly received balls before the research are – 15, after the research are – 18, lost balls before the research are – 13, after the research are – 3, efficiency before the research is – 53.5%, efficiency after the research is – 85.7%.

The total number of balls using jump serving with one or two steps before the research is – 13, after the research is – 16, exactly received balls before the research are – 7, after the research are – 13, lost balls before the research are – 6, lost balls after the research are – 3, efficiency before the research is – 53.8%, after the research is – 81.2%

The total number of balls using jump serving with force before the research is



– 17, after the research is – 13, exactly received balls before the research are – 7, after the research are – 9, lost balls before the research are – 10, lost balls after the research are – 4, efficiency before the research is – 41.1%, efficiency after the research is – 69.2%

Ball receiving results before and after the research (h=8)

Ball serving types	Total number of balls during one game	Results of received balls		
		Exactly received balls	Lost balls	Efficiency %
Simple serving from standing position	<u>10</u>	<u>7</u>	<u>3</u>	<u>70</u>
	13	13	0	100
Oscillatory movement	<u>28</u>	<u>15</u>	<u>13</u>	<u>53.5</u>
	21	18	3	85.7
Jump serving with one or two steps	<u>13</u>	<u>7</u>	<u>6</u>	<u>53.8</u>
	16	13	3	81.2
Jump serving with force	<u>17</u>	<u>7</u>	<u>10</u>	<u>41.1</u>
	13	9	4	69.2
Total	<u>68</u>	<u>36</u>	<u>32</u>	<u>52.9</u>
	63	53	10	84.1

The total number of balls served by the opponent team during one game



before the research – 68, after the research – 63, exactly received balls before the research – 36, after the research – 53 , lost balls before the research – 32 , after the research – 10, efficiency before the research – 52.9%, after the research – 84.1%.

The method carried out by us has proved to be efficient. The exercises in which the players received the balls served one after the other standing in the protection area showed high results and selected method seemed more efficient.

Conclusions. Analyses of literature , results of pedagogical experiments and their comparative analyses have made us come to the following conclusions: the exercises carried out during the pedagogical research helps not only to develop technical readiness effectively but also develop accuracy in doing tactic techniques efficiently. Receiving the balls from below with double hands is considered as a main method of receiving attack blows as well. Therefore, it is important to pay great attention to receiving the balls served with different speed, directions and power with double hands.

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UDC: 378

ADVANTAGES OF THE APPLICATION OF THE CREDIT SYSTEM TO IMPROVE THE QUALITY OF EDUCATION IN HIGHER EDUCATIONAL INSTITUTIONS

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Аннотация: Мақолада олий таълим тизимида таълим сифатини оширишда кредит тизимини қўллаш афзалликлари, таълимда кредит тизимининг хусусиятлари ўрганилган. Шу билан бирга хорижий давлатлардаги мавжуд кредит тизими батафсил очиб берилган, кредит тизимидаги илғор хорижий тажрибалар мисоллар билан кенг ёритилган ва қиёсий таҳлил қилинган. Кредит тизимини ТАТУ ва унинг филиалларида қўллашда мавжуд афзалликлари ва муаммолари баён этилган.

Калит сўзлар: ECTS, USCS, UMAP, CATS, Балония жараёни



Аннотация: В статье рассматривается преимущество применения кредитной системы для повышения качества образования в системе высшего образования и изучены особенности кредитной системы в образовании.

Вместе с этим полностью раскрыты кредитные системы существующих передовых зарубежных стран и в то же время был проведен обширный охват и сравнительный анализ примеров передового зарубежного опыта в кредитной системе. Описаны преимущества и проблемы использования кредитной системы в ТУИТ и его филиалах.

Ключевые слова: ECTS, USCS, UMAP, CATS, процесс Балония

Annotation: The article highlights the advantages of applying the credit system to improve the quality of education in the higher education system, the features of the credit system in education.

At the same time, the credit systems of existing advanced foreign countries are fully disclosed, and at the same time, extensive coverage and comparative analysis of examples of advanced foreign experience in the credit system has been carried out. The advantages and problems of using the credit system in TUIT and its branches are described.

Keywords: ECTS, USCS, UMAP, CATS, Bologna process

Introduction. As you know, the education system should meet the modern requirements for the rapid development of the globalization process and development of the information process.

The existing system of education needs a new educational system and a new approach to the teaching process. One of the most pressing issues in the system of higher education is the training of qualified personnel.

Absence of a modern system for assessing the activities, knowledge and pedagogical skills of professor-teachers negatively affects the quality of education. The purpose of the credit system is to improve the quality of education, to ensure transparency and to recognize academic knowledge and skills.

Main part. There are several credit systems in the world of higher education. They are American Credit System (US CS), Credit Accumulation and Transfer System (CATS), European Credit Transfer System (ECTS), University Credit Transfer System in the Asia-Pacific region (UCTS) [3].

To get a bachelor's degree at USCS, a student must earn 120 credits, get 30-35 credit hours for a master's degree, and graduate students - 6-12 credit hours per semester [2], while CATS has 1200 academic hours of academic year or 120 credits where 1 British credit 10 hours. To get a bachelor's degree in British universities need to get 360 credits for 3 years.

The fourth year gives the opportunity to "bachelor of the highest degree." The educational process in medicine, dentistry and architecture has more than 7 years. Credit accumulation and transfer system(CATS) has spread to the UK, southern Africa and to the new Zealand. In the ECTS European credit system, each student must receive 60 credits per year [1].

The credit system in the Asia-Pacific region UCTS is based on the European credit system ECTS, a total of 60 credits per year. But Japan, which adopted the USCS credit system, replaced one credit hour with credits. To get a bachelor's degree in Japan, you need to dial 146 units. A postgraduate study in Japan consists of two stages: the "master's course" takes two years and receives a master's degree, and the "doctoral course" lasts 3 years and has a doctorate in philosophy.

China has adopted a three-tier education system, such as the American Credit System. 120 credits are granted for a bachelor's degree at universities in Beijing and Xinhua, and 30–60 for a master's degree. It takes 4-5 years of study at universities, 7-



8 years of study at medical universities and 2-3 years of study at vocational schools. Thus, the difference in foreign countries exists only in the credit system, and not in the educational system. For example, if a European loan covers all classroom and extracurricular hours, US loans only reflect classroom hours where it is assumed that the student is more likely to work on himself [3].

In the higher education system, credit hours are used in various forms, which is the basis for the preparation of financial estimates by the state. The load of teachers and students of the department is determined by the credit hours. Transfer of the student to the next course, payment for study is made on the basis of a credit hour. There are inconsistencies in the filing of credit hours, but in any case, credit is crucial in planning and budgeting estimates.

Despite its weaknesses, the “credit system” was widely used. It regulates the multifaceted activities of the university: the curriculum, schedule, assessment of students' knowledge, the award of a degree, tuition fees and so on. This system will help to realistically assess the performance of the teacher and student, allowing the teacher to determine the load and help the student to adjust the load. The credit system gives the freedom to learn, which corresponds to the relations of a market economy [6].

An analysis of the aforementioned world education system shows that the USCS is easily replaced by the European (ECTS) and the Asia-Pacific (UCTS):

1 American credit hour = 1 Chinese credit = 1 Japanese credit unit = 2 European credit = 2 Asia-Pacific credit = 4 British loans.

The European Credit Transfer and Accumulation System (ECTS) is the only universal European system of student supervision and accountability in the development of university education programs. This is a unique way of learning the lesson learned, using the accumulation of credit units [7].

University loans assess the level of student training required to achieve learning outcomes. These results must be accompanied by the ability of the student to score a certain number of points in each particular subject, until he finishes his studies at the university.

Any loan amount can be compared with the time spent on studying a particular topic. On average, during one school year a student can receive up to 60 credits, that is, spend 1500-1800 hours to master the subjects in the curriculum. So, one credit is 25-30 hours.

The European credit system is based on three elements: the curriculum, the activity and scope of the listener, its results.

The credit system includes the control of all types of education (classroom and out of classroom). The credit system shows the results achieved and not the number of hours. In the European credit system, a bachelor's degree can vary from 180 to 240 credits. The master's degree can vary from 90 to 120 credits.

A loan is a conditional test apparatus that provides a part of the curriculum for a student. For each subject a certain number of credit units is allocated.

Credits are issued for all the material or its components: outside semester courses, dissertations, state exams. The student receives various loans in various subjects. The importance of this subject depends on the time the student has to study. As a result, credit are collected and approved, confirming that they have successfully completed a bachelor's degree.

In some cases, collected credits may be transferred to another program within one training program. For example, when moving from one university to another, there is no need to study and reread subjects [5].

From the 2018-2019 school year, the ECTS crediting system was introduced at the Tashkent University of Information Technologies (TUIT) and its branches.

The main features of the introduction of the credit system of education.



- get a diploma.

The conditions of the diploma require that the student receive 240 credits for the 4-7-year period of study.

-academic period.

Academic semester lasts 15 weeks per semester. The attestation period lasts 1 week. At the end of each semester, students are given a 6-week vacation. During the winter and summer periods of study, retraining will be organized for 4 weeks to eliminate academic debt.

-transition from course to course

The transition from course to course is carried out at the expense of the GPA indicator which should not be less than 2.6 units.

$$GPA = \frac{K_1 * U_1 + K_2 * U_2 + K_3 * U_3 + + K_n * U_n}{K_1 + K_2 + K_3 + + K_n}$$

The study load of a student is 60 credits per academic year, and the schedule of studies for individual training and selection of teachers is made up of study subjects and teachers. Independent work of the student is not included in the educational schedule.

According to the rules of the educational process in the system of credit education, if 1 credit is 30 hours, then 15 academic hours will be continued with 15 hours of independent study.

The main advantage of the credit system is independent work. The free choice of teachers, the schedule of lessons and subjects allows students to be independent, active and mobile, as well as to plan and carry out their educational activities. It should be noted that the advantages of the credit system are connected with four parties - students, teachers, educational institutions and employers. Each side will benefit from it.

Benefits for students:

- selection of subjects, lecturers and course schedules;
- be able to assess knowledge in the learning process;
- communication capabilities, faster adaptation to the new environment, communication with others.

The teachers also have a crawl from the credit system:

- interests of students to subjects - greatly facilitates the work of the teacher;
- open rating system will allow the student to correctly and transparently assess their knowledge;

Teachers receive opinions and recommendations on self-assessment and the teaching of the subject.

As for the institution itself, the introduction of the credit system will significantly increase its flexibility in its policies. Unlike traditional universities, the new university has the ability to change its subject in accordance with the needs of a specialist in the labor market.

Employers will be able to get highly qualified specialists according to their needs.

One of the main problems is that students are not ready for independent work, adaptability to information flows and new situations, and also do not have enough literature to work independently.

Conclusions. The study and analysis of the introduction of credit education in foreign countries has shown that there are peculiar features in different countries of the world. Nevertheless, the effectiveness and relevance of the credit education system was confirmed by the spread of education in many countries around the world, since the curriculum is focused on developing independent work among students, increases the level of creative activity and stimulates learning, and thus improves the quality of education.



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VALEOLOGICAL ASPECTS OF HEALTHY LIFESTYLE OF YOUNG GENERATION

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Annotatsiya: Ushbu maqola Urganch davlat universiteti talabalarining valeologiya va jismoniy tarbiya masalalari bo'yicha bilimlarini o'rganish jarayonida talabalarning bilimlari tahlil qilingan.

Kalit so'zlar: Valeologiya, jismoniy tarbiya, sog'liqni saqlash, jismoniy mashqlar, jismoniy xususiyatlar, jismoniy tayyorgarlik.

Аннотация: В данной статье анализируются знания студентов в процессе тестирования студентов Ургенчского государственного университета при изучении предметов валеологии и физической культуры.

Ключевые слова: валеология, физическая культура, здоровье, физические упражнения, физические особенности, физическая подготовка.

Abstract: This article analyses knowledge of students in the process of testing of students Urgench State University, while learning Valeology and Physical training subjects.

Keywords: Valeology, physical training, health, physical exercises, physical features, physical preparation.

Introduction. The actuality of studying the problem of physical education at a university not as a physical profile is determined by the needs of modern society in the physical and spiritual improvement of students. The need to involve university students in various types of physical cultural activities: educational, sports, recreation and rehabilitation, are the focuses. Researchers studying the problem of physical

education of students, emphasize that it should occupy a worthy place in the education and professional training of students. [1,4,5,8,10].

The organization of physical education in higher education institutions, according to the recommendations given in the scientific and methodological literature, takes into account the health status, level of physical development and preparedness of students, as well as the conditions and nature of work of their upcoming professional activity. However, recent studies have shown that physical activity and physical fitness, as well as the health status of university students are at a very low level.

Currently, more and more researchers, trainers and teachers of physical culture come to the conclusion that the existing physical education programs for general education, secondary special and higher educational institutions do not contribute to solving the problems of rehabilitation, development and improvement of basic core qualities [3,4,6,7,9,11].

Literature review. In our article, the solution of the following tasks is set as follows:

1. To assess the level of knowledge of physical culture, testing was organized with assignments that assess knowledge on the subject of physical education among students enrolled in the faculty of physical education, as well as students enrolled in natural and humanities faculties of Urgench State University, after completing valeology course. Having created and delivered tests containing 16 questions with four answers for all 1-4 year students. More than 350 students participated in the testing. In addition, a survey was also conducted among the student audience in order to ascertain the significance of physical education.

2. Conducting a medical examination to diagnose the nature of deviations in the state of health of students.

3. Assessment of the initial level of physical development, physical fitness, as well as the functional state of the body of students, followed by the development of a

scale for evaluating the physical fitness of young men and women studying at non-sports faculties of Urgench State University.

The exceptional importance of physical education and sports is determined by two main reasons: firstly, studies in the framework of the university program provide no more than 20% - 25% of the necessary physical activity of students. Secondly, independent physical exercise, are the factors that shape not only social activity, but also the formation of the principles of a healthy lifestyle for students. A preliminary survey of Urgench State University students indicates that 30.2% of students studying in the humanities and natural faculties are engaged in sections of various sports, but most of the students ignore morning exercises, have bad habits, prefer a passive lifestyle, and do not have basics of valeological knowledge. It has been established that the level of motor activity decreases with an increase in the course, that is, there is an increase in the effects of hyperkinesia and hypodynamia, which to a certain extent contribute to the occurrence of overweight, disorders in the body's activity, in particular, from the cardiovascular and respiratory systems.

Managing the health process is impossible without owning valeological knowledge. The modern concept of health identifies three of its main components:

1. The physical that includes the level of growth and development of organs and systems, as well as the status of their operation;
2. Psychological - is a state of mental sphere, is determined by the motivational, emotional, thought-moral and spiritual factors. Its basis is the emotional comfort, providing adequate mental capacity and human behavior;
3. Behavioral - is an external manifestation of the human condition. It is expressed in the degree of adequacy of behavior, the ability to communicate. It is based on the life position and interpersonal relationships that determine the adequacy of interaction with the external environment and the ability to work effectively.

In the second position of the concept of health, an important component is the psychological state in which a certain importance is given to the need to develop a motivational sphere, that is, one cannot only be limited to the concepts of health, development of physical qualities and motor abilities. For this, it is necessary that the student at the university receive the necessary level of knowledge and skills for the formation of motor activity.

Research Methodology. Therefore, one of the objectives of the study was to assess the level of valeological knowledge is testing with tasks that evaluate knowledge of valeology among students studying at the faculty of physical education, as well as students studying at non-sports faculties of Urgench State University. Testing of students was carried out on practical exercises in physical culture, providing for self-control skills training in order to increase students' interest in improving functional health. Were developed 4 variants of test questions for students studying at 1-4 courses of Urgench State University faculties. Each option consists of 16 test questions. The developed questions on the content can be divided into the following groups:

1. Questions evaluating the level of theoretical knowledge in valeology among students of 1-4 courses.
2. Questions evaluating the attitude of students towards adhering to the principles of a healthy lifestyle
3. Evaluation by students of the importance of physical education and physical activity in maintaining physical activity and promoting health and their impact on the body.
4. Ways of health correction, independently developing health programs, taking into account the state of their own health.

The results of the test survey among all students in the faculties of physical education and the natural faculty revealed the following:

- To the question, “Modern formulation of the concept of health”, the number of correct answers was 92.7% among students of the faculty of physical education, and 69.8% of the correct answers were found among students of natural science of the faculty.
- Clearly formulated the answers to the questions "The purpose and objectives of valeology" 83.8% of students of the Faculty of Physical Culture, and only 67% of students of the Faculty of Natural, History.
- To the question, “What methods can be used to assess physical development?” 77.7% of students of the natural faculty indicated the correct answer, indicating that the level of physical development can be assessed based on anthropometric and functional studies.
- Only 38% of students of the physical education department gave correct answers.

It is paradoxical that the question “What changes do occur in the body under the influence of systematic physical exertion?” There was given a complete and precise formulation by the students of the Faculty of Physical Culture. Analysis of the distribution of the available answers to the questions asked, showed a competent approach on the part of the student’s sports audience. It showed that changes in one functional system cause changes in other systems. Those are structural changes occur at the level of the whole organism, although this question was expected clear and correct answers from students of the natural faculty. In assessing the influence of negative factors, including harmful habits on health, the like-mindedness was revealed among the students of the surveyed faculties. To the question “What kinds of sports do you practice and what physical qualities did you want to develop?” In the responses, one can note the manifestation of sexual dimorphism. So young men prefer to engage in sports such as national wrestling, athletics, that is, sports that would develop in the first place, strength, then speed capabilities and endurance.



Girls prefer to engage in sports, in particular, rhythmic gymnastics, swimming, tennis, contributing to the development of the right physique and the formation of a beautiful posture.

Students of the natural faculty, characterizing the influence of motor activity on the human body, were divided in their opinions. Thus, 90% of students believe that systematic physical activity causes adaptive changes in the type of hypertrophy and hyperplasia; 10% of students believe that positive changes occur only in the cardiovascular system; in particular, by increasing the chambers of the heart, improving blood flow, putting the reserve capillaries into operation, improving the blood supply. The survey we conducted confirms the interest of female students in physical education, but a small number of female students, in particular, 12.5%, prefers non-traditional sports like judo, boxing, sambo, football, etc. Because of the questionnaire to the question, “why do you practice physical culture?” Almost all students included in the preparatory group for health reasons, at the end of the school year indicated motives that have a health focus.

From the motives indicated by the students, it is clear that their attitude to their health has changed significantly. The motives of “Preservation of Mental and Physical Health” increased from 50% in the first year to 70% in the 4th year. “Notable decrease in the level of physical development” - from 65% in the first year to 40% in the 4th year. “Experienced a feeling of muscular joy from exercise” - from 40% (Liberal faculties) to 80% (Faculty of Physical Culture); depending on the training of the chosen specialization “increase in physical working capacity”, it was noted - from 35% to 78% of the students of these faculties, respectively. As can be seen from the responses to the fourth course, there is a deterioration in the state of physical health, both among girls and among young men. To the question, “What contributed to the deterioration of your health,” over 65% of 4th year students consider because of the lack of a physical culture subject in the educational process.

About 20% of students consider the deterioration of health due to their stay in most of the state of physical inactivity.

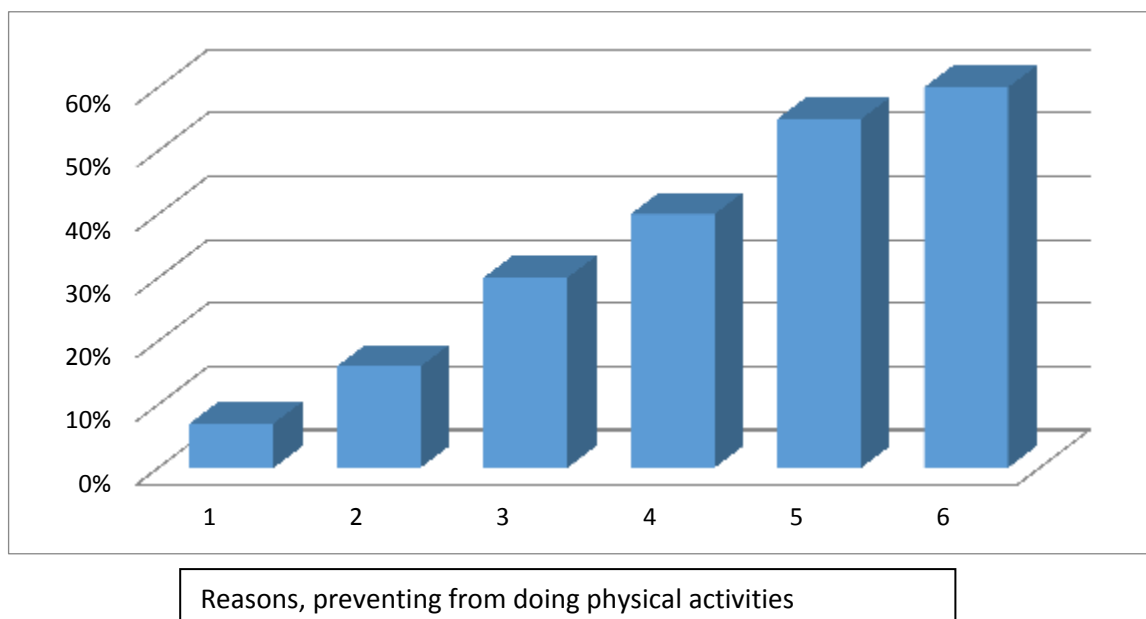
It is positive that after reading the lecture series “Methodological foundations of a healthy lifestyle”, as well as watching the videos “Drug addiction - the plague of the XXI century”, students changed their attitude to lifestyle, understanding how harmful bad habits are. Thus, the theoretical and methodological knowledge gained in the course of valeology, expanded the students' world outlook, allowed to understand properly the value of health, to understand the importance of the mechanisms of health-improving action of physical exercises not only to improve health, and to correct existing deviations.

Analysis and Results. One of the priorities of valeological education in the university is the preservation and strengthening of students' health, the formation of their concept of the value of a healthy lifestyle. Analysis of the personal data showed that the students of the Urgench State University consider physical exercises important for improving health, developing physical qualities, and improving body posture. However, in reality, their participation in physical culture and sports activities is not enough. Most students are engaged in physical culture only within the framework of the schedule. However, the number of additionally involved in sports in the faculties of natural history and humanities was about 30%. We tried to find out what prevents students from engaging in physical culture: Figure 1 shows the results of the student survey:

1. Prefer to fill their leisure time with other activities (computers, music)-7%.
2. Due to the feeling of constraint due to the figure flaws, or due to the low level of physical fitness - 16%
3. chronic fatigue after the classes, or because of the overload of educational tasks - 30%.
4. lack of motivation to play sports - 40%

5. The majority of students report a lack of time - 55%.
6. due to the lack of developed skills and abilities when performing certain exercises - 60%.

(pic. 1)



Testing of students is carried out in practical classes in physical culture, providing for self-control skills training with the aim of increasing students' interest in improving the functional state of their health. With the help of test technologies, we determined the attitude of students to their own health, physical activity, knowledge of the basic theoretical principles on valeology, methods and criteria for predicting health, the way, and most importantly, how lifestyle affects, in particular, the effect of negative and positive factors on health.

Conclusion. The introduction of complex pedagogical monitoring of students' health indicators throughout the whole period of training into mass physical culture and sport, as well as ensuring accurate organization of the valeology educational process for deeper development of the mechanism of the health effect of physical exercises and their use in order to correct the existing deviations in health status:

The valeological orientation of the university physical culture is effective not only for mastering theoretical knowledge and practical skills in assessing physical health, but also in terms of the formation of a healthy lifestyle.

The results of the survey of students indicate that the deterioration of the physical condition of students at UrSU for the 4th year is primarily because the subject of “physical education and sport” is not included in the curricula of the university. The content of the educational process in physical education at the university for all courses of study should be aimed at developing students' readiness to perform the physical activities necessary for the full functioning of the body, and at senior courses it is necessary to provide each student with the opportunity to choose the sport chosen by him. be sectional in nature with the interests of students.

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**REQUIREMENTS FOR PERSONNEL PURPOSE AND PRODUCER'S
PERSONNEL**

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Annotation: The article discusses the importance of independent learning in essence, the main goal and mission of independent work of students, as well as the quality of the curriculum. The classification of independent creative works, which the student and the director should do when forming the director, is presented. On this topic, developed guidelines.



Key words: student-director, director, stage director, course artistic director, theater, actor, independent study, independent director's work, director's analysis, instruction, scenario, book reading.

Аннотация: В статье рассматривается важность самостоятельного обучения в сущности, основной цели и миссии самостоятельной работы студентов, а также качество учебного плана. Представлена классификация самостоятельных творческих работ, которые студент и режиссер должны сделать при формировании режиссера. По этой теме разработаны методические рекомендации.

Ключевые слова: студент-режиссер, режиссер, режиссер, художественный руководитель курса, театр, актер, самостоятельная работа, работа независимого режиссера, режиссерский анализ, инстинкт, сценарий, чтение книг.

Аннотация: Мақолада талабалар мустақил ишининг моҳияти, асосий мақсади ва вазифаси, ўқув жараёни сифатини яхшилашда мустақил таълимнинг аҳамияти ўрганилган. Талаба-режиссёрнинг саҳналаштирувчи режиссёр бўлиб шаклланишида амалга ошириши лозим бўлган мустақил ижодий ишлари таснифи берилган. Мавзу юзасидан услубий тавсиялар ишлаб чиқилган.

Калит сўзлар: талаба-режиссёр, режиссёр, саҳналаштирувчи режиссёр, курс бадий раҳбари, театр, актёр, мустақил таълим, мустақил режиссёрлик иши, режиссёрлик таҳлили, инсценировка, сценарий, китоб мутолааси.

Introduction. The Law of the Republic of Uzbekistan "On Education" and the National Program of Training of Students, along with deep theoretical and practical knowledge of the students, will be able to independently perform their chosen field of knowledge, independently improve their knowledge and skills, and

correctly analyze and solve problem situations, one of the main objectives is to train professionals who can adapt quickly to their circumstances.

Planning, organizing and creating all necessary conditions for students to independently improve their education, as well as training students in their classroom, as well as providing them with the opportunity to pursue higher education, and providing guidance for independent learning is one of the main objectives of the higher education institution. This is evidenced by one-third of the total number of training curricula envisaged by the curriculum of higher education institutions.

Main part. Independent work of students without the direct participation or direct supervision of the teacher, the tasks given by them, the textbooks on the basis of the textbooks. The independent work of students is an integral part of the learning process. Without the need to improve the independent learning of the curriculum, the tasks of contemporary education can not be at the required level [3. - P. 26]. Independent work of students - a certain part of the knowledge, skills and qualifications specified in the curriculum of the student on the basis of the advice and recommendations of the teacher, from the audience and the audience. Independent learning creates competition in a positive way. Students learn from their own minds, powers, and time to do useful work. Specific aspects of student aspiration are created by preparing for various competitions, participating in science olympiads and seeking to win, participating in scientific and creative exhibitions [1. - P. 122]. As you know, active learning and research work requires the use of all types of independent research. The independent work of the student should be reflected in all forms of the educational process. The main objective of the student's independent work is to develop and develop the skills and knowledge necessary to independently perform specific educational activities in the student's leadership and supervision. Increasing the knowledge and experience of the modern



expert depends on the degree of personal qualities. Independent work is crucial in shaping such qualities, strengthening the knowledge and skills gained in the classroom work, developing new skills and developing creative skills.

5150400 - Organization of independent work of students on the subject "Direction of variety and mass spectacle", which is the main specialty of the direction of directing (variety and mass spectacular directing), approved by the order of the Ministry of Higher and Secondary Special Education of August 14, 2009 № 286 "Students are independent and the "Instruction on the organization and control of work". The creative features of the subject are taken into account.

The further development of creative abilities of the film-makers, the further development of knowledge in them, the formation of skills of independent thinking, and the ability to solve the problem, are among the most important tasks in the field of art education.

Naturally, when considering the basic principles of directing and organizing the student's independent work in the direction of directors, the focus is on developing and developing the strong self-study skills of teaching and scientific literature, most importantly, in directing independent filmmaking.

The following aspects should be considered when defining the form and size of students' independent work:

- reading stage;
- specificity of the specific science and the level of difficulty in mastering;
- The student's skill and theoretical and practical level of training (basic knowledge);
- Level of availability of information science;
- The level of student access to information resources;
- creative abilities of students [2].

Searching for the information required by the Internet mission requires the student to understand, analyze, to use the information needed to synthesize information and to make the results of the research, as well as to independently conduct tasks, research and scientific research, and control experiments and methodologies.

The purpose of the independent study from the film is to teach the students:

- training of highly qualified personnel in all spheres of the directing;
- understand students' perceptions and phenomena in socio-political processes and to be able to interpret them in scenic space;

- To teach methods of choice of ideological and artistic repertoire that can meet modern requirements;

- improving and continuing education of the current Uzbek National Theater Directorate based on the best practices of the World Theater Arts Directorate;

- The ability to perceive theatrical art and field art, the ability to deeply understand the psychology of images in color;

- Formation of skills and qualifications in the direction of directing;

- Realization of artistic ideas through performances and performances.

The aim of students' independent work is to teach the students the methods of modern teaching in this field, to create appropriate holidays and performances, to create scenes, to choose script and pesa selection, to instil the methods, to create scenes and create scenes.

The artistic director of the course has a great role in the implementation of independent work of the students in the effective and artistic way. The artistic director of the course is proficient in choosing a repertoire by the student-director because he knows the talent and creative abilities of each student.

The artistic director of the course is an independent observer and mentor in the artistic, social, educational and professional work of the stage director.



The organization of independent study on the subject of "Variety and Mass Performing Arts" is organized on the basis of the following creative processes, taking into account the academic ability and abilities of the student:

- preparing a program for independent filmmaking;
- Preparation of scenarios and scenarios;
- director's analysis of artistic work;
- Collecting audio and video materials and assembling them according to the chosen topic;
- watch and analyze national and international performances and celebrations;
- studying and analyzing internet data;
- getting acquainted with the latest foreign educational sources, etc.

Depending on the nature of the science, students may also have other tasks for independent work.

Preparation for independent filmmaking - 5150400 - Directing students (variety and mass spectacular directing) students study independently at the end of each semester. According to him,

- At the end of the first semester - written and creative observations;
- at the end of the second semester - the director's etiquette;
- at the end of the third semester - literary fragments;
- At the end of the fourth semester - dramatic fragments;
- at the end of the fifth semester - a playful play;
- At the end of the sixth semester - concert program;
- at the end of the seventh semester - a theatrical variety show;
- At the end of the eighth semester - a theatrical public show.

In these creative processes, students create a drama of the future stage, perform a director's analysis, work on the artistic expression of the work. Most



importantly, it creates an ensemble of actors and creates a complete artistic creation with them.

Independent director's work is taken by professors and teachers of the department. The student's independent filmmaking work is discussed and evaluated by the public.

Preparation of Instissors and Scenarios - Instead of the instructional instructions and instructions of the artistic director of the course, instinct or create scenarios on any subject, except in the case of exercises. Based on these works, it is possible to stage a student's independent work. The scenario and scenario are discussed and evaluated by the faculty members of the department.

The director's analysis of a work of art - based on the instructions and instructions of the artistic director, carries out the director's analysis of any artistic work except for the student filmmaker's training. In this process, the artistic review is carried out on the basis of the laws of dramatic art. Studying the social significance of the art work and analyzing educational aspects. It is learned at what stage the work was staged. The artistic style of the director is studied. The director's analysis of the literary work is discussed and evaluated by the faculty members of the department.

Collecting audio and video materials and assembling them according to the chosen topic - the audio and video materials are selected, analyzed and assembled in accordance with the instructions and instructions of the artistic director. Audio and video materials are used in independent filmmaking.

Conclusion. In order to strengthen the theme, performances and celebrations will be watched and analyzed on a national and international scale. Comprehensive creative processes are being studied in the field. Foreign and national experiences are interpreted in the learning process.



Studying and analyzing Internet content, getting acquainted with foreign educational sources - comparative analysis of national and international experiences in the study and analysis of positive developments and achievements in the world about the variety and popular holidays, interpretation of course artistic works.

Assessment of students' independent work is carried out in accordance with existing "Regulations on monitoring and evaluation of students in higher education institutions".

Experience shows that the student can deepen his knowledge only if he is self-employed and constantly working on himself. The basic knowledge, abilities and skills of the students are formed only in the process of independent learning, the ability to function independently, and their interest in creative work.

The following recommendations were given to the formation of a direct student-directorial director;

- further improvement of teacher-student traditions in the direction of directors;
- Strengthening literary literary dance and making this process "voluntary";
- integration of theory and practice, organization of practical exercises in creative institutions;
- master class, online meetings with participation of local and foreign experienced specialists;
- The necessary conditions for independent study, educational and methodical support, strengthening of information and technical support.

The timely, productive student-director's independent work is the guarantee of future artistic performances, holidays and performances, artistic and spiritual value of art and video.

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MODERN PROBLEMS OF INFORMATION AND COMMUNICATION TECHNOLOGIES

UDK 654.195.62

ORGANIZATION LOCAL RADIO WAVES WITH A WAVELENGTH $\Lambda=160\text{M}$ AND FREQUENCY WITH $1,600 \div 1835 \text{ KHZ}$ MIDDLE-WAVE DIAMETER

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Аннотация. Мақолада оптик толали алоқа линиялари базасидаги ахборот тизимларининг дунёда ва Ўзбекистондаги ривожланиш ҳолати ва истиқболлари баён қилинган. Шунингдек мақолада мавзуга оид адабиётлар таҳлил қилинган бўлиб, оптик толали алоқа линияларининг дунёда ва Ўзбекистондаги ҳолати келтирилган. Мақоланинг ёритиш методикаси сифатида ривожланган мамлакатлардаги оптик толали алоқа линияларининг ишлатилишдаги ютуқларнинг шарҳи ва таҳлили кўриб чиқилган.

Калит сўзлар: Оптик тола, спектр, ОТАЛ, POF, DWDM, PMMA, IP-TV, HDTV, TCTN (TASHKENT CITY TELEPHONE NETWORK), интернет, телекоммуникация.

Аннотация. В данной работе авторами излагаются состояние и перспективы развития информационных систем на базе ВОЛС в мире и в Узбекистане. А также в статье проанализированы литературы о тематике и приведены состояние волоконно-оптических линий связи в мире и в Узбекистане. В качестве методике изложения рассмотрены обзор и анализ достижения волоконно-оптических линий связи в развитых странах мира.



Ключевые слова: Оптическое волокно, спектр, ВОЛС, POF, DWDM, PMMA, IP-TV, HDTV, ТГТС (ТАШКЕНТСКАЯ ГОРОДСКАЯ ТЕЛЕФОННАЯ СЕТЬ), интернет, телекоммуникация.

Abstract: Abstract deals with use detecting and correcting errors in organization waves and radio communication lines, providing quality and reliable connection between central radio stations and their baseband units.

Keywords: Channel, frequency, radio, aerial, waves, magnification, system, connection.

Introduction. Before setting up medium radius ranges local radio lines with a wavelength $\lambda = 160\text{m}$ and frequency with $1,600 \div 1835\text{ kHz}$, we first need to study radio systems in this range.

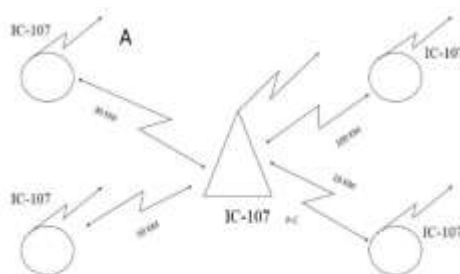
Short-to medium-wave electromagnetic radiation has a role and function in the radio. Using this feeder wave, we can create about 3000-2000 radio stations in long distances.

This characteristic of the short and medium wave is caused by the ionosphere waves of the waves and the properties of the barrier of the earth's globe. In the early days of the last century, in the radio communication, high-frequency radio equipment was not developed. There are also shortcomings in the middle and short circuits, one of which is the size of the antenna feeder devices. Therefore, the modeling of antenna feeder devices from the middle and the periphery is a process that requires much labor. At the stages of development of information technologies, modeling programs are enough. Antenna feeder modeling software for broadcasting devices is now a MMANA program.

Literature review. Having a large library of ready-made antenna files allows not only to find a suitable antenna, but also to check for con. Specific examples of the level of development of the program. Also given, though not directly related to

MMANA, but desirable for confident work and proper understanding results obtained, the basics of computer simulation antennas.

Research methodology. Central station radio waves of mid-wave range include “Transvir type” IC-107, operating at frequencies of 1.500mHz -30mHz on range of shortwave radios. For radio station (radio transmitting device), central station, established on basis of following scheme, should be centered in center or distribute radio waves in one direction.



Picture 1. Radio network structure operating in mid-wave diapason.

Antenna Types

You can use “delta loop” antenna for central station. Delta loop is called Delta in following sentences. Delta is a type of antenna or an “antenna” based antenna type. The word "Delta" is derived from Greek "D". A principal closed loop consists of three base points and the perimeter is in the form of a triangle $L_n = 1$, which has equal wavelengths in most cases. This antenna was tested in the U.S.A in 1925.

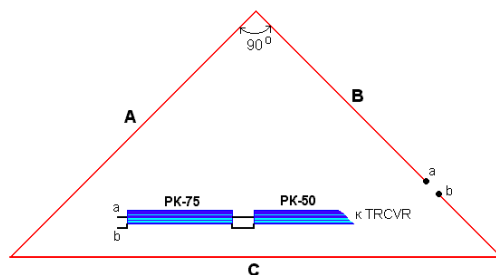
Here is a brief overview of Delta antenna specifications.

- 1) Delta-based antennas. Plate is an enlarged variant of vibrator type.
- 2) Magnification of antenna increases as a result of magnification of parameters of plate vibrator.
- 3) Antennas are classified as symmetrical antennas and can not be grounded, but at low frequencies, antenna is connected to ground with smaller frequencies less than wavelength.

4) Input resistance of Delta antenna is approximately $Z = 100 \div 400$ Ohm. If height of the antenna is higher, input resistance of antenna may be reduced to $Z = 80 \div 60$ ohm. In this case, antenna can be connected without coaxial cables with $Z = 50 \div 75$ Om.

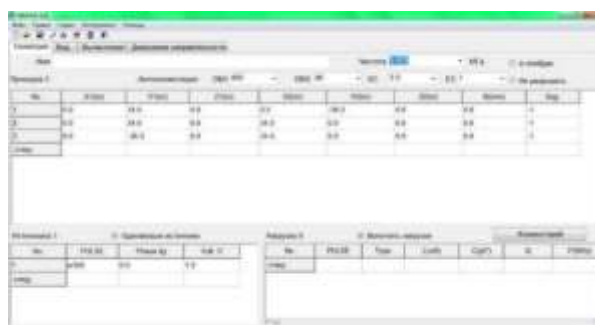
Analysis and results. Delta Loop Antenna Design.

Before installing the antenna, the soil type must be examined. We use the software built using the Delta Loop calculator to calculate the antenna perimeters. In this program, a 75Ω coaxial transformation is used between the antenna and the feeder when the antenna uses a 50-mm feeder (antenna and its connecting device).



Picture 2. An image of the delta antenna in the Delta Loop calculator.

Entering antenna parameters in MMANA program and calculate antenna's electrical parameters.



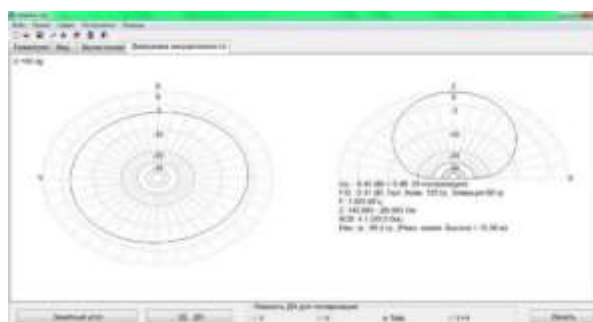
Picture 3. A description of the Geometry window of the Delta Loop antenna in the MMANA program.



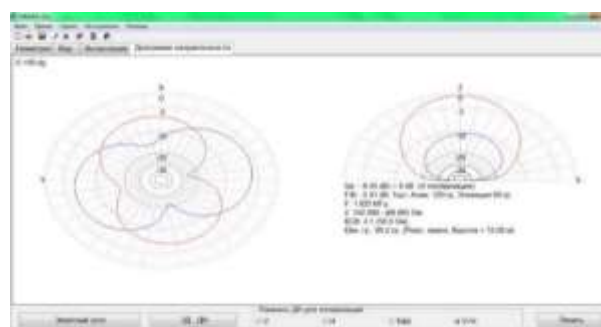
Picture 4. The image of the Delta Loop antenna in the MMANA program.



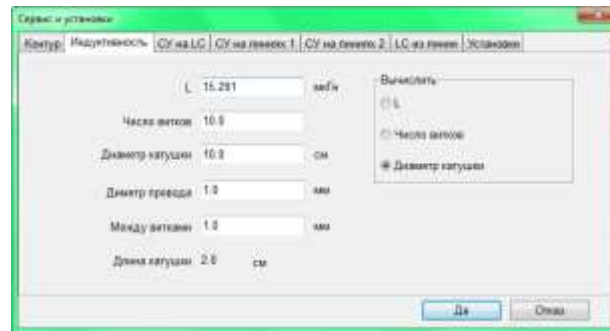
Picture 5. Image of the Delta Loop antenna in the MMANA Vicisleniya pane.



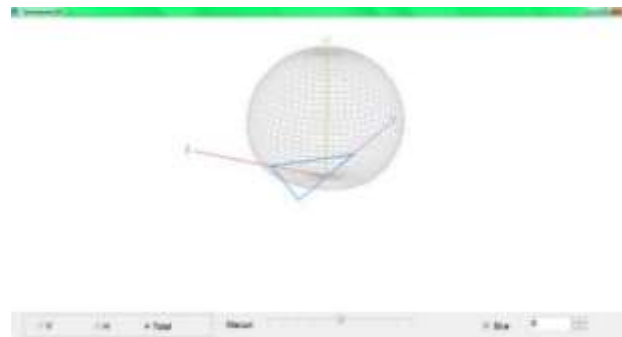
Picture 6. The schema of the Delta Loop antenna in the MMAN



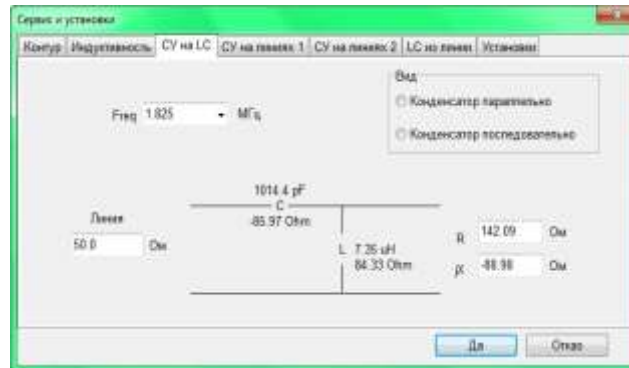
Picture 7. Vertical and horizontal wave propagation in the schema window of the Delta Loop antenna in MMAN



Picture 8. 3D view of the Delta Loop antenna in the MMANA schema window.



Picture 9. A connector for the Delta Loop antenna, a G-Simon Adjustable Inductive Roll Parameters tab.



Picture 10. Delta Loop Antenna Adapter Parameters.

T Shaped Aerials

The location of the radio station location of the subscriber and the constructive report of the antenna Subscriber stations are planned to be stationary (indoors) on the project, but stations can be installed in the vehicle body. Radio stations can be radio transmitters with type IC-107 or short-wave transmitters. The experiment shows that T-shaped G-symmetrical antennas can provide good results in a 160-meter diameter

wavelength with its simplicity of construction, electrical parameters. For T-cells, a T-Antenna is available. T shaped antenna was tested by American radiocrats Loven Windom in the 30s of the last century and achieved good results. That's why the name given to the antenna was named "WINDOM". In the 40s and 50s of the last century, it was called "American". One of the good things about the "T" antenna We can use the antenna for different antennas on small antennas. In these cases, the feeder can be connected to the antenna by a wire (in the classic version), the access point of the feeder determines the input resistance of the antenna. By changing the port, we can adjust the power of the transmitter connected to the antenna. We will consider the construction of the "T" shaped antenna. The design of the "T" shaped antenna is not so difficult. The length of the antenna is initially L, then the distance to the point of the feeder connected to the antenna is determined by X0. The length of the antenna is the antenna length L. below measures Lk The length of the antenna signal.

$$L = 0.95 * \lambda / 2 = 0.475 * \lambda$$

Here:

L-Antenna cable length (m)

l- Wavelength of Propositional Frequency (m)

Antenna's feeder port is determined by experiment. The probable connection point is determined by the following figure.

$$X0 = 0.17 l \quad (2)$$

The wavelength range ranges from 160 to 1860 kHz for radio couples ranging from 160 m to about 1960 kHz.

Radio frequency spectators are allowed to experiment with the frequency range 1840-1960.

$$l \text{ (m)} = 300 / (F) \quad (3)$$

we calculate the frequency wave length for 1.840kHz.

$$l \text{ (m)} = 300 / 1.840 \text{ kHz} = 163.04 \text{ m}$$

Antenna length L

$$L = 0.475 * l = 163 * 0.475 \sim 80\text{m}$$

The distance to the antenna point of the feeder

$$X_0 = 0.17 * l = 0.17 * 80 = 13.1\mu 13\text{m}$$

The resulting "T" shaped antenna looks like this.

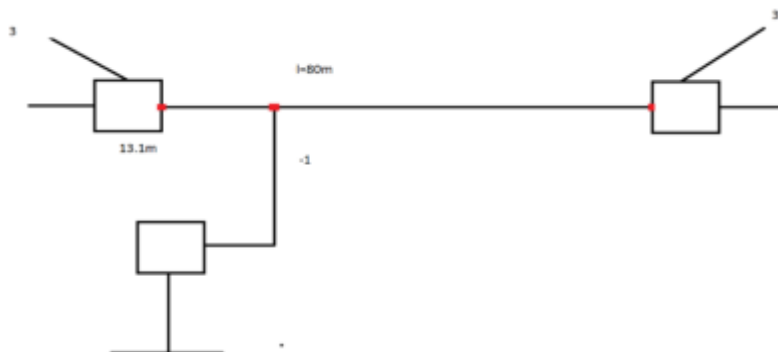


Figure 11. Designed T-shaped antenna's constructive look.

Conclusion/Recommendations

In summary , I can say that these studies and information can be used and taught as experimental training on “ Radiolocation Systems” which is in “ Telecommunication Technologies” .Also bands used in radio systems can be used in mobile and television standards.

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STATE AND PERSPECTIVES OF DEVELOPMENT OF INFORMATION SYSTEMS BASED ON CFL IN THE WORLD AND IN UZBEKISTAN

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Аннотация. Мақолада оптик толали алоқа линиялари базасидаги ахборот тизимларининг дунёда ва Ўзбекистондаги ривожланиш ҳолати ва истиқболлари баён қилинган. Шунингдек мақолада мавзуга оид адабиётлар таҳлил қилинган бўлиб, оптик толали алоқа линияларининг дунёда ва Ўзбекистондаги ҳолати келтирилган. Мақоланинг ёритиш методикаси сифатида ривожланган мамлакатлардаги оптик толали алоқа линияларининг ишлатилишдаги ютуқларнинг шарҳи ва таҳлили кўриб чиқилган.

Калит сўзлар: Оптик тола, спектр, ОТАЛ, POF, DWDM, PMMA, IP-TV, HDTV, TCTN (TASHKENT CITY TELEPHONE NETWORK), интернет, телекоммуникация.

Аннотация. В данной работе авторами излагаются состояние и перспективы развития информационных систем на базе ВОЛС в мире и в Узбекистане. А также в статье проанализированы литературы о тематике и приведены состояние волоконно-оптических линий связи в мире и в Узбекистане. В качестве методике изложения рассмотрены обзор и анализ достижения волоконно-оптических линий связи в развитых странах мира.

Ключевые слова: Оптическое волокно, спектр, ВОЛС, POF, DWDM, PMMA, IP-TV, HDTV, ТГТС (ТАШКЕНТСКАЯ ГОРОДСКАЯ ТЕЛЕФОННАЯ СЕТЬ), интернет, телекоммуникация.

Abstract. In the given work as authors are stated a condition and prospects of development of information systems on the basis of BOLC in the world and in Uzbekistan. And also in article literatures on subjects are analysed and resulted a condition of fiber-optical communication lines in the world and in Uzbekistan. In quality to a statement technique the review and the analysis of achievement of fiber-optical communication lines in the developed countries of the world are considered.

Keywords: Optical fiber, spectrum, FOCL, POF, DWDM, PMMA, IP-TV, HDTV, TCTN (TASHKENTCITYTELEPHONENETWORK), internet, telecommunication.

Introduction. Fiber-optic information transmission systems are one of the main transmission media in digital broadband systems with integrated services that connect urban PBX, as well as for transatlantic and intercontinental information exchange. Modern high-speed transmission technologies are based primarily on the use of fiber-optic media, which currently provide the highest possible throughput. That is why the technology of fiber-optic transmission media is currently rapidly developing throughout the world.

Literature review. Report of the II International Congress of UNESCO "Education and Informatics", held in Moscow in July 1996, Romanov V.P. et al. Use of precedent technology in strategic management // Bulletin of the Russian Economic Academy named after GV Plekhanov, Mardanov A.Z. The economic effects of the introduction of CRM. May 12, 2009, <http://www.cfin.ru/itm/crm/effects.shtml>, Albitov A., Solomatin E. CRM (Customer Relationship Management). <http://www.cfin.ru/itm/crm-review.shtml>, Palevich A. Risks of CRM implementation in banks. Journal "BDM. Banks and the business world ", № 133 for 2006. Publication date: 11/26/2007 http://www.cfin.ru/itm/crm/crm_bank.shtml

Research Methodology. The research methodology is the study and review of the prospects and development of fiber-optic communication lines in the world and in Uzbekistan Fiber-optical communication is a new technology for transmitting information over long distances without loss of signal quality. Due to its colossal bandwidth, fiber-optic communication lines are unique among other methods of transmitting large amounts of information. Research to improve the characteristics and parameters of FOCS and on the element, the base continues in all developed countries of the world. Nowadays, fiber-optic communication lines are being laid all over the world, which allow transmitting large amounts of information over considerable distances. This method became the basis of high-speed access to the Internet, significantly overtaking other popular methods of connection for key parameters.

For the next half a century incomplete, the construction of fiber-optic communication lines survived the present well-developed success:

In 1988, the construction of the first large-scale communication line between Japan and the USA was completed;



- In 2003, a signal transfer rate of about 11 Tbit/s was first achieved;
- In 2009, tests in the field of high-speed data transmission overcame a new frontier—scientists were able to broadcast a stream of 15.5Tbit/s without loss of speed over a distance of about 7,000 km.

Fiber-optic communication systems are now widely spread throughout the world, gradually crowding out other wired data transmission methods due to its features and unique characteristics. At present, communication lines based on fiber-optic connections are very popular all over the world. The demand for high-speed telecommunication technologies became apparent when mobile data consumption with 6 billion users is projected to grow to 40 trillion megabytes by 2016. As a result, today the telecommunications world operates with transmission networks at a speed of 100G (100Gbit/s). Therefore, progress does not stand still, and regularly there are messages about new technologies and achieved information transfer rates on telecommunication highways. Progress is mainly associated with the development of information transmission technology via modern fiber-optic cables. Hence, the basis of modern primary telecommunications networks has become an optical communication system. The creation of new-generation optical highways operating at multi-gigabit and terabit speeds required the development of a new network technology — compressed wave multiplexing (Dense Wave Division Multiplexing, DWDM). In this technology, the fiber-optical transmission system (FOTS) transmits information to the optical fiber at the same time by a large amount of light waves— λ . In addition, each wave is a separate spectral channel and carries its own information. Of particular note is that only DWDM technology performs multiplexing and switching of light signals without converting them into electrical form. The creation of the FOTS DWDM required the development of fiber-optic amplifiers that directly amplify light signals in the third window of optical



transparency in the range $\lambda = 1528\text{--}1565\text{nm}$, which corresponds to the frequency interval 192–196THz. The entire modern line of FOTS equipment is built according to a simple scheme 10G - 40G - 100G-400G-1T-.When transmitting a binary digital signal over an optical fiber with a speed of, for example, 10G or 10 Gbit/s. A bandwidth of $\sim 30\text{GHz}$ is required, which is less than one percent of the 4 THz bandwidth. Therefore, a new principle of constructing FOTS-spectral separation (SP), called DWDM, appeared. The ITU-T standard establishes frequency plans that determine the values of the center frequencies of the spectral channels in the linear spectrum of FOTS-SP in increments of 100, 50, 25, 12.5GHz. Using wave (frequency) multiplexers based on optical multilayer amplifiers operating in the above frequency range, as well as reducing the step between waves, for example, to 50 GHz and 25 GHz, allows you to increase the number of simultaneously transmitted wavelengths to 80–160, i.e. It provides the transmission of traffic at speeds of 800Gbit/s – 1.6Tbit/s in one direction over one OF. The emergence of optical amplifiers operating in the above range, as well as the reduction of the step between the waves, allowed Huawei in 2012 to create the world's first 400G DWDM backbone transmission system with a bandwidth of up to 20Tbit/s. one fiber at a distance of up to 1000 km without intermediate electrical regeneration. The system has the highest efficiency since it used the minimum pitch of 12.5 GHz. According to the latest news, specialists from Eindhoven Institute of Technology (the Netherlands) and the University of Central Florida (USA) have developed a FOTS-SP with a throughput of up to 255 Tbit/s. At this speed, the information in 1GB will be transferred in 31 microseconds, and 1 terabyte in 0.03 seconds. In recent years, fiber made entirely from polymeric materials — plastic (polymer) optical fiber (POF — Plastic / Polymer Optical Fiber) has become increasingly popular. Although the optical properties of polymeric materials do not allow plastic fiber to push quartz fiber out of the data transfer area, due to a number of distinctive features, it can

compete with both quartz fiber and copper lines (twisted pair, coaxial cable) in some applications. Moreover, it is safe to say that POF has already taken a worthy place in the telecommunications market. The subsequent increase in the flow of transmitted information, the emergence of an increasing number of systems requiring the transmission of a digital signal over short distances, as well as the development of industrial automation, led to the fact that optical fiber was increasingly used in short communication lines, especially where copper lines do not provide high-quality transmission of information. In this case, the task was to create an environment for signal transmission, which has all the advantages of optical fiber, but at the same time has a competitive cost in comparison with copper lines. Plastic optical fiber is a multimode fiber of large diameter, the core, and sheath of which are made of polymeric materials IEC-60793-2-40 standard identifies eight types of plastic fiber, differing in their structure and, as a result, optical characteristics. However, the most widespread plastic fiber with a core and shell diameter of 980/1000 μm and a stepped refractive index. The outer containment usually has a diameter of 2.2 mm. Polymethyl methacrylate (PMMA) is used as the core material, which is also known as plexiglass, acrylic, plexiglass, etc. The outer shell is usually made of polyethylene. In a plastic optical fiber, whose diameter is much larger than the diameter of quartz fiber (standard multimode quartz fiber has a size of 50/125 μm), a huge number of spatial modes of optical radiation can simultaneously propagate. This number can reach several million. The numerical aperture of plastic fiber (NA) has a value of about 0.5. Single-mode plastic fiber is not produced. Due to the large aperture of the plastic fiber, radiation input into it is much easier than in the case of fibers with a small core. Therefore, instead of expensive narrow-focus lasers or special focusing optics, POF transmitters use cheap LEDs with a wide angle of divergence emitting in the visible range. For POF, both standard connectors (ST, FC, SMA ...) and special design connectors (for example, the Versatile Link family from Avago Technologies)

are manufactured. Since the polymer material is easier to process than quartz, working with it requires less skill and time. The process of terminating is reduced to removing the outer sheath of the cable, splitting the fiber, installing the connector and polishing the end. Crimping tools are also needed for mounting some connectors. All necessary fixtures have a significantly lower cost than in the case of quartz fiber. Epoxy glue is usually not used.

Despite all these advantages, the unresolved question remains: what to do with the huge attenuation in polymer materials that is huge by the standards of fiber optic links? Indeed, POF has noticeable limitations on the speed and range of information transfer. Usually, plastic fiber-based lines have a length of the order of several tens of meters, and the maximum transfer rate is limited to about 200 Mbps (the transfer rate can reach several Gbit / s, but fibers with a different refractive index profile and multiplexing technology are used).

However, it is these restrictions and determines the scope of plastic fiber. In terms of the range and speed of transmission, POF will never be able to compete with quartz fiber. However, in non-extended networks, which, in addition, do not require high speeds, the advantages of plastic fiber, which have been written above, are manifested.

It is of particular interest to consider how things are in terms of the introduction of fiber-optic communication lines in the Republic of Uzbekistan. Now, namely, the introduction of new information delivery environments based on fiber optic links to improve the reliability of communication. In Uzbekistan. According to the instructions of the President of the Republic of Uzbekistan Islam Abduganievich Karimov (according to Resolution No. 307 of 1995 on August 1 of the Cabinet), the implementation of the national program for the reconstruction and development of

the telecommunications network of the Republic of Uzbekistan began. The goal of the program was to reconstruct the existing network and provide access to the global telecommunications network. This task was successfully completed. One of the timely resolved important issues was the task of constructing and commissioning the national Trans-Asia-Europe fiber optic link (TAE FOL) of the large-scale Trans-Asia-T Europe Optical Fabre Cable project. According to this project, it is planned to build cable communication lines in Europe and in Southeast Asia. It consists of representatives of all states through which the fiber optic cable line passes, namely the participation of this project by the participation of this international commission.

The construction of TAE FOCL led even more developed economic and cultural cooperation between the states of Asia and Europe. The network is stretched from Shanghai to Frankfurt-Main and passes through the territory of 18 states: China, the Republic of Central Asia, the Republic of the Transcaucasus, Turkey, Ukraine, Belarus, Poland, Hungary, Romania, Austria, Germany. The cable is laid under the water of the Caspian and the Black Sea. TAE FOCL (fiber optic communication line) is a high-quality telecommunication network built on the basis of fiber-optic lines. Without erroneous and distorted signal transmission is ensured by the use of digital transmission systems in it. The transmission speed of digital information signals is 622 Mbit/s and this makes it possible to organize all types of communication services. To reach the international network, the sale of information flows of the national segment to the neighboring state constitutes a sizeable part of the income that these lines give us and this will speed up the self-repayment of all expenses. The connection of the FOCL to the international network provided an opportunity for the republic to use new types of communication and led the modernization of the economic and political structure of society. For the first time in Uzbekistan, fiber optic lines are laid from the border of Kazakhstan (Abai village) to the border of Turkmenistan (Alat city) through the switching points of the city of Tashkent,

Gulistan, Dzhizak, Samarkand, Karshi, Bukhara. For the first time in the Bukhara-Nukus highway, the construction of a cable line was completed. And this made it possible to create a high-speed and high-quality communication line a thousand times, connecting them with the number of growing subscribers, and through this line, four television and four radio programs from the territory of Uzbekistan are transmitted via a separate channel. To date, the branch TSHTT laid 598.8 km of fiber-optic communication lines to 2,075 buildings. In 873 buildings in the city of Tashkent, an opportunity has been created to provide services to the public with a capacity of 22,344 ports based on FTTB technology.

Analysis and results. The development of telecommunications and information technologies is becoming an important and integral element of structural transformations and the rise of the country's economy, the growth of business and intellectual activity of society, the strengthening of the country's authority in the international community, the gradual formation of the information society. By the Decree of the President of the Republic of Uzbekistan of May 3, 22, UP-38 “On the Further Development of Computerization and Introduction of Information and Communication Technologies”, the most important priorities for the communications and informatization industry were identified: the widespread introduction of computer and information technologies in the real economy management, business, science and education; the creation of conditions for the wide access of various strata of the population to modern computer and information systems; organization of training highly qualified human resources in the field of information and communication technologies; development of ICT technical infrastructure throughout the country; stimulation of the development of domestic production of software products. In order to implement the state policy, determine and implement priority directions for the introduction and development of information and communication technologies, in 22 the Coordination Council was established under the Government

of the Republic of Uzbekistan, and the Uzbek Agency of Post and Telecommunications was transformed into the Uzbek Agency of Communication and Information with additional tasks assigned to it. related to the creation and development of national information systems, information resources, information technologies, and services. As a result of these projects, digital long-distance stations were installed in all regional centers of the republic, analogs were replaced and digital exchanges with a capacity of 84 thousand numbers were installed, fiber optic cable was installed on intercity and intraregional communication lines with a total length of 62 km, and upgrades were made 95 television and 4 radio transmitters, cellular telephony is rapidly developing and the number of Internet users is increasing, a system of CDMA wired radio access in the regions of the republic. Currently, the local network of the Republic has more than two thousand PBXs with a total installed capacity of 1.974 million numbers, of which the share of digital is 46%. The number of main telephone sets is more than 1.715 million pieces, the telephone density of 6.85 telephones per 1 inhabitant. The level of coverage by digital telecommunication networks of cities of the republic is 96.4%, the district centers of the republic are 72.5%. The level of coverage of rural settlements with telecommunications networks is 77.2%, including 33.3% digital. In short, networks and telecommunications facilities of the Republic of Uzbekistan today are a developing network of networks. The telecommunications system of Uzbekistan has direct international channels in 28 directions with access to 18 countries of the world, using fiber-optic and satellite systems.

Conclusion. In order to develop (high-speed) broadband access to the Internet and back up existing networks, more than 1,800 km of fiber optic communication lines were built with the installation of channel-forming equipment, including the development of a network using FTTB technology to over 4,000 administrative and residential facilities throughout the country bringing up to 105,116 ports.



The joint-stock company Uzbektelecom carried out work on the modernization of the IP / MPLS network of the TNTC branch, raising the speed at the trunk level to 100 Gbit/s based on the new DWDM transport network. The new network connected all districts of the city of Tashkent via high-speed optical channels. This project expanded dozens of times the capacity of the backbone data network, which ensured reliable and high-speed access for Tashkent city users to various services. This will contribute to the development of the provision of converged services such as the high-speed Internet, video telephony, IP-TV, Telecom TV, watching HDTV channels and others. A new DWDM line was commissioned at a speed of 100 Gbit/s in the Tashkent-Bukhara section. It should be noted that this is the first system operating at speeds up to 100 Gbit/s in the countries of Central Asia. In this system, the most advanced technologies of coherent reception and correction are applied, which significantly distinguishes the system from the traditional DWDM system operating at 10 Gbit/s.

Telecommunication networks of Uzbekistan today are experiencing a stage of the most active development and modernization. Full-scale and timely modernization of telecommunications networks is a necessary condition for the successful development of the country's economy. Based on the above, it follows that the large-scale implementation of fiber optic links in the Republic allows users to significantly reduce the need for a transmission medium for exchanging information of the necessary traffic. In light of the above, the problem of increasing the reliability of fiber optic links is relevant and timely in the Republic of Uzbekistan.

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USING THE METHODS OF NON-GPS NAVIGATION

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Annotatsiya – Hozirda mobil aloqa tizimlarida mobil stantsiyalarning manzillarini aniq aniqlaydigan GPS texnologiyalari yordamisiz ishlash mexanizmlari kuchaytirilishi zarur hisoblanadi. Bu taklifni amalga oshirish uchun ushbu maqolada ishlatiladigan Okamura-Xata va Wolfish-Ikegami usullarini taklif qilamiz. Ushbu ishning maqsadi - GPS vositalaridan foydalanib, kompleks tadqiqotchilarni va nazorat qiluvchi tashkilotlarning ish samaradorligini oshirishdir.

Kalit so'zlar - GSM, GPS bo'lmagan, NLOS, LOS, WIM, BTS, mobil stantsiya, BTS chastotasi oralig'i, Chastota, Okamura-Xato va Wolfish-Ikegami.

Аннотация - Мобильная связь должна быть улучшена за счет внедрения технологии без GPS, которая может точно определять местоположение мобильных станций. В этой статье мы предлагаем методы использования Okamura-Hata и Wolfish-Ikegami. Целью данной работы является проведение комплексных исследований особенностей и организации наблюдения объектов с помощью GPS.

Ключевые слова - GSM, Non-GPS, NLOS, LOS, WIM, BTS, мобильная станция, Диапазон рабочих частот передачи BTS, Частота, Окамура-Хата и Вольфиш-Икегами.

Abstract — Mobile communications must be enhanced by establishing a non-GPS technology that can detect the positions of mobile stations precisely. In this paper, we propose methods of Okamura-Hata and Wolfish-Ikegami used. The purpose of this work is carrying out of complex researchers of features and the supervision organization objects by means of GPS.

Keywords — GSM, Non-GPS, NLOS, LOS, WIM, BTS, mobile station, Band of operational frequencies of transmission BTS, Frequency, Okamura-Hata and Wolfish-Ikegami.

INTRODUCTION. In mobile communications, the establishment of very precise mobile station detection technologies is an important goal. Some of the existing technologies utilize only the mobile communication system itself. One example is the cell-based mobile location approach. The subject of researchers in mobile systems GSM on Non-GPS navigation. The purpose of this work is carrying out of complex researchers of features and the supervision organization objects by means of GPS.

LITERATURE REVIEW. For the achievement of the given purpose, it was necessary to solve the following problems.

To consider types of control mobile systems and to show advantages of application GPS navigation control systems, mobile objects. At carrying out of researches in the given work results can be used practically for an authentic estimation capacity of supervision mobile objects on GPS and workings out of recommendations. Because of the spent researchers following scientific results are received.

Features and advantages of application and exact calculation of trajectory GPS by the mobile system and using method tensor are shown in a dual network. In the research the cover zone of one basic station two methods - a method the Okamura-Hata and a method Wolfish-Ikegami settles. During calculations, it will be proved

that the difference in calculations by the given methods is insignificant. At term performance, it is required to define cover zone BTS of standard GSM, allocated according to the job in regions of Tashkent, using two methods.

The covering cell radius is defined in three directions: the north, the southeast, and the southwest. It is necessary to define also the MS cover zone one of the offered methods (on a choice). On the drawing to specify the configurations of cover zones BTS received by various methods, and the MS cover zone. The height of the antenna a mobile station (MS) is accepted equal 1,5 m.

Table 1

Height suspension antennas BS

Height of rising of antenna BS h BTS, m	40
Standard GSM	1800
Calculation models	COST231- Xara

Table 2

Standard values of parameters BTS and the MS

Designation	The name and unit of measure	Value
PT_x BTS	The capacity of transmitter BTS, dBWt	13
GT_x BTS	Factor transmitting antenna BTS gains, dB	18
$f T_x$ BTS	Band of operational frequencies of transmission BTS, MHz	935-960
PR_x BTS	The sensitivity of receiver BTS, dBWt	-138
GR_x BTS	Factor receiving antenna BTS gains, dB	18
fR_x BTS	Band of operational frequencies of reception BTS, MHz	890-915

PT_x MS	The capacity of the transmitter of the MS, dBWt	-3
GT_x MS	Factor gains of the transmitting antenna of the MS, dB	0
fT_x MS	Band of operational frequencies of transmission of the MS, MHz	890-915
PR_x MS	The sensitivity of the receiver of the MS, dBWt	-104
GR_x MS	Factor gains of the receiving antenna of the MS, dBWt	0
fR_x MS	Band of operational frequencies of reception of the MS, MHz	935-960

The lay of the land in service area Δh_{BTS} systems of mobile radio service is defined on a district map taking into account layout of three-sector antenna K730380 in location BTS.

The coefficient of the coordination of the antenna with a wireless signal on polarization (for the transmitter and the receiver) is accepted by the equal

$$\xi_{R_x} = \xi_{T_x} = 0,9 \quad (1)$$

The efficiency of transferring and receiving feeders is accepted by the equal

$$\eta_{FT_x} = \eta_{FR_x} = 0,95 \quad (2)$$

Determination of a cover zone three-sector BTS by means of prediction models, the registration of propagation loss of radio-waves. The basis of territorial planning is made by energetic calculation in which process the architecture of a network and its space coordinates taking into account quality of service and information loading is defined. The given quality of the accepted signal is defined by the sensitivity of the receiver. In a general view, the transmission equation can be presented as:

$$P_{R_x} = \frac{P_{T_x} \eta_{T_x} G_{AT_x} \zeta_{T_x} G_{AR_x} \eta_{R_x} \zeta_{R_x}}{L_{\Sigma}} \quad (3)$$

Where P_{R_x} - capacity of a wireless signal on a receiver input (it is defined by sensitivity of the receiver);

P_{T_x} - The capacity of the transmitter;

η_{T_x}, η_{R_x} - efficiency of transferring and receiving feeders;

G_{AT_x}, G_{AR_x} - gain amounts of transferring and receiving antennas;

ζ_{T_x}, ζ_{R_x} - coefficients of the coordination of antennas with a wireless signal on polarization;

L_{Σ} - Total attenuation of radio-waves on a route.

Value of capacity of a wireless signal on a receiver input is convenient for expressing in decibels concerning watt. Thus, the equation becomes:

$$P_{R_x} (dB / Wt) = P_{T_x} (dB / Wt) + \eta_{T_x} (dB) + G_{AT_x} (dB) + \zeta_{T_x} (dB) + G_{AR_x} (dB) + \eta_{R_x} (dB) + \zeta_{R_x} (dB) - L_{\Sigma} (dB) \quad (4)$$

Under this formula, it is simple to define the total energetic losses arising on a route of radio propagation

$$L_{\Sigma} (dB) = P_{T_x} + \eta_{T_x} + G_{AT_x} + \zeta_{T_x} + G_{AR_x} + \eta_{R_x} + \zeta_{R_x} - P_{R_x} \quad (5)$$

For BTS total attenuation of radio-waves on a route is equal:

$$L_{\Sigma_{BTS}} (dB) = P_{T_x} + \eta_{T_x} + G_{AT_x} + \zeta_{T_x} + G_{AR_x} + \eta_{R_x} + \zeta_{R_x} - P_{R_x} = 138,7 (dB) \quad (6)$$

For the MS total attenuation of radio-waves on a route is equal:

$$L_{\Sigma_{MS}} (dB) = P_{T_x} + \eta_{T_x} + G_{AT_x} + \zeta_{T_x} + G_{AR_x} + \eta_{R_x} + \zeta_{R_x} - P_{R_x} = 156,7 (dB) \quad (7)$$

Let's define total attenuation of radio-waves as losses of propagation for the appropriate type of terrain L_c the correction and considering the lay of the land L_{CLL} :

$$L_{\Sigma} = L_c + L_{CLL} \quad (8)$$

Research methodology. Let's define the correction, considering a lay of the land. For this purpose around rough location BTS on a map of the city we select a

place which will satisfy simultaneously to following conditions:

In the given operation the three-sector antenna is used, we divide terrain into 3 sectors: sector A - 0° , sector B - 120° , sector C - 240° .

1. From BTS the MS:

$$f_0 = 1850 \text{ MHz}$$

$$a(h_m) = [1, 1 \log(1850) - 0,7] 1,5 - [1,56 \log(1850) - 0,8] = 0,044$$

$$A = A(f_0, h_b, h_m) = 46,3 + 33,9 \log(1850) - 13,83 \log(40) - 0,044 = 134,8566 \quad (9)$$

$$B = B(h_b) = 44,9 - 6,55 \log(40) = 34,40650 \quad (10)$$

$$L_C = A + B \log(r) \quad (11)$$

2. From the MS to BTS:

$$f_0 = 1750 \text{ MHz}$$

$$a(h_m) = [1, 1 \log(1750) - 0,7] 1,5 - [1,56 \log(1750) - 0,8] = 0,04187 \quad (12)$$

$$A = A(f_0, h_b, h_m) = 46,3 + 33,9 \log(1750) - 13,83 \log(40) - 0,04187 = 134,04063 \quad (13)$$

$$B = B(h_b) = 44,9 - 6,55 \log(40) = 34,40650$$

$$L_C = A + B \log(r) \quad (14)$$

From BTS_0 to the MS

$$\text{At } h = 81; L_{CLL} = \frac{2,5 + 3,5}{2} = 3 \text{ dB} - \text{sector A} - 0^\circ \quad (15)$$

$$\text{At } h = 172; L_{CLL} = \frac{7,5 + 10}{2} = 8,75 \text{ dB} - \text{sector B} - 120^\circ \quad (16)$$

$$\text{At } h = 142; L_{CLL} = \frac{6 + 8}{2} = 7 \text{ dB} - \text{sector C} - 240^\circ \quad (17)$$

Let's define losses of propagation for the appropriate type of terrain:

From BTS_0 to the MS:

$$L_C = L_E - L_{CLL} = 138,7 - 3 = 135,7 \text{ dB} - \text{Sector A} - 0^\circ \quad (18)$$

$$L_C = L_E - L_{CLL} = 138,7 - 8,75 = 130,2 \text{ dB} - \text{Sector B} - 120^\circ \quad (19)$$

$$L_C = L_E - L_{CLL} = 138,7 - 7 = 131,7 \text{ dB} - \text{Sector C} - 240^\circ \quad (20)$$



From the MS to BTS:

$$L_C = L_E - L_{CLL} = 156,7 - 3 = 134,7dB - \text{Sector A} - 0^\circ \quad (21)$$

Sector A - 0° :

$$r = 10^{\frac{L_C - A}{B}} = 10^{\frac{135,7 - 134,8566}{34,40650}} = 1,058km$$

From BTS₂ to the MS

$$\text{At } h = 136; L_{CLL} = \frac{5+7}{2} = 6dB - \text{sector C} - 240^\circ \quad (22)$$

Let's define losses of propagation for the appropriate type of terrain:

From BTS₂ to the MS:

$$L_C = L_E - L_{CLL} = 138,7 - 6 = 132,7dB - \text{Sector C} - 240^\circ \quad (23)$$

Sector A - 0° :

$$r = 10^{\frac{L_C - A}{B}} = 10^{\frac{132,7 - 134,8566}{34,40650}} = 0,473km$$

From the MS to BTS:

$$L_C = L_E - L_{CLL} = 156,7 - 6 = 150,7dB - \text{Sector C} - 240^\circ \quad (24)$$

$$r = 10^{\frac{L_C - A}{B}} = 10^{\frac{150,7 - 134,8566}{34,40650}} = 2,887km$$

From BTS₃ to the MS

$$\text{At } h = 175; L_{CLL} = \frac{7+10,1}{2} = 8,55dB - \text{sector B} - 120^\circ \quad (25)$$

Let's define losses of propagation for the appropriate type of terrain:

From BTS to the MS:

$$L_C = L_E - L_{CLL} = 138,7 - 8,55 = 130,15dB - \text{Sector B} - 120^\circ \quad (27)$$

Sector A - 0° :

$$r = 10^{\frac{L_C - A}{B}} = 10^{\frac{130,15 - 134,8566}{34,40650}} = 0,727km$$

From the MS to BTS:

$$L_C = L_E - L_{CLL} = 156,7 - 8,55 = 148,15 \text{ dB} - \text{Sector B} - 120^\circ \quad (28)$$

$$r = 10^{\frac{L_C - A}{B}} = 10^{\frac{148,15 - 134,8566}{34,40650}} = 2,434 \text{ km}$$

The model allows estimating attenuation under the formula

$$L_C = 46,3 + 33,9 \log(f_0) - 13,83 \log(h_b) - a(h_m) + [44,9 - 6,55 \log(h_b)] \log r + C \quad (29)$$

Where With - a constant: for average cities and suburbs with moderate vegetation $C=0$ and for centres of big cities $C = 3$.

$h_b = 40 \text{ m}$ - Height of the antenna of the basic station

$h_m = 1,5 \text{ m}$ - Height of the antenna of the mobile station

Analysis and results

Table 3

Results of calculations of the model of Okomura and the Hut

The direction of sector BTS concerning the joint venture, hailstones.	Propagation loss, LP, дБ		The expected distance between BTS and the MS, km			The expected distance between the MS and BTS, km		
	BTS-MS	MS-BTS	BTS ₀	BTS ₂	BTS ₃	BTS ₀	BTS ₂	BTS ₃
Sector C	135,7	134,7	1,058			1,045		
Sector South-eastern	130,2		0,732		0,727			2,434
Sector South-east	131,7		0,809	0,473			2,887	

The model, WIM distinguishes two cases LOS (direct visibility) and NLOS (non-line-of-sight, i.e. in case of indirect visibility). In case of LOS if on a straight line of propagation of a signal from the transmitter and the receiver there are no barrages the WIM-model is described by the equation:

$$L_{LOS} = 42,64 + 26 \log d_{km} + 20 \log f_{MHz}, d_{km} \geq 0,02 \quad (30)$$

Losses in free space:

$$L_{f_s} = 32,45 + 20 \log d_{km} + 20 \log f_{MHz} \quad (31)$$

$$L_{LOS} = L_{f_s} + 10,19 + 6 \log d_{km} = L_{f_s} + 6 \log(50 \text{ dkm}) = L_{f_s} + 6 \log\left(\frac{d_{km}}{20}\right) \quad (32)$$

The parameters also used in NLOS WIM: h_b - the height of the antenna of basic station (40-50 m from the earth); h_m - the height of the antenna of the subscriber (1-3 m from the earth); h_B - the height of buildings;

$\Delta h_b = h_b - h_E$ - Height of the antenna of the basic station from the level of roofs; distance between buildings (20-50);

ω - width of streets (it is normal $b/2$);

Now we consider some variants in case of NLOS WIM.

$\Delta h_b > 0$:

$$L_{NLOS} = 69,55 + 38 \log d_{km} + 26 \log f_{MHz} - 10 \log \omega - 9 \log b + 20 \log h_m - 18 \log(1 + h_b) + L_{LOS} \quad (33)$$

$\Delta h_b \leq 0, d_{km} \geq 0,5$:

$$L_{NLOS} = 69,55 + \quad (34)$$

$h_b \leq 0, d_{km} < 0,5$:

$$L_{NLOS} = 69,55 + \quad (35)$$

As a rule, city regions are built up by unequal height buildings. The width of streets and distance between buildings also fluctuate largely. Therefore at calculation on model WIM, some conditions are accepted:

The height of one floor in a residential building is accepted equal 3 m;

In one-storied residential buildings the height of a no planar roof is accepted equal 2m;

Distance between one-storied buildings is not less than 5 m;

Width of the streets which have been built up with one-storied houses not less 10m;

The distance between many-storied buildings is accepted equal 20m;

The width of the streets which have been built up with many-storied buildings is accepted region 20 m;

The height of one floor in office educational and etc. a location is accepted regions 3,5 m;

The height of one floor of the industrial enterprise is accepted regions 7,5 m.

Hence, it is necessary to know the per cent of the building of the region in which antenna BS, is allocated by buildings of various type. On the basis of it the average height of buildings, average distance between buildings and an average width of streets for all regions defined in the job is defined.

Building height on which antenna BS will be allocated, it is not recommended to average. Knowing the height of this building and height of position of antenna BS according to the job, it is possible to define h_b - the height of the antenna of the basic station from the level of roofs.

$$h_b = 40m, h_m = 1,5m$$

$$h_B = \frac{27 + 27 + 27 + 10}{4} = 22,75m \quad (36)$$

$$h_b = h_b - h_B = 40 - 22,75 = 17,25m \quad (37)$$

$$b = 24m, \omega = 12m$$

LOS:

$$d_{km} = 10^{\frac{L_C - 42,64 - 20 \log f}{26}} \quad (38)$$

NLOS:

$$d_{km} = 10^{\frac{L_C - 69,55 - 26 \log f + 10 \log \omega + 9 \log b - 20 \log h_m + 18 \log(1 + h_b)}{38}} \quad (39)$$

From BTS₀ to the MS: $f_0 = 1850MHz$ Sector A - 0°:

LOS:



$$d_{km} = 10^{\frac{135,7 - 42,64 - 20 \log 1850}{26}} = 11,641843 \text{ km}$$

NLOS: service station attendant

$$d_{km} = 10^{\frac{135,76 - 69,55 - 26 \log(1850) + 10 \log(12) + 9 \log(24) - 20 \log(1,5) + 18 \log(1 + 17,25)}{38}} = 4,2330 \text{ km}$$

From the MS to BTS: $f_0 = 1750 \text{ MHz}$

Sector A- 0° :

$$d_{km} = 10^{\frac{134,7 - 69,55 - 26 \log(1750) + 10 \log(12) + 9 \log(24) - 20 \log(1,5) + 18 \log(1 + 21,4)}{38}} = 5,056 \text{ km}$$

BTS₃ to the MS: $f_0 = 1850 \text{ MHz}$ Sector B - 120° :

LOS:

$$d_{km} = 10^{\frac{130,15 - 42,64 - 20 \log 1850}{26}} = 7,1529 \text{ km}$$

NLOS:

$$d_{km} = 10^{\frac{130,15 - 69,55 - 26 \log(1850) + 10 \log(12) + 9 \log(24) - 20 \log(1,5) + 18 \log(1 + 21,4)}{38}} = 3,01231 \text{ km}$$

From the MS to BTS: $f_0 = 1750 \text{ MHz}$

Sector B- 120° :

$$d_{km} = 10^{\frac{148,169,55 - 26 \log(1750) + 10 \log(12) + 9 \log(24) - 20 \log(1,5) + 18 \log(1 + 21,4)}{38}} = 10,721 \text{ km}$$

From BTS₂ to the MS: $f_0 = 1850 \text{ MHz}$ Sector C - 240° :

LOS:

$$d_{km} = 10^{\frac{132,7 - 42,64 - 20 \log 1850}{26}} = 8,965 \text{ km}$$

NLOS:

$$d_{km} = 10^{\frac{132,7 - 69,55 - 26 \log(1850) + 10 \log(12) + 9 \log(24) - 20 \log(1,5) + 18 \log(1 + 21,4)}{38}} = 3,5161 \text{ km}$$

From the MS to BTS: $f_0 = 1750 \text{ MHz}$

Sector A- 0° :

$$d_{km} = 10 \frac{150,7 - 69,55 - 26\log(1750) + 10\log(12) + 9\log(24) - 20\log(1.5) + 18\log(1 + 21,4)}{38} = 12,5km$$

Results of calculation we tabulate.

Table 4

Results of calculations of the model of Wolfish-Ikegami (WIM)

The direction of sector BTS concerning the joint venture, hailstones.	Propagation loss, LP, дБ		The expected distance between BTS and the MS, km			The expected distance between the MS and BTS, km		
	BTS-MS	MS-BTS	BTS ₀	BTS ₂	BTS ₃	BTS ₀	BTS ₂	BTS ₃
Sector C	135,7	134,7	4,238			5,056		
Sector South-eastern	130,2		3,022		7,1529 /3,012			10,72 1
Sector South-west	1131,7		3,309	8,965/ 3,516			12,51 3	

CONCLUSION. Maintenance of reliable and steady functioning of networks of mobile radiotelephone (cellular) communication with the account requirements of information security. Modern radio-electronic equipment GSM represents a difficult complex which structure except most GSM includes a control system of processes in GSM. Now, modern mobile systems are used for many purposes. This work is devoted to one of the types of information technology GPS, which gives the information from time and a position of investigated objects. Now, this technology is very important because it gives the information on navigation and management of objects and for the definition to people of ways in cities and everywhere where this inquiry is necessary for them. For reliable work GPS, it is necessary to demand much on the reliable work of mobile system GSM. Therefore, the research problem of methods of the check of the working capacity of mobile GPS object is actual.



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