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ВЕСТНИК

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
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NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабаршысы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабаршысының Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді мультидисциплинарлы контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

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MORPHOLOGICAL AND MOLECULAR BIOLOGICAL DETERMINANTS OF REPEATED IMPLANTATION FAILURE

Abstract. The evolution of assisted reproductive technology (ART) from classical in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) to the era of predictive models using artificial intelligence has led to a worldwide reproductive revolution in recent years. But despite the significant development of ART, there is still a high prevalence of failed IVF attempts. Thus, although ART improves overall outcomes for infertile couples, some problems still remain unresolved, such as repeated implantation failure (RIF). The term RIF is applicable only in IVF programs. RIF is a complex and urgent problem of modern reproductology. It has a wide range of understudied etiological factors and pathogenesis mechanisms. The pathogenesis of implantation failures is based on a variety of polygenic and polymorphic mechanisms of defective receptivity due to disturbance of endometrial architectonics. Management of RIF should be individualized taking into account its pathogenesis patterns using methods based on the principles of evidence-based medicine. Randomized clinical trials with large statistical samples and with a thorough consideration of clinical and morphological patterns are necessary to understand the mechanisms of its realization further and to overcome the problem.

Key words: in vitro fertilization, repeated implantation failure, assisted reproductive technology.

The evolution of ART from classical IVF and intracytoplasmic sperm injection (ICSI) to the era of predictive models using artificial intelligence has led to a worldwide reproductive revolution in recent years. The etiology of infertility is considered multifactorial, and some of its key aspects include genetic abnormalities of male and female origin, ovulation disorders, tubal obstruction, uterine or peritoneal disorders associated with female infertility, as well as male factors, such as poor sperm quality [2]. In 2019, the European Society for Human Reproduction and Embryology (ESHRE) published a press release based on statistical analysis of a large data set. According to them, 20–30% of infertility is associated with male factors, 20–35% is associated with female etiology, and 25–40% is a combination of female and male infertility factors. The remaining 10–20% are classified as idiopathic infertility, and most of these couples suffer from repeated implantation failure (RIF) [3].

Thus, despite the significant development of ART, there is still a high prevalence of failed IVF attempts. There are many studies and reviews focused on various factors, from uterine anatomy and endometrial receptivity to connective tissue disorders and immunological factors that negatively or

positively affect IVF success rates. Although ART improves overall outcomes for infertile couples, some problems still remain unresolved, such as RIF.

The term RIF is applicable only in IVF programs. Although there is no generally accepted formal definition of repeated failure of implantation, Orvieto et al (2015) offer a definition that implies three unsuccessful in vitro fertilization cycles with good quality embryo transfer [4]. Researchers at Zeyneloglu et al (2014) agree that this clinical situation can be established after three failed IVF cycles, especially when transferring two high-quality embryos [5]. The data of Simon, Laufer et al (2012) add to the definition that anatomical disorders of the embryo and a decrease in the receptivity of the endometrium can play a key role in the development of RIF [6]. To define RIF, it is also important to take into account the age of the mother and determine whether the embryos were transferred at the stage of fragmentation or blastocyst [7]. Coughlan et al (2014) offer a more complete working definition based on maternal age, number of embryos transferred, and number of completed cycles. They define RIF as non-occurrence of clinical pregnancy after 4 transfers of “fresh” or thawed good embryos in women under 40 years of age [8]. In the clinical protocol of the Ministry of Health of the Russian Federation in 2019, such a clinical situation is called “Repeated unsuccessful attempts at transferring embryos (implantation)” and refers to it as cases of 3 unsuccessful attempts at elective (eSET or eDET) transfer of “fresh” or thawed embryos in women under 35 years of age, and 2 - in women 35 years of age and older, in the absence of any factors that reduce the chances of pregnancy [9].

Failure to implant embryos may be due to female, male, or fetal factors, or a specific type of IVF protocol. Each clinical situation should be carefully studied to determine the most likely etiology of the disease, since RIF is a complex problem with several variables. There are many risk factors for RIF, including maternal age, smoking of both parents, increased body mass index and stress level [10,11,12,13,14]. Immunological factors, such as the level of cytokines and the presence of specific autoantibodies, as well as any infectious pathogens leading to chronic endometritis, should be investigated in each individual patient with RIF. Uterine neoplasms, such as polyps and fibroids, and congenital anatomical abnormalities should also be excluded. Sperm analysis, preimplantation genetic screening and endometrial receptivity should be reviewed and evaluated. RIF in order to propose new solutions and develop individual approaches for specific patients or groups of patients.

Pathogenetic mechanisms of implantation failures. Endometrial receptivity. You cannot talk about implantation without considering such an important aspect of a woman’s reproductive system as endometrial receptivity. Implantation is a complex process resulting from the correct interaction between the endometrium and the blastocyst. According to various estimates, only 30% of all implantation failures account for embryonic abnormalities, while the suboptimal susceptibility of the endometrium and the altered dialogue between embryos and endometrium are responsible for the remaining two-thirds [15]. Endometrial susceptibility has been the subject of extensive debate for over 80 years since Rock and Bartlett et al described histological changes in the endometrium in the implantation window in 1937 [16]. From that moment, a tremendous path has been made in the study of endometrium, and flow cytometry and advances in molecular biology have allowed further studies of the cross-linking between the embryo and endometrium [17]. Omics also greatly helps in the study of receptivity and implantation. It is the field of research with highly sensitive methods that allow simultaneous study of changes at various molecular levels: genomics, transcriptomics, proteomics, metabolomics, etc. Understanding the physiology and pathophysiology of the human endometrium is being revolutionized through the use of omics [18].

Although recent advances have led to a deep understanding of the processes associated with the cross-dialogue between the embryo and the endometrium during implantation, the cause of their impairment remains a mystery, and significant progress in transforming the findings into clinically relevant prognostic tests and treatments for suboptimal susceptibility of the endometrium has not been achieved.

The susceptibility and selectivity of the endometrium are two complementary concepts introduced to describe the endometrium as a biosensor that evaluates the quality of the embryo [19]. Selectivity is a built-in programmed function of the endometrium for recognition and rejection of embryos with reduced development potential. On the contrary, susceptibility allows the endometrium to provide an optimal environment for embryo development and placenta formation.

An extensive meta-analysis of 2019, which included 163 studies (88834 women) [20], allowed to identify the main markers of endometrial receptivity:

– Ultrasound markers evaluated on the day the ovulation trigger is administered and on the day of embryo transfer:

- Endometrial thickness;
- Three-line structure;
- Endometrial volume;
- Pulsation index of the uterine arteries;
- Resistance indicators in the uterine, arcuate, radial, basal and spiral arteries;
- Uterine contractions on the day of embryo transfer;
- Markers in endometrial biopsy:
 - BLC6;
 - α -Inhibin;
 - β -Glycan;
 - luminal integrin $\alpha v \beta 3$;
 - L-selectin ligand;
 - Aromatase P450;
 - vascular endothelial growth factor A;
 - expression of matrix metalloproteinases and E-cadherin;
 - alpha-2 PEG;
 - hCG-LH receptor;
 - LIF (leukemia inhibitory factor);
 - colony-stimulating macrophage factor;
 - HOXA-10;
 - Counting pinopods by electron microscopy (at least 60 fields at $\times 2000$ magnification);
 - ERA;
- Markers in endometrial fluid aspirate:
 - Concentration of hDP 200 (Human decidua-associated protein 200);
 - LIF (leukemia inhibitory factor);
 - TNF- α ;
 - IL-18;
- Hysteroscopic assessment:
 - ring type of arrangement of glands and the presence of well-developed varicose vessels;
 - Endometrial blood flow >29 mL/min/100 g.

While some studies in this 2019 meta-analysis showed high sensitivity in assessing endometrial receptivity by certain markers, others showed opposite data. Therefore, it is impossible to draw conclusions regarding the clinical use of certain markers in the practice of a reproductologist, although many authors distinguish ultrasound criteria, as well as the ERA test, as the most effective [21,22,23]. The main factor limiting the quality of evidence supporting the sensitivity of endometrial receptivity markers, measured by biopsy, fluid aspirate, ultrasound, or hysteroscopy, was inaccuracy in the studies. Most markers have so far been studied only in small samples, and that leads to uncertainties regarding its reproducibility, their true effect, and clinical value.

Immunological mechanisms. In the recent years great importance has been given to the immunological mechanisms of the formation of endometrial insufficiency in the study of the etiopathogenesis of repeated implantation failures, especially in the absence of a macroscopic substrate or signs of chronic endometritis.

Uterine NK cells, Uterine Natural Killer (uNK) are primarily responsible for the implementation of the immune response in the uterine cavity. They come from the NK cell line and differ in the marker CD56 +, however, they do not have the same ability to destroy cancer cells and other foreign HLA class 1 molecules, therefore, they do not have a harmful effect on the implanted embryo. Due to the similar phenotype, CD117 + CD94-CD3-, it is likely that peripheral NK cells at the 3 stages of their development migrate to the endometrium and complete their maturation and development already there, subsequently becoming uNK cells [24]. In fact, they are the dominant type of immune cells in the uterine mucosa, and it has been suggested that they play a role in trophoblast invasion and increased blood flow through the

spiral arteries. Measuring the level of uNK cells seems difficult, as it fluctuates during the menstrual cycle due to changes in the level of progesterone and other hormones. As a result, any change in hormonal levels in healthy fertile women can affect the level of uNK cells without any effect on the outcome of pregnancy.

During implantation, uNK through paracrine signals stimulate endometrial epithelial cells to produce IL-15, VEGF, and other factors that can regulate the proliferation of uNK cells. An immune paracrine connection between uNK and endometrial epithelial cells promotes implantation and development of trophoblast [25].

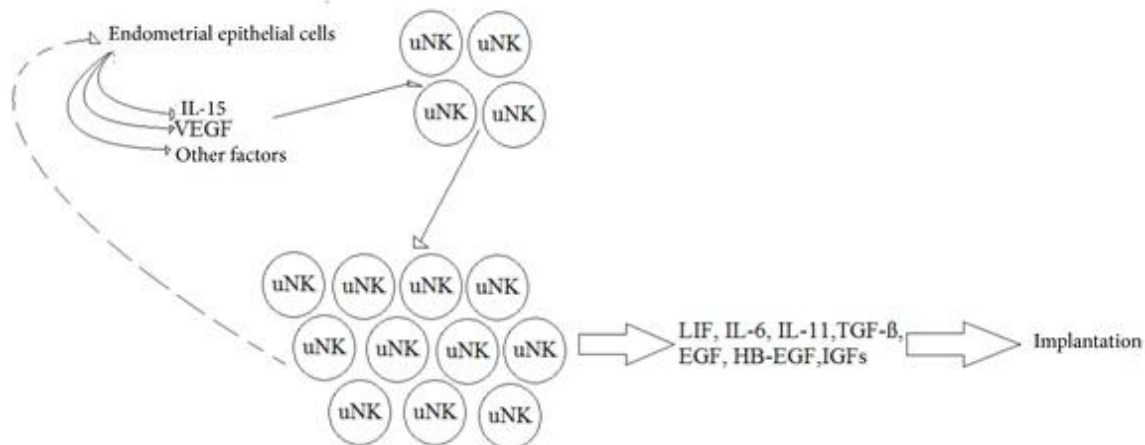


Figure 1 – Schematic representation of the role of uNK in implantation

A study published by Santillan et al (2015) showed that both peripheral NK cells and uNK levels are elevated in patients with failed implantation. Blood NK cell levels were $13.4 \pm 1.2\%$ (range 2.63–29.01) in patients with repeated failure of implantation and $8.4 \pm 0.7\%$ (range 5.72–13.28) in the control group. uNK levels were measured using an endometrial biopsy, and levels exceeding 250 CD56+ cells in a $400\times$ high power field were detected in 53% of patients with idiopathic implantation failures and only 5% in the control group. These measurements became possible by imaging uterine NK cells with immunohistochemical staining. Although thresholds still require standardization, NK cell analysis may ultimately prove useful for women suffering from idiopathic repeated implant failure [26]. On the other hand, a meta-analysis by Seshadri et al (2014), aimed at determining the role of NK cells in both peripheral blood and the uterus in infertility, revealed some conflicting data on their role. There were no significant differences in peripheral (SMD -0.33; 95% CI -1.06; 0.40; $P = 0.37$) and uterine (SMD -1.82; 95% CI -4.80; 1.17; $P = 0.23$) NK cell levels, expressed as percentages, although in studies in which they were expressed as numerical values, there were significantly higher levels of peripheral NK cells in infertile women (SMD 3.16; 95% CI 1.07; 5.24; $P = 0.003$). In addition, NK cell levels are apparently not related to the birth rate in people undergoing IVF programs (RR 0.57; 95% CI 0.06; 5.22; $P = 0.62$). This study also recorded significantly higher percentages of peripheral NK cells (SMD 1.36; 95% CI 0.04; 2.69; $P = 0.04$) and numbers (SMD 0.81; 95% CI 0.47; 1.16; $P < 0.00001$), but there were no significant differences in uNK cell levels between women with repeated implantation failures and the control group (SMD 0.40; 95% CI -1.24; 2.04; $P = 0.063$). It remains unclear why measurements of NK cells in absolute and relative indices give different results [27].

Sacks et al. found that the concentration of peripheral NK cells ($0.23 \times 10^9/L \pm 0.11$ vs. $0.20 \times 10^9/L \pm 0.13$) and their percentage ($> 18\%$, threshold) in lymphocytes were significantly increased in women with failed implantation compared to the control group. Nevertheless, it is important to note that the sensitivity of this test was only 11%, which suggests that in patients with failed implantation many other factors can play a role and contribute to difficulties in achieving pregnancy. According to the authors of the study, determining the level of NK cells cannot be used as a predictor of implantation failures in the general population, but it can be used in women with an already established diagnosis to determine whether etiology is related to their immunological profile [28].

In a 2019 meta-analysis studying a cohort of infertile women [29], it was concluded that there is no difference in NK concentrations of peripheral blood if the phase of the menstrual cycle was ignored in the measurement. However, in the secretory phase, the authors observed a higher proportion of circulating NK cells in women suffering from infertility.

The authors also studied the relationship between the concentration in the peripheral blood of large T-cell granular lymphocytes (post-thymic antigen-primed, constitutively activated CD3 + CD8 + T-lymphocytes characterized by the presence of cytotoxic granulations in the cytoplasm and co-expression of CD57 (CD3 + CD8 + CD57 +) and repeated implantation failures. Based on their data, it can be concluded that the levels of CD3-CD56 + and CD8 + CD57 + cells in peripheral blood are not associated with repeated implantation failures and cannot be recommended as markers [29].

The role of NK cells in implantation failure remains in the process of study and causes many contraverses. The level and activity of NK cells is just one aspect of the immune system in women suffering from infertility, and more data are needed to analyze them clinically.

The role of microRNA. Promising data have been published regarding intracellular genetic mechanisms for the mechanisms of endometrial insufficiency and implantation failure. MicroRNAs (miRNAs) play a key role in regulating gene expression by inhibiting translation and controlling post-transcriptional modifications. There are studies showing that miRNAs provide pathways involved in the regulatory mechanisms of human reproduction, including the formation and maintenance of primordial follicles, spermatogenesis, oocyte maturation, folliculogenesis, and corpus luteum function [31,32,33,34]. Previously, a connection was found between miRNA expression and infertility, polycystic ovary syndrome, premature ovarian failure, and repeated failure of implantation [35,36].

Thirteen different miRNAs have already been identified in endometrial samples of patients, with repeated implantation failures that presumably regulate the expression of 3800 genes and which were not found in the group of healthy women. It was also shown that ten miRNAs are overexpressed in endometrial samples in women with repeated implantation failures, including miR-23b, miR -199a, and miR-145 [37].

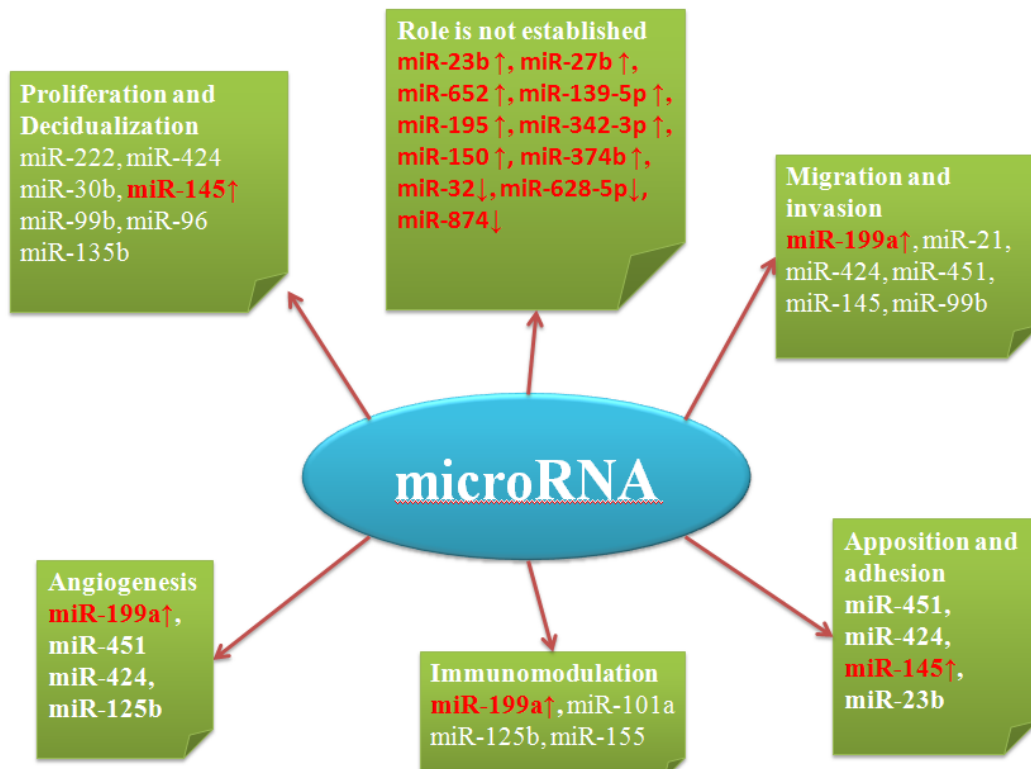


Figure 2 – The established role of miRNAs in implantation and impaired expression in RIF

The role of biocenosis. An important and understudied aspect of endometrial viability is the state of the vaginal and endometrial biocenosis. A study conducted in 2019 compared the microbiological composition of endometrial aspirate and vaginal discharge in women with RIF and a control group. Data of this study showed that the Shannon index (biodiversity index) of vaginal discharge was statistically significantly lower in the RIF group compared with the control group ($p = 0.02$), while a comparison of the same index in endometrial aspirates did not reveal differences [24].

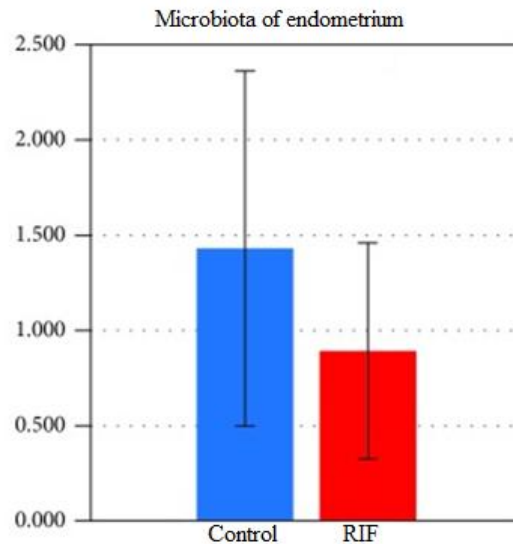


Figure 3 – Comparison of the Shannon index of the biocenosis of endometrial aspirate [38]

The unweighted Unifrac distance (an indicator used to compare biological communities) of the microbiota of the endometrial aspirate showed a significant difference between the RIF group and the control group ($p = 0.0089$). Meanwhile, the same indicator of vaginal discharge was the same in both groups ($p = 0.38$). The microbiota of endometrial aspirate with a predominance of lactobacilli, determined by the status of the genus *Lactobacillus* > 90%, was observed with a higher frequency in the RIF group (64.3%) rather than in the control group (38.9%) ($p = 0.13$). Similar results were obtained for the vaginal microbiota: 67.9% in the RIF group and 44.4% in the control group was the microbiota with a predominance of lactobacilli ($p = 0.14$). The detection rate of *Gardnerella* in the EF microbiota was 39.3% in the RIF group and 27.7% in the control group ($p = 0.53$). *Burkholderia* was not detected in any of the microbiota of the endometrial aspirate in the control group, but was found in 25% of the RIF group ($p = 0.032$). Some studies have shown that *Burkholderia* are often detected in the uterine cavity in patients using the intrauterine device contraceptive system with levonorgestrel [39], in another study, the authors suggest that *Burkholderia* may be one of the potential pathogens that cause tubovarian abscess [40]. The effect of *Burkholderia* on endometrial susceptibility requires further studying. There were no significant differences in the frequency of detection of certain types of bacteria in the microbiota of the vaginal discharges between the two groups.

Genetic Disorders. A 2019 study [41] examined the hypothesis that transcriptome analysis of follicular cells after failed IVF cycles can reveal potential causes of implantation failures and provide new information about their pathophysiological mechanisms. Real-time PCR showed 165 differentially expressed genes in the group of patients with implantation failures compared with the group of pregnant women. These genes included many pro-inflammatory cytokines and other factors associated with inflammation. Overexpression of several factors, some of which regulate the activity of vascular endothelial growth factor, also indicates increased permeability and vasodilatation in the pathogenesis of RIF. Some genes have been associated with abnormal differentiation and increased apoptosis [41]. Thus, it can be assumed that failure of implantation in IVF cycles may be associated with an imbalance between pro-inflammatory and anti-inflammatory mediators.

Promising data were obtained in a study by Diaz-Nuñez et al. in 2019 regarding coagulation factors and their association with RIF. In this prospective study, women with repeated implantation failures were

subjected to a ThromboinCode analysis to identify 12 genetic variants of factors V Leiden, V Hong Kong, V Cambridge, II, XIII, XII and A1. Higher values were observed in the RIF group (70%) compared with the control group (52.94%) and the population of Spain in general (56.5%) regarding XII coagulation factor ($p = 0.043$) [42].

Conclusion. Repeated implantation failure is a complex and urgent problem of modern reproductology, which has a wide range of understudied etiological factors and pathogenesis mechanisms. Based on the analysis of modern literature, it can be concluded that there is still no consensus regarding the definition of repeated implantation failure, reliable risk factors and implementation mechanisms, as well as methods for overcoming them. The main reason for the failure of implantation is a disturbance of the receptivity of the endometrium [43]. And the basis of the pathogenesis for each individual patient differs due to etiological factors and mechanisms, which include changes in the architectonics of the endometrium, impaired immune status, neoangiogenesis, vasodilatation, defects of coagulation factors, genetic factors and even microbiota imbalance. Management of RIF should be individualized taking into account its pathogenesis patterns using methods based on the principles of evidence-based medicine. Taking into account clinical and morphological patterns randomized clinical trials on large statistical samples are necessary to study the mechanisms of its realization further and overcoming the problem.

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ҚАЙТАЛАНҒАН ИМПЛАНТАЦИЯ СӘТСІЗДІГІНІҢ МОРФОЛОГИЯЛЫҚ ЖӘНЕ МОЛЕКУЛЯРЛЫ-БИОЛОГИЯЛЫҚ ДЕТЕРМИНАНТТАРЫ

Аннотация. Қосалқы репродуктивті технологиялардың (ҚРТ) классикалық Экстрокорпоралды ұрықтанудан (ЭҚҰ) және сперматозоидтарды интрацитоплазмалық инъекция жасаудан (ICSI) жасанды интеллектті қолдана отырып болжанатын модельдер дәуіріне дейінгі эволюциясы соңғы жылдары дүниежүзілік репродуктивті революцияға ықпал етті. Бірақ ҚРТ-ның айтарлықтай дамуына қарамастан, сәтсіз Экстрокорпоралды Ұрықтандыру әрекеттерінің жоғары таралуы сақталады. Осылайша, ҚРТ бедеулік жұптардың жалпы нәтижелерін жақсартса да, кейбір проблемалар әлі де шешілмеген, мысалы, имплантацияның қайталама сәтсіздігі (ИҚС). Имплантацияның қайталама сәтсіздігі термині тек ЭҚҰ бағдарламалары бар пациенттерге қолданылады. ИҚС – бұл аз зерттелген этиологиялық факторлар мен патогенетикалық механизмдердің кең спектріне ие қазіргі заманғы көбеюдің күрделі және өзекті мәселесі. Имплантация сәтсіздігінің патогенезі эндометриялық архитектониканың, иммундық мәртебенің, неоангиогенездің, вазодилляцияның, коагуляция факторларының, генетикалық факторлардың және тіпті биоценоздың бұзылуының аясында ақаулы рецептивтіліктің әртүрлі полигендік және полиморфты механизмдеріне негізделген. Соңғы жылдары имплантацияның қайталама сәтсіздік ақауларының этиопатогенезін зерттеуде, әсіресе, макроскопиялық субстрат немесе созылмалы эндометрит белгілері болмаған кезде, эндометриялық дәріменсіздіктің пайда болуының иммунологиялық механизмдеріне көбірек мән беріліп келеді. Соңғы жылдардағы жетістіктер имплантация кезінде эмбрион мен эндометрий арасындағы айқас диалогпен байланысты процестерді терең түсінуге әкелсе де, олардың бұзылуының себебі құпия болып қала береді, ал нәтижелерді эндометрияның субоптималды сезімталдығын емдеуге арналған клиникалық маңызды болжамдық сынақтар мен емдеулерге айналдыруда айтарлықтай жетістіктерге қол жеткізілген жоқ. ИҚС-нің көптеген маркерлері кішкентай үлгілерде ғана зерттелген, бұл, олардың репродуктивті жағдайға қатысты белгісіздікке, шынайы әсеріне және клиникалық құндылығына қатысты белгісіздікке әкеледі. ҚИС-ті бар бедеулік жұптардың емдеу тактикасын дәлелді медицина қағидаттарына негізделген әдістерді қолдана отырып, патогенетикалық заңдылықтарды ескере отырып жекелеу керек. Мәселені енгізу және шешу тетіктерін одан әрі зерттеу үшін клиникалық және морфологиялық ерекшеліктерді ескере отырып, ірі статистикалық үлгілерде рандомизацияланған клиникалық зерттеулер қажет.

Түйін сөздер: Экстрокорпоралды ұрықтандыру, имплантацияның қайталама сәтсіздігі, қосалқы репродуктивті технологиялар.

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МОРФОЛОГИЧЕСКИЕ И МОЛЕКУЛЯРНО-БИОЛОГИЧЕСКИЕ ДЕТЕРМИНАНТЫ ПОВТОРНЫХ НЕУДАЧ ИМПЛАНТАЦИИ

Аннотация. Эволюция вспомогательных репродуктивных технологий (ВРТ) от классического экстракорпорального оплодотворения (ЭКО) и интрацитоплазматической инъекции сперматозоидов (ИКСИ) к эпохе моделей прогнозирования, использующих искусственный интеллект, в последние годы способствовала всемирной репродуктивной революции. Но, несмотря на значительное развитие ВРТ, по-прежнему присутствует высокая распространенность неудачных попыток ЭКО. Таким образом, хотя ВРТ и улучшает общие результаты для бесплодных пар, некоторые проблемы до сих пор остаются нерешенными, например, повторные неудачи имплантации (ПНИ). Термин повторные неудачи имплантации применим только к пациентам в программах ЭКО. ПНИ – это сложная и актуальная проблема современной репродуктологии, имеющей широкий спектр малоизученных этиологических факторов и патогенетических механизмов. В основе патогенеза неудач имплантации лежат разнообразные полигенные и полиморфные механизмы дефектной рецептивности на фоне нарушений архитектоники эндометрия, иммунного статуса, неоангиогенеза, вазодилатации, дефектов факторов свертывания, генетических факторов и даже нарушений биоценоза. Последние годы в изучении этиопатогенеза повторных неудач имплантации всё большее значение уделяется иммунологическим механизмам формирования несостоятельности эндометрия, особенно в отсутствии макроспического субстрата или признаков хронического эндометрита. Хотя достижения последних лет привели к глубокому пониманию процессов, связанных с перекрестным диалогом эмбриона и эндометрия во время имплантации, причина их нарушений остается загадкой, и значительный прогресс в преобразовании открытий в клинически значимые прогностические тесты и методы лечения субоптимальной восприимчивости эндометрии достигнут не был. Большинство маркеров ПНИ пока что изучались лишь на маленьких выборках, что приводит к неопределенности в отношении воспроизводимости, истинного их эффекта и клинической ценности. Тактика ведения бесплодных пар, страдающих ПНИ, должна быть индивидуализирована с учетом патогенетических паттернов с применением методов, основанных на принципах доказательной медицины. Для дальнейшего изучения механизмов реализации и преодоления проблемы необходимы рандомизированные клинические испытания на больших статистических выборках с учетом клинико-морфологических особенностей.

Ключевые слова: экстракорпоральное оплодотворение, повторные неудачи имплантации, вспомогательные репродуктивные технологии.

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MULTIFACTORIAL ANALYSIS OF NEUROLOGICAL DETERIORATION IN CHILDREN WITH SPINAL TRAUMA AFTER SURGICAL TREATMENT

Abstract. The article presents a multifactorial analysis of assessing the dynamics of neurological deficit in pediatric patients with unstable complicated thoracic and thoracolumbar spine fractures. The effect of the terms of surgery that has passed from the moment of injury, as well as the severity of the damage to the spinal cord and its elements, has been studied in details. Magerl spinal fractures classification was implemented to evaluate the type of spine fracture, neurological deterioration were evaluated according to the international ASIA scale.

Longest result follow-up period was 5 years after surgery. Surgical treatment of 36 patients at the age of 3 years to 17 years with unstable thoracic and thoracolumbar spine fractures complicated by neurologic deficit were performed.

Longest result was monitored for up to 5 years in all patients. It was in studies revealing that a full recovery of neurological functions in children with complicated spinal fractures is noted during surgical treatment in the first 6-12 hours from the time of trauma, with the main cause of neurological deficit associated with compression of the spinal cord.

Key words: spinal trauma, spine cord injury, ASIA, children, spine surgery.

Background. Traumatic injuries of the spine can be observed in 1% - 10% of all traumatic cases in children reaching the rate from two to twenty per 1 000 000 [1]. In large central city each year more than a thousand children get a spine fracture, about two to three percents are mechanically non-stable and has neurological impact [2]. In an up to five percents of traumatized children cord is also damaged, but one can say that SCI can be found with higher prevalence than initially was thought due to existence of reports in literature about more frequent rate of cord injury [3].

Spinal cord deficit occur in these patients due to a lot of causes: significant displacement of the fractured fragments, damage to the neural tissue after development of the traumatic stenosis. Resolution of symptoms may depend on these primary factors and the surgical activity. Not necessary primary contusion leads to the deficit development – it can also occur later due to vascular issues which are secondary to persistent ischemia [4].

One of the most significant injury pattern can be observed in patients with thoracic fractures and dislocations. This region is distinguished by its narrowness and lack of free space available for the cord [4] and even non-significant canal compromise can lead to significant problems.

It is unclear whether or not the size of canal left intact plays a role in development of neurological deficit. Sometimes gross compression of the conus leads to no deterioration at all. At the same time minor (less than 1.0 cm) fragment dislocation and non-profound deformity in saggital plane can cause marked neurological devastation [5].

One of the biggest issues discussed in literature is when to make surgery. It was shown by many authors that “the sooner - the better”, but there are situations when surgical aggression can deteriorate a patient. According to different authors different points of view on how long early post-injury is exist

varying from four weeks [6] to first five days [7] or even 3 days [8, 9]. Many surgeons accept first 8 hours as “golden hours” for surgery [10].

According to Vaccaro et al. [8] there was no any significant difference between patients with cervical spine injury who were operated surgically either during first 3 days or five days post-injury. Relationship between cord compression and function was studied by Wagner and Chehrazi in 44 patients with damage of the subaxial cervical region [10] using such factors like value of stenosis and time to decompression. It was shown that only stenosis played significant role in the course of neurological deterioration as both groups of patients (those who were operated in first 8 hours or those – during first 2 days) showed the same level post-operatively even after a year. Many experienced surgeons such as Fehlings et al. advocate that neurologically compromised patient should have his operation as soon as possible and no longer than a day after injury [11]. Although they agree that no universally accepted time limits exist.

Both interesting and controversial data was shown in the article of Bohlman and Anderson who operated on patients as late as 9 years post injury [12]. There were 58 surgical procedures and 29 patients became walkers again after being paralyzed. 9 people didn't show any benefit. Controversy consists in the fact which authors advocated in paper that those who showed improvement could show it without the fact of surgery.

Group of Aganesov et al. strongly agree with the hypothesis that timing plays major role and early decompression with fusion is a key to success [1].

Blood supply of the damaged segments also plays big role as it was experimentally shown that 3 hours of blood watershed led to irreversible cell death [13]. Soviet scientists and spine surgeon Lutsik [14] could show that the most sensitive structures are anterior spinal artery and its branches. This fact obviates the necessity for early surgical intervention to help free the injured cord. Another interesting feature is that white and grey matter have different sensitivity to ischemia: later is more sensitive and the aforementioned first one can last for four hours which gives an opportunity to restore function in terms of early surgical intervention [15].

Objectives. To explore which factors affect the outcome in children with unstable complicated thoracic and thoracolumbar spine fractures the most.

Materials and Methods: 36 patients (2/3 were boys and 1/3 were girls) at the age of 3 years to 17 years (with more than 75% older than 11 years) with unstable thoracic and thoracolumbar spine fractures with neurological deterioration were surgically treated at the hospital with further evaluation of neurological status.

Table 1 – Patient's distribution according to age

| Age | 3 years - 7 years | 7 years - 11 years | 11 years - 17 years | Total |
|---------|-------------------|--------------------|---------------------|------------|
| Males | 4 | 4 | 16 | 24 (66,7%) |
| Females | – | – | 12 | 12 (33,3%) |
| Total | 4 (11,1%) | 4 (11,1%) | 28 (77,8%) | 36 (100%) |

Motor vehicle accident was a leading cause for trauma in 19 (52.8%) patients followed by fall from height in the rest 17 (47.2%) patients.

Evaluation of neurological deterioration was performed using ASIA score [16] - table 2 presents the results. Type of fracture, amount of stenosis and type of medulla compression and its condition was assessed with x-ray, CT scans and MRI.

Data present in table 2 shows distribution of those patients according to ASIA score: almost half of them (16) were classified as A (complete injury), 14 – class B (sensory function preserved), 4 – class C and 2 patients as class D. It should be noted that clinical picture of complete spinal cord injury was observed in 12 patients who had injury at the thoracic area and in 4 patients with injured thoracolumbar area.

Table 2 – Patient’s distribution according to results of neurological assessment

| Group | Level of injury | ASIA class | | | | Total |
|-------|-----------------|------------|----|---|---|-------|
| | | A | B | C | D | |
| I | Thoracic | 2 | – | – | – | 8 |
| | Thoracolumbar | – | 6 | – | – | |
| II | Thoracic | – | – | – | – | 4 |
| | Thoracolumbar | 2 | – | – | 2 | |
| III | Thoracic | 2 | – | – | – | 8 |
| | Thoracolumbar | – | 2 | 4 | – | |
| IV | Thoracic | 8 | 4 | – | – | 16 |
| | Thoracolumbar | 2 | 2 | – | – | |
| Total | Thoracic | 12 | 4 | – | – | 16 |
| | Thoracolumbar | 4 | 10 | 4 | 2 | |

Magerl spinal fracture classification [17] was implemented to evaluate the type of spine fracture. Type A3 fractures were observed in 18 (50%) patients, type B – in two (5.6%) and type C in 16 (44.4%) children. According to the level of injury data distributed in the next manner: thoracic area in 16 (44.4%) patients, thoracolumbar area (Th10-L2) in 20 (55.6%) patients.

Surgical treatment for all patients consisted of procedure aimed to restore canal clearance and stabilize injured segments: either only dorsal or combined approach was used with pedicle screw instrumentation as a primary type of implants [2,3,4]. Patients with complete paraplegia (type A) were operated from posterior approach to correct the deformity and stabilize an injured segment with metal device and at the same surgical session anterior approach was performed to clear the canal and replace the fractured vertebral body with Pyramesh filled with autologous bone. In fracture-dislocation injuries surgical treatment was performed through the dorsal approach to restore the relationship between segments, stabilize them in achieved position which all led to cord decompression on its own without the necessity for anterior decompression. 360 degrees fusion was an obligate step of the procedure.

Despite controversial attitude to steroids in neurologically compromised patients in our clinic NASICS – 1 protocol exists for treatment of such patients: steroid bolus (30mg/kg during first 6 hours) with further supplementation using dosage of 5.4mg/kg per hour during next 23 hours was used. Post - surgery patients continued to receive hormone therapy in the same dosage during two days.

After surgery all patients received physical rehabilitation including passive and possible active exercises, muscle stretching and robotic – assisted kinesiotherapy.

Mean period of treatment of one patient was 24 days. After this period patients were discharged with further recommendation of continuing physical rehabilitation.

During the research we analyzed an influence of different factors which could affect the patient’s outcome after surgical treatment. Next criteria were used: level of injury, amount of canal compromise, timing to surgery, ASIA scale.

Monitoring of the patient’s neurological status was performed daily during first postoperative week and every 2-3 days after. After discharge patients were examined every 6 months with neurological assessment provided and its results saved. Longest follow-up period was 5 years after surgery.

Results. Injury at the thoracic region were accompanied by neurological deterioration much more often and more severe comparing to thoracolumbar. From 16 patients with trauma at that level 12 were graded as class A (complete paraplegia) and 4 as class B (sensory function preserved) according to ASIA. 20 patients with thoracolumbar fracture varied in their level of deterioration from A to D, with 10 patients having class B.

Great variance was observed in time past prior surgery: in some patients only few hours took place, for some 1.5 years had passed. Based on that four clusters of patients were gathered and table 3 presents these data: unfortunately only 8 patients were able to be surgically treated no longer than 12 hours post-injury. Almost half of the patients were operated later than two weeks. All the rest were treated in terms of 0.5-3 days to 14 days.

Table 3 – Patients distribution according to type and level of injury and timing to surgery

| Type of injury Level of injury Timing to surgery | Type A3 | | Type B | | Type C | | Total |
|--|----------|----------------|----------|----------------|----------|----------------|-------|
| | Thoracic | Thoraco lumbar | Thoracic | Thoraco lumbar | Thoracic | Thoraco lumbar | |
| First 6 – 12 hours after injury (group I) | – | 6 | – | – | 2 | – | 8 |
| From 12 hours to 3 days (group II) | – | 2 | – | – | – | 2 | 4 |
| From 3 days to 2 weeks (group III) | – | 4 | – | – | 2 | 2 | 8 |
| More than 2 weeks (group IV) | 4 | 2 | 2 | – | 6 | 2 | 16 |
| Total | 4 | 14 | 2 | – | 10 | 6 | 36 |

Thus most of the patients were operated at intermediate and late trauma periods.

Surgical treatment allowed to achieve complete removal of the stenosis, clear the canal and stabilize injured area in all patients (table 4).

Table 4 – Amount of stenosis before and after surgical treatment

| Groups | Level of injury | Amount of stenosis % | |
|--------|-----------------|------------------------------|---------------|
| | | Before surgery | After surgery |
| I | Thoracic | min 90 - max 97 (93,5±3,5) | 0 |
| | Thoracolumbar | min 73 - max 94 (83,7±6,7) | 0 |
| II | Thoracolumbar | min 42 - max 88 (65,0±22) | 0 |
| III | Thoracic | min 96 - max 100 (98,0±2,0) | 0 |
| | Thoracolumbar | min 44 - max 82 (53,7±18,2) | 0 |
| IV | Thoracic | min 18 - max 100 (63,8±18,7) | 0 |
| | Thoracolumbar | min 46 - max 73 (59,0±12,0) | 0 |

In group I patients the amount of stenosis was markedly increased comparing to the rest groups: mean 93% for the thoracic and mean 84% for the thoracolumbar areas.

Neurological examination performed in early post-op period showed improvement of motor and sensory (pain, light touch) function equivalent to 1-2 points according ASIA, pain sensation improved faster.

In group I patients improvement of neurological function after surgical decompression occurred on the 1-2 day after treatment, in group II – on the 2-3 day, in group II – on the 5-7 day, in group 4 – after 4-5 months. The most rapid improvement was observed in patients from I group with ASIA class B treated in first 6-12 hours after trauma.

Evaluation of the long-term results showed following data:

Group I. 6 patients with incomplete spinal cord injury showed marked improvement especially in sensory function: 3 children became class E and 3 more patients had an increase of pain and light touch sensation for a mean of 18 points from the baseline. Their motor function improved for a mean of 26 points from the baseline. In the long-term follow-up (5 years) after surgical treatment patients from this group were assessed as 71 points (50 – 100) in motor function and 85 points (54-112) in sensory function. Four of these became ambulatory and two patients were able for assistance walking. In two patients classified as ASIA - A after trauma no improvement occurred. They remained paraplegic and had bladder and bowel incontinence.

Group II. Complete restoration of neurological function was observed in 2 patients with class D according ASIA at the baseline. In two more patients with class A no improvement occurred. In the long-term follow-up period mean motor function scores were 73 (50 – 97) points and mean sensory function scores were 95 (78-112) points.

Group III. In four out of eight patients there was an improvement observed as a restoration from class C to class D, and two patients improved from class B to class D. In 2 patients with class A neurologic deterioration no improvement was observed after surgery. In the long-term follow - up motor function

scores were in mean of 77 (50-93) points, and sensory function scored with a mean of 91 (38-107) points. Mean increase in sensory function score was 10 (6-15) points and in motor function 19 (0-34) points. After 4-5 years of observation no further improvements were observed.

Group IV. In patients with incomplete spinal cord injury improvements were also observed but with a lower rate. Six out of 16 patients from this group with baseline class B according ASIA improved to class C in 2-3 years after surgery. In 10 patients with class A there was no improvement observed. Mean motor function score was evaluated as 59 (50-82) points and sensory function as 67 (24-84) points.

Special attention should be paid to 16 patients with class A neurologic injury. Regardless timing to surgery none of these children improved their function. There was only slight and very slow restoration in 2-3 years after surgery but not more than on 5-8 points from the baseline.

Discussion. Our results shows that injury at the thoracic region were accompanied by much more pronounced neurological deficit probably due to the fact that this region same as cervical spine is distinguished by less reserve space available for the spinal cord in situation when canal compromise by fractured fragment is present. We couldn't observe this in patients with thoracolumbar fractures.

Another fact which was shown in our study is relationship between time passed prior to surgery and the end result. Literally "the sooner – the better": when surgery took place early, much faster resolution of symptoms and recovery of neurologic deficit occurred. Unfortunately the same couldn't be applied to patients with complete loss of motor and sensory function – those graded A score according ASIA: there were no resolution of their neurologic deficit except some tendency for improvement of sensory function.

It should be noted that for those patients who were surgically treated during first 12 hours stenosis of the cord was significantly more pronounced: up to 97% at the thoracic spine and almost 90% at the thoracolumbar area. Those patients with A score according ASIA (n=2) had injury in the thoracic region with marked stenosis and no improvement.

Patients graded class B (n=6) showed better benefit from early surgery rather than those treated late: improvement of cord functions was observed during first days after surgery. Canal compromise was the main reason for this and early removal of fractured fragments led to restoration of function prevention of further edema, vascular disturbances and secondary cord injury.

Significantly less amount of traumatic stenosis in patients from second group was accompanied by less pronounced neurological deficit. Only two patients were classified as A and two classified as D according ASIA.

Two patients graded A according ASIA showed no improvement after surgery due to the significant compression of the cord (87% mean) as a primary traumatic factor.

Two kids with D level of injury showed benefit even though were surgically treated later than usually necessary. But it should be mentioned that speed of their restoration was not as high as in first group. Probably class D played the major role same as the level of injury (thoracolumbar) – both of these are prognostic positive for the patients.

Patients treated as long as two weeks after trauma according to CT evaluation had distinct size of stenosis at thoracic (up to 100%) and thoracolumbar (approx. 54%) areas – later was the least amongst all patients who took part in this study. These patients showed following distribution according to the type of neurologic injury: ASIA - A in 2 patients, ASIA - B in 2 patients and ASIA - C in 4 patients. Absence of neurological improvement same as aforementioned amount of class A and B patients in this group can be connected to the fact of delay for the surgical procedure. Provided later than in first and second groups surgical treatment led to improvement of neurologic deficit in patients with class B (2 patients) and C (4 patients) but began later (5-7 post-op day) and with lower rate. There were no improvement in neurological function 5 years after surgery despite the fact of surgery in D graded patients.

Patients who treated late had the least marked cord stenosis from all of the groups both at the thoracic (63%) and thoracolumbar (60%). Interestingly those patients despite the fact of less canal compromise had very marked neurological deficit: 10 patients graded as A (complete loss of function) and 6 graded as B (sensory function preserved). This made us to conclude that primary damage to the cord and secondary changes which took place in later period were responsible for this phenomenon. Mostly due to this secondary changes which passed the phase of active resolution surgical treatment aimed to restore the alignment and stabilize the segment was ineffective.

Unfortunately no patients graded A according ASIA showed any benefit mostly due to the fact of severe spinal cord injury. Very insignificant improvement of sensation with limits can be probably explained by child's nerve tissue ability to regenerate in some manner.

Conclusion. Particular study confirmed the commonly accepted thesis that thoracic region is most vulnerable for the development of neurological deficit in trauma patients. Another significant factor which influenced on the clinical picture was percentage of traumatic stenosis. One of the biggest issues in treatment of these patients is time passed between trauma and surgery – it can be logistically very difficult to follow the rule of performing decompression no later than 12 hours but this is crucial for restoration of neurological status. Early and adequate decompression of the cord and its roots may allow a patient to get better recovery and stabilization of an injured segment using pedicle instrumentation creates an ability to mobilize patient early and provide more effective rehabilitation.

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ХИРУРГИЯЛЫҚ ЕМДЕУДЕН КЕЙІН ОМЫРТҚАСЫ ЗАҚЫМДАНҒАН БАЛАЛАРДАҒЫ НЕВРОЛОГИЯЛЫҚ БҰЗЫЛУДЫ КӨПФАКТОРЛЫ ТАЛДАУ

Жұмыста омыртқа бағанының кеуде және кеуде-бел бөлігінің омыртқалық-жұлындық жаракаты бар балаларда неврологиялық тапшылықтың динамикасын бағалаудың көп ықпалды талдауы ұсынылады. Жарақат кезінен бастап жүргізілген операциялық араласулар мерзімдерінің әсері, сондай-ақ жұлын мен оның элементтерінің бұзылу ауырлығы жете зерделенді. Омыртқа бағаны сүйегінің зақымдануларын бағалау мақсатында Magerl жіктемесі пайдаланылды, неврологиялық бұзылыстар ASIA халықаралық шкаласына сәйкес бағаланды.

Омыртқа бағанының кеуде және бел бөліктерінің тұрақсыз асқынған сынулары бар балалардағы неврологиялық өзгерістерінің динамикасына әртүрлі факторларының әсерін бағалау- осы жұмыстың мақсаты.

Әртүрлі дәрежеде неврологиялық бұзылыстармен асқынған омыртқа бағанының кеуде және кеуде-бел бөліктерінің сынулары бар 3-тен 17 жасқа дейінгі 36 пациентті хирургиялық емдеудің нәтижелеріне талдау жүргізілді. Нәтижелерді бағалау үшін толық неврологиялық бағалауды, рентгенографиялық өлшемдерді, компьютерлік томографияны (КТ) және магнитті-резонанстық томографияны (МРТ) қосқанда, клиникалық зерттеу әдістері пайдаланылды.

Омыртқа каналының стеноз санын азайту, омыртқа бағаны сегменттерінің түзелуін қалпына келтіру және зақымдалған аймақты тұрақтандыру үшін барлық пациенттерге хирургиялық ем жүргізілді. 36 пациент ішінен 8 пациентке жарақаттан кейін 12 сағаттан кешіктірмей операция жасалды. Пациенттердің жартысына жуығына екі апта өткен соң операция жасалды. Қалғандары 0,5-3 күннен 14 күнге дейінгі мерзімде емделді.

Өткізілген зерттеу кеуде бөлігінде окшауланған жарақаттарда ең ауыр неврологиялық тапшылық болғанын көрсетті. Кеуде бөлігіндегі зақымдануларда кеуде-бел бөлігімен салыстырғанда неврологиялық нашарлау едәуір жиі болғаны байқалды. Осы деңгейдегі жаракаты бар пациенттердің 16-нан 12-і ASIA сәйкес, А класы ретінде (толық параплегия) және 4-і В класы ретінде (сезу функцияның сақталуы) жіктелді. Жарақаттың деңгейі ғана емес, каналдың зақымдану дәрежесі мен жарақат пен декомпрессияға дейінгі кезеңі де емнің соңғы нәтижесіне қатты әсер етеді. I-топтағы пациенттерде неврологиялық функцияның жақсаруы хирургиялық декомпрессиядан кейін 1-2 тәулік емдеген соң, II-топта – 2-3 тәулік, III-топта - 5-7 тәулік, IV топта – 4-5 ай өткен соң болды. Жағдайдың ең тез жақсаруы жарақаттан кейін 6-12 сағат ішінде ем алған ASIA сәйкес В класты I-топтағы пациенттерде байқалды.

Бір пациентті емдеудің орташа мерзімі 24 күнді құрады. Пациенттің неврологиялық мәртебесінің мониторингісі күн сайын операциядан кейінгі бірінші апта ішінде және одан кейін әр 2-3 күн сайын өткізілді. Шығарылған соң пациенттер неврологиялық бағасы ұсынылуымен және нәтижелердің сақталуымен әр 6 ай сайын қарап-тексерілді. Операциядан кейінгі ең ұзақ бақылау кезеңі 5 жыл. Бақылаудың алыс кезеңінде (5 жыл) хирургиялық емдеуден кейін I-топтағы пациенттер қозғалыс функциялары бойынша 71 балға және сезу функциясы бойынша 85 балға бағаланды. II-топтағы пациенттерде қозғауыштық функцияның орташа көрсеткіштері 73 балды құрады, сезу функциясының орташа көрсеткіштері 95 балл. III-топтағы пациенттердің қозғауыштық функциясын бағалаудың алыс кезеңінде орташа 77 балды, сезу функциясы орташа 91 балды көрсетті. IV топта қозғауыштық функциясының орташа балы -59, сезу функциясы – 67 балға бағаланды.

Омыртқа бағанының асқынған сынуларымен балаларда неврологиялық функциясының толыққанды қалпына келуі зақымдалған кезінен бірінші 6-12 сағатта хирургиялық ем жүргізілгенде байқалатыны зерттеу барысында анықталды, бұл ретте, неврологиялық тапшылықтың негізгі себебі жұлынның қысылуымен байланысты.

Омыртқа бағанының кеуде және бел бөліктерінің асқынған тұрақсыз сынуларымен педиатриялық пациенттерде соңғы нәтижелерге едәуір әсер ететін негізгі факторлар: жаракат деңгейі, каналдың компрессия дәрежесі, жұлынның декомпрессиясына дейінгі уақыт.

Түйін сөздер: омыртқа бағанының жаракаты, жұлынның зақымдалуы, АЗИЯ, балалар, омыртқа бағанының хирургиясы.

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МНОГОФАКТОРНЫЙ АНАЛИЗ НЕВРОЛОГИЧЕСКИХ НАРУШЕНИЙ У ДЕТЕЙ С ТРАВМОЙ ПОЗВОНОЧНИКА ПОСЛЕ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ

В работе представлен мультифакторный анализ оценки динамики неврологического дефицита у пациентов детского возраста с позвоночно-спинномозговой травмой грудного и грудопоясничного отделов позвоночника. Детально изучено влияние сроков оперативного вмешательства, прошедших от момента травмы, а также тяжести самого повреждения спинного мозга и его элементов. С целью оценки костных повреждений позвоночника использовали классификацию Magerl, неврологические нарушения оценивали согласно международной шкале ASIA.

Целью данной работы было оценка влияния различных факторов на динамику неврологических изменений у детей с нестабильно осложненными переломами грудного и поясничного отделов позвоночника.

Проведен анализ результатов хирургического лечения 36 пациентов в возрасте от 3 до 17 лет с переломами грудного отдела позвоночного столба и грудопоясничного перехода, осложненных неврологическими нарушениями различной степени выраженности. Использованы методы клинического исследования, включая полную неврологическую оценку, рентгенографические измерения, компьютерную томографию (КТ) и магнитно-резонансную томографию (МРТ) для оценки результатов.

Все пациенты были подвергнуты хирургическому лечению, чтобы уменьшить количество стенозов позвоночного канала, восстановить выравнивание сегментов позвоночника и стабилизировать поврежденную область. Из 36 пациентов 8 пациентов были прооперированы не позднее, чем через 12 часов после травмы. Почти половина пациентов были оперированы позже, чем через две недели. Все остальные лечились в сроки от 0,5-3 дней до 14 дней.

Проведенное исследование показало, что наиболее тяжелый неврологический дефицит сопровождался травмами, локализованными в грудном отделе. Повреждения в грудном отделе значительно чаще сопровождались неврологическим ухудшением по сравнению с грудным поясничным. Из 16 пациентов с травмой на этом уровне 12 были классифицированы как класс А (полная параплегия) и 4 как класс В (сохраненная сенсорная функция) согласно ASIA. Не только уровень самой травмы, но и степень поражения канала и период, прошедший от травмы до декомпрессии, оказывают сильное влияние на конечный результат лечения. У пациентов I группы улучшение неврологической функции после хирургической декомпрессии произошло на 1-2 сутки после лечения, во II группе - на 2-3 сутки, во III группе - на 5-7 сутки, в IV группе - после 4-5 месяцев. Наиболее быстрое улучшение наблюдалось у пациентов из I группы с ASIA класса В, получавших лечение в течении 6-12 часов после травмы.

Средний срок лечения одного пациента составил 24 дня. Мониторинг неврологического статуса пациента проводился ежедневно в течение первой послеоперационной недели и каждые 2-3 дня после. После выписки пациенты осматривались каждые 6 месяцев с предоставлением неврологической оценки и сохранением результатов. Самый длительный период наблюдения после операции составил 5 лет. В отдаленном периоде наблюдения (5 лет) после хирургического лечения пациенты из I группы оценивались как 71 балл по двигательной функции и 85 баллов по сенсорной функции. У пациентов II группы средние показатели моторной функции составляли 73 баллов, а средние показатели сенсорной функции - 95 баллов. В отдаленном периоде оценки моторной функции пациентов III группы были в среднем 77 баллов, а сенсорная функция - в среднем 91 баллов. В IV группе средний балл моторной функции оценивался как 59 баллов, а сенсорная функция - 67 баллов.

В ходе исследования установлено, что полноценное восстановление неврологических функции у детей с осложненными переломами позвоночника отмечается при выполнении хирургического лечения в первые

6-12 часов от момента повреждения, при этом, основная причина неврологического дефицита связана со сдавлением спинного мозга.

Основные факторы оказывающие существенное влияние на конечный результат у педиатрических пациентов с осложненными нестабильными переломами грудного и поясничного отделов позвоночника: уровень травмы, степень компрессии канала, время до декомпрессии спинного мозга.

Ключевые слова: травма позвоночника, повреждение спинного мозга, АЗИЯ, дети, хирургия позвоночника.

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HOW *THALICTRUM FOETIDUM* EXTRACT INFLUENCES THE LIPID PEROXIDE OXIDATION AND ANTIOXIDANT SYSTEM IN RATS SUBJECTED TO CHRONIC IMMOBILISATION STRESS

Abstract. The experiment showed a potential correction of the free radical oxidation in the rats' membrane lipids by means of oral injection of *Thalictrum Foetidum* aqueous extract, contains a complex of natural antioxidants.

The experimental animals were divided into 6 groups (6 animals per group). The experimental animals from group 1 and the animals from group 2, which had been subjected to stress by immobilization for 5 hours, were given 1.5 ml of distil water orally/intragastrically. The animals from group 3, 4, 5 and 6 were given 0.5 ml, 1,0 ml, 1,5 ml and 2,0 ml correspondingly of *Thalictrum Foetidum* extract orally/intragastrically every day an 1 hour before stress exposition. The animals from all the groups were decapitated under ether anesthetic 5 hours after simulating immobilization stress, notably in the condition of the maximum stress exposition. Blood serum was used for the experiment. There was estimated lipid peroxide oxidation and the condition of the antioxidant system by the spectrophotometric method. For some chances to be observed in the indicators under research, the latter were determined in the control and experimental animals after 5, 15 and 30 days.

According to the experimental results, only the 15th and the 30th day, i. e. under chronic stress, show a statistically credible reduction in these indicators as to immobilization stress, approximating the control groups.

Analyzing the results of the experiment, we may conclude that *Thalictrum Foetidum* liquid extract has a rather gentle effect on the lipid peroxide oxidation and antioxidant system under immobilization stress.

Key words: *Thalictrum Foetidum*, liquid extract, immobilization stress, antioxidant system, lipid peroxide oxidation.

Introduction. Stresses, especially if they are frequent and long-term, have a negative impact not only on psychological state, but also on physical health. They serve as major risk factors in the development and exacerbation of many diseases. Of the most frequent diseases one can find those of the cardiovascular system (myocardial infarction, stenocardia, hypertension), the gastrointestinal tract (gastritis, stomach and duodenal ulcer), depressed immunity [1-3].

Moreover, stress, including the immobilization one, leads to intensive free radical peroxide oxidation (FRPO), resulting in oxidizing cell corruption, that can also provoke the development of gastroduodenal erosions and ulcers. This testifies to the necessity of prescribing antioxidants in the treatment and prevention of diseases of the nervous system [4].

As a rule, such medicaments as sedatives and neuroleptics are prescribed to solve problems, involving nervous disorder. This approach, however, does not always bring positive results, as it is important to remove the factors, which have provoked this state in a person. When the symptoms of nervous exhaustion are discovered, the treatment should be all-embracing and systematic, directed at removing the cause of diseases, which provoke disorders of the nervous system. Therefore, treating

patients, suffering from cerebrovascular diseases, with herbal drugs is one of the alternative methods of the therapy, which promotes normalization of the functions of the nervous system [5,6].

The *Thalictrum Foetidum* contains triterpene saponins, up to 2.2% of alkaloids (berberine, fetidin, thalictrine, isotetrandrine, berbamine), tannin (1.63-5.45%), flavonoids (rutin, glucorammnine, kaempferol, quercetin, flavestsin, ranunkuletin), cardenolides, volatile oil and organic acids. The tincture of *Thalictrum Foetidum* is used as a sedative, bactericide, anti-inflammatory, blood-stanching, diuretic and antiemetic agent. Apart from that, the infusion of herb is used in case of neuroses and convulsions, over tension, indigestion and diarrhea, diseases of the liver and the gall bladder, edema and dropsy and in case of internal and external bleedings [7-9].

Materials and methods. The experiment was conducted on 36 WAG-line rats with an average weight of 210-230 g. The stress-simulating action was studied on the prototype of chronic neuromuscular tension, reconstructed for 5, 15 and 30 days. Immobilization stress was simulated by keeping rats in plastic "cages-cases" every day for 5 hours. The experimental animals were divided into 6 groups (6 animals per group). The animals from group 1 (the so-called intact animals of a conditional norm) were given 1.5 ml of distil water orally and intragastrically through the probe. The animals from group 2 were subjected to stress by immobilization for 5 hours and given 1.5 ml of distil water orally and intragastrically through the probe. The animals from group 3, 4, 5 and 6 were given 0.5 ml, 1.0 ml, 1.5 ml and 2.0 ml correspondingly of *Thalictrum Foetidum* aqueous liquid extract though the probe orally and intragastrically every day an hour before stress exposition.

For some quantitative chances to be observed in the indicators under research, the latter were determined in the control and experimental animals in action after 5, 15 and 30 days.

The animals from all the groups were decapitated under ether anesthetic 5 hours after simulating immobilization stress, notably in the condition of the maximum stress exposition. Blood serum was used for the experiment to estimate lipid peroxide oxidation (LPO), namely: the level of primary oxidation products – conjugated dienes (CD), and secondary products – malondialdehyde (MDA), as well as the condition of the antioxidant system, namely: catalase activity and superoxide dismutase [10] by the spectrophotometer method [11,12].

Results and discussion. The results of the experiment are presented in table. The LPO was estimated according to the number of peroxide products: CD and thiobarbituric acid active products (TBA-AP), which amount to 14.00 ± 0.64 mmol/l and 4.65 ± 0.10 mmol/l correspondingly in the intact animals.

Neurotropic and antioxidant activity of *Thalictrum Foetidum* liquid extract

| Indicator | Term of the experiment | Intact animals (n = 6) | Immobilization stress (n = 6) | Immobilization stress + 0.5 ml of <i>Thalictrum Foetidum</i> extract (n = 6) | Immobilization stress + 1 ml of <i>Thalictrum Foetidum</i> extract (n = 6) | Immobilization stress + 1.5 ml of <i>Thalictrum Foetidum</i> extract (n = 6) | Immobilization stress + 2 ml of <i>Thalictrum Foetidum</i> extract (n = 6) |
|-------------------------|------------------------|------------------------|-------------------------------|--|--|--|--|
| DC, mmol/l | 5 days | 14.16 ± 0.64 | $30.72 \pm 1.06^*$ | $29.15 \pm 0.12^*$ | $27.24 \pm 0.01^*$ | $28.09 \pm 1.43^*$ | $25.45 \pm 0.32^*$ |
| | 15 days | | $34.85 \pm 0.85^*$ | $24.18 \pm 0.44^{***}$ | $23.18 \pm 0.10^{***}$ | $24.01 \pm 0.90^{**}$ | $21.21 \pm 0.1^{***}$ |
| | 30 days | | $37.85 \pm 0.12^*$ | $15.11 \pm 1.12^{**}$ | $15.67 \pm 0.03^{**}$ | $15.23 \pm 0.09^{**}$ | $14.54 \pm 0.07^{**}$ |
| MDA, mkmol/l | 5 days | 4.65 ± 0.10 | $6.94 \pm 0.16^*$ | $6.02 \pm 0.21^*$ | $6.13 \pm 0.11^*$ | $5.98 \pm 0.04^{**}$ | $5.67 \pm 0.06^{**}$ |
| | 15 days | | $7.15 \pm 0.45^*$ | $5.11 \pm 0.01^{**}$ | $5.16 \pm 0.10^{**}$ | $5.06 \pm 0.56^{**}$ | $4.89 \pm 0.17^{**}$ |
| | 30 days | | $7.56 \pm 0.78^*$ | $4.21 \pm 0.23^{**}$ | $4.34 \pm 0.05^{**}$ | $4.56 \pm 0.34^{**}$ | $4.23 \pm 0.23^{**}$ |
| SOD, standard unit | 5 days | 3.59 ± 0.11 | $6.93 \pm 0.49^*$ | $5.33 \pm 0.12^*$ | $5.16 \pm 0.30^*$ | $5.09 \pm 0.12^{***}$ | $4.87 \pm 0.07^{***}$ |
| | 15 days | | $6.98 \pm 0.23^*$ | $4.21 \pm 0.16^{**}$ | $4.13 \pm 0.04^{**}$ | $4.22 \pm 0.02^{***}$ | $4.08 \pm 0.67^{***}$ |
| | 30 days | | $7.13 \pm 0.89^*$ | $3.42 \pm 0.34^{**}$ | $3.47 \pm 0.05^{**}$ | $3.47 \pm 0.57^{**}$ | $3.32 \pm 0.07^{**}$ |
| Catalase, standard unit | 5 days | 5.10 ± 0.13 | $5.88 \pm 0.26^*$ | 5.74 ± 0.11 | 5.73 ± 0.16 | 4.97 ± 0.25 | $4.86 \pm 0.03^{**}$ |
| | 15 days | | $6.03 \pm 0.21^*$ | $4.97 \pm 0.02^{**}$ | $5.02 \pm 0.09^{**}$ | $4.67 \pm 0.43^{**}$ | $4.54 \pm 0.78^{**}$ |
| | 30 days | | $6.23 \pm 0.03^*$ | $4.75 \pm 0.67^{**}$ | $4.98 \pm 0.21^{**}$ | $4.78 \pm 0.06^{**}$ | $4.66 \pm 0.01^{**}$ |

Note. 1. * - statistically significant difference compared to group of intact control; ** - statistically significant difference compared to group of stimulated by immobilization stress, $p \leq 0.05$.

2. All data were presented as Mean \pm SE.

Table shows a considerable increase of these indicators, subjected to immobilization stress for 5 days. The level of CD approaches 30.72 ± 1.06 mmol/l, doubly exceeding the norm, whereas TBA-AP makes 6.94 ± 0.10 mmol/l, surpassing the control in 1.5 times.

On the 15th day the level of CD makes 34.85 ± 0.85 mmol/l, exceeding the norm in 2.5 times; TBA-AP comes to 7.15 ± 0.10 mmol/l, twice surpassing the control. After 30 days the CD level runs to 37.85 ± 0.12 mmol/l, thrice exceeding the norm; TBA-AP approaches 7.56 ± 0.78 mmol/l, twice surpassing the control.

According to the data from table, at the 5-day stage *Thalictrum Foetidum* liquid extract of in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml does not reduce the level of CD and TBA-AP statistically significantly relative immobilization stress.

Liquid extract of *Thalictrum Foetidum* has lowered the level of CD and TBA-AP in all the doses under research statistically significantly as regards to immobilization stress on the 15th day. Thus, under immobilization stress the level of CD in *Thalictrum Foetidum* liquid extract in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml makes 24.18 ± 0.44 mmol/l, 23.18 ± 0.10 mmol/l, 24.01 ± 0.90 mmol/l and 21.21 ± 0.10 mmol/l accordingly. Though statistically veritable as to the animals' group, which have undergone immobilization stress 34.85 ± 0.85 ($P \leq 0.05$), these indicators do not come close to the control. Under immobilization stress the level of TBA-AP in *Thalictrum Foetidum* liquid extract in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml amounts to 5.11 ± 0.01 mmol/l, 5.16 ± 0.10 mmol/l, 5.06 ± 0.56 mmol/l and 4.89 ± 0.17 mmol/l correspondingly. These indicators are veritable as regards to immobilization stress 7.15 ± 0.45 mmol/l ($P \leq 0.05$).

The 30th day showed *Thalictrum Foetidum* liquid extract in all the doses under research decreasing the level of CD and TBA-AP according to statistical significance as regards to immobilization stress and approaching the control.

Thus, under immobilization stress the level of CD in *Thalictrum Foetidum* liquid extract in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml made 15.11 ± 1.12 mmol/l, 15.67 ± 0.03 mmol/l, 15.23 ± 0.09 mmol/l and 14.54 ± 0.07 mmol/l correspondingly. These indicators are statistically significant as to the animals' group, subjected to immobilization stress 37.85 ± 0.12 mmol/l ($P \leq 0.05$). Under immobilisation stress the level of TBA-AP in *Thalictrum Foetidum* liquid extract in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml amounts to 4.21 ± 0.23 mmol/l, 4.34 ± 0.05 mmol/l, 4.56 ± 0.34 mmol/l and 4.23 ± 0.23 mmol/l correspondingly. These indicators are statistically significant as to immobilization stress 7.56 ± 0.78 mmol/l ($P \leq 0.05$).

Thus, after studying the indicators of LPO we can draw the conclusion that at the five-day stage the characteristics of TBA-AP and CD cannot be corrected significantly as regards to immobilization stress [13]. Only at the 15-day and 30-day stages the liquid extract of *Thalictrum Foetidum* in all the doses under research reduces the level of CD and TBA-AP according to statistical significance as to immobilization stress, thus approaching the control group. Moreover, we have established that increasing the dose of *Thalictrum Foetidum* liquid extract of has an insignificant effect on the indicators of TBA-AP and CD.

The condition of the antioxidant system was estimated according to the number of products of catalase and superoxide dismutase (SOD), amounting in the intact rats to 5.10 ± 0.13 standard unit and 3.59 ± 0.11 standard unit correspondingly. The data from table show a considerable increase of these indicators under immobilization stress. At the 5-day stage the level of catalase comes to 5.88 ± 0.26 standard unit under immobilization stress, thus exceeding the norm significantly ($P \leq 0.05$). SOD runs to 6.93 ± 0.49 standard unit, surpassing the control twice. At the 15-day stage the level of catalase comes to 6.03 ± 0.21 standard unit, exceeding the norm in 1.5 times. Meanwhile, SOD indicators make 6.98 ± 0.23 standard unit, twice surpassing the control. The 30th day sees the level of catalase amounting to 6.23 ± 0.03 standard unit, thus surpassing the norm twice. SOD indicators ran to 7.13 ± 0.89 standard unit, thus exceeding the control in 2.5 times.

According to table, at the 5-day stage the liquid extract of *Thalictrum Foetidum* in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml does not lower the level of catalase and SOD significantly as to immobilization stress.

At the 15-day stage the liquid extract of *Thalictrum Foetidum* in all the doses decreases the level of catalase and SOD significantly as to immobilization stress, approaching the control group. Thus, under immobilization stress the level of catalase in the liquid extract of *Thalictrum Foetidum* in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml amounted to 4.97 ± 0.02 standard unit, 5.02 ± 0.09 standard unit, 4.67 ± 0.43 standard unit and 4.54 ± 0.78 standard unit accordingly. These indicators correspond to statistical significance as regards to the animals' group, subjected to immobilization stress 6.03 ± 0.21 standard unit ($P \leq 0.05$). Under immobilization stress the level of SOD in the liquid extract of

Thalictrum Foetidum in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml came to 4.21 ± 0.16 standard unit, 4.13 ± 0.04 standard unit, 4.22 ± 0.02 standard unit and 4.08 ± 0.67 standard unit correspondingly. These indicators are significant as to immobilization stress 6.98 ± 0.23 standard unit and the control group of 3.59 ± 0.11 standard unit ($P \leq 0,05$). On the 30th day we observed similar dynamics for all the doses of *Thalictrum Foetidum* liquid extract under research. Thus, under immobilization stress the level of catalase in the liquid extract of *Thalictrum Foetidum* in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml ran to 4.75 ± 0.67 standard unit, 4.98 ± 0.21 standard unit, 4.78 ± 0.06 standard unit and 4.66 ± 0.01 standard unit accordingly. These indicators correspond to statistical significance as regards to the animals' group, subjected to immobilization stress 6.23 ± 0.03 standard unit ($P \leq 0.05$). Under immobilization stress the level of SOD in the liquid extract of *Thalictrum Foetidum* in doses of 0.5 ml, 1 ml, 1.5 ml and 2 ml came to 3.42 ± 0.34 standard unit, 3.47 ± 0.05 standard unit, 3.47 ± 0.57 standard unit and 3.32 ± 0.07 standard unit correspondingly. This is veritable as regards to immobilization stress 7.13 ± 0.89 standard unit ($P \leq 0.05$).

Conclusions. Thus, according to the results of the experiment on the LPO indicators (CD and TBA-AP), we have determined that under chronic immobilization stress these indicators cannot be corrected significantly as to the control group during a 5-day period. At the 15-day and 30-day stages the liquid extract of *Thalictrum Foetidum* in the doses under study lowered the level of CD and TBA-AP according to statistical significance as to immobilization stress, approaching the control. Moreover, it has been established that increased doses of the liquid extract of *Thalictrum Foetidum* exert an insignificant effect on the LPO indicators in the rats' blood.

Taking into consideration the experimental results of the antioxidant system (catalase and SOD) under chronic immobilization stress, we may draw the conclusion that these indicators cannot be corrected significantly as regards to the control within a 5-day period. Only a 15-day stage and 30-day stage saw the liquid extract of *Thalictrum Foetidum* in the doses under research lower the level of catalase and SOD significantly as to immobilization stress, approaching the control group.

Analyzing the results of the experiment, we can come to the conclusion that the liquid extract of *Thalictrum Foetidum* exerts a very gentle effect on the LPO and antioxidant system under immobilization stress. This holds true as the experimental results show that only at the 15-day and 30-day period, namely under chronic stress, these indicators decrease significantly as to immobilization stress, approaching the control group.

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СОЗЫЛМАЛЫ ҚИМЫЛСЫЗДАНДЫРУ СТРЕСС ЖАҒДАЙЫНДА ЕГЕУҚҰЙРЫҚТАҒЫ ЛИПИДТЕРДІң ТОТЫҒУ КҮЙІНЕ ЖӘНЕ АНТИОКСИДАНТТЫ ЖҮЙЕГЕ РУТВИЦА САСЫҚ СЫҒЫНДЫСЫНЫҢ ӘСЕРІН ЗЕРТТЕУ

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ИССЛЕДОВАНИЕ ВЛИЯНИЯ ЭКСТРАКТА РУТВИЦЫ ВОНЮЧЕЙ НА СОСТОЯНИЕ ПЕРЕКИСНОГО ОКИСЛЕНИЯ ЛИПИДОВ И АНТИОКСИДАНТНОЙ СИСТЕМЫ У КРЫС В УСЛОВИЯХ ХРОНИЧЕСКОГО ИММОБИЛИЗАЦИОННОГО СТРЕССА

Аннотация. В экспериментальных условиях исследована возможность коррекции свободнорадикального окисления липидов мембран крыс путем перорального введения водного экстракта рутвицы вонючей, содержащего комплекс природных антиоксидантов.

Для проведения эксперимента животные были разделены на 6 групп по 6 животных в каждой группе. Животным 1-й группы – интактные (условная норма), и животным 2-й группы, которые подвергались стрессу путем иммобилизации в течение 5 часов, перорально внутрижелудочно через зонд вводили дистиллированную воду объемом 1,5 мл. Животным 3-й, 4-й, 5-й и 6-й групп перорально внутрижелудочно через

зонд вводили по 0,5 мл, 1,0 мл, 1,5 мл и 2,0 мл соответственно экстракта рутвицы вонючей каждые сутки за 1 час до экспозиции стресса. Иммобилизационный стресс моделировали путем каждодневного удерживания крыс в течение 5 часов в пластиковых клетках-пеналах. Животных всех групп декатировали под эфирным наркозом через 5 часов после моделирования иммобилизационного стресса, то есть на фоне максимальной экспозиции стресса. Для эксперимента использовали сыворотку крови. Определяли перекисное окисление липидов, а именно: уровень первичных продуктов окисления – диеновых конъюгатов и вторичных продуктов – малонового диальдагида и состояние антиоксидантной системы, а именно: активность каталазы и супероксиддисмутазы спектрофотометрическим методом. С целью выявления изменений исследуемых показателей, их определяли у контрольных и экспериментальных животных через 5, 15 и 30 суток.

Анализируя результаты исследования, можно сделать вывод, что жидкий экстракт рутвицы вонючей оказывает очень мягкое воздействие на состояние перекисного окисления липидов и антиоксидантной системы в условиях иммобилизационного стресса, потому что по результатам эксперимента только на этапе 15-ти и 30-ти суток, то есть в хроническом стрессе, эти показатели статистически достоверно снижаются относительно иммобилизационного стресса, приближаясь к контролю.

Ключевые слова: рутвица вонючая, жидкий экстракт, иммобилизационный стресс, антиоксидантная система, перекисное окисление липидов.

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ACUTE RESPIRATORY VIRAL INFECTIONS IN KAZAKHSTAN IN 2017-2019

Abstract. During the 2017-2019 period, 4,391 clinical samples were collected from patients diagnosed with ARVI, ARI, bronchitis, and pneumonia in polyclinics and healthcare facilities located in various regions of Kazakhstan.

Laboratory diagnosis of 4,391 nasopharyngeal swabs in the real-time polymerase chain reaction revealed the genetic material of pathogens causing ARVI in 24.41 % of cases, including adenovirus in 1.78 %, rhinovirus in 4.34 %, coronavirus in 0.82 %, parainfluenza virus type I/III in 0.87 %, metapneumovirus in 1.04 %, bocavirus in 0.30 % of examined samples. The number of samples tested positive for respiratory syncytial virus was the highest (15.25 %).

The data obtained from screening of nasopharyngeal swabs in the real-time polymerase chain reaction suggested the circulation of ARVI of mixed etiology in the examined areas of the RK.

The results of the primary screening of clinical samples collected from various regions of Kazakhstan during the epidemic seasons 2017-2019 in the polymerase chain reaction correlate with the data obtained over the 2016-2017 epidemic season according to the spectrum of influenza and ARVI causative agents. Co-circulation of adenovirus, rhinovirus, coronavirus, type I/III parainfluenza virus, metapneumovirus, bocavirus is continuing with the predominant prevalence of the respiratory syncytial infection pathogen, the proportion of which was 15.25 % of the total number of samples.

Differential diagnosis of ARVI contributes to the timely identification of infectious agents in humans and more effective implementation of sanitary and preventive measures.

Key words: PCR diagnostics, surveillance, influenza, ARVI.

Introduction. Acute respiratory viral infection (ARVI) is the most common disease group characterized by damage to the human respiratory tract regardless of age, place of residence, and social status. Despite certain successes achieved in the fight against infectious diseases, the importance of ARVI pathogens not only does not decrease, but also shows an increasing tendency. It has been established that infectious diseases currently account for at least 50-60 % of the entire human pathology, up to 20 % of the population can suffer from a respiratory infection during the epidemic period [1-6].

ARVI is a heterogeneous group of infections that has similar development mechanisms, epidemiological and clinical characteristics. ARVI causative agents include respiratory syncytial virus (RSV), parainfluenza and influenza viruses, adenoviruses, rhinoviruses, reoviruses, etc., and more than 300 of their subtypes.

The natural susceptibility to ARVI is high. Unstable immune response, lack of cross-immunity, and a large number of pathogen serotypes contribute to the development of the disease in the same person several times a year, which leads to a decrease in the overall resistance of the body [7].

The danger of ARVI lies in the complications and exacerbations of chronic diseases. In connection with the characteristics of virus structure and life activity, almost all types of acute respiratory viral infections in the early stages of the disease have similar clinical manifestations. Different laboratory methods are used to confirm the clinical diagnosis, differentiate a respiratory virus, and carry out epidemiological studies. The real-time polymerase chain reaction (RT-PCR), based on the detection of viral DNA/RNA is one of the most modern, highly sensitive, and specific methods.

The purpose of this study was to identify the causative agents of ARVI among the population of Kazakhstan during the epidemic seasons 2017-2019 in RT-PCR.

Materials and methods. In 2017-2019, clinical samples (nasopharyngeal swabs) were collected from patients during the period in polyclinics and infectious diseases hospitals located in five regions of Kazakhstan, including 13 regions and Nur-Sultan and Ust-Kamenogorsk cities.

Human nasopharyngeal swabs were collected in sterile tubes with 2 ml of Medium 199 containing 0.5 % bovine serum albumin and a complex of antibiotics (50,000 units/ml of penicillin, 50 µg/ml of streptomycin, 3,000 µg/ml of gentamicin, and 5,000 units/ml of nystatin). Samples were kept for 24 hours at 4 °C and stored in a low-temperature freezer at -80 °C.

To isolate RNA from the samples under study and carry out the reverse transcription reaction, the Ribo-prep and Reverta-L reagent kits were used. Primary screening was carried out in RT-PCR assay using fluorescent hybridization detection with AmpliSens®ARVI-screen-FL reagent kits for detection of ARVI RNA (FBIS Central Research Institute for Epidemiology of Rospotrebnadzor) on the Rotor-Gene Q6plex instrument (QIAGEN, Germany).

Results and discussion. To study the circulation of ARVI among the population during the epidemic seasons 2017-2019, biomaterials were obtained from patients diagnosed with ARVI, ARI, bronchitis, and pneumonia from patients with diagnoses of acute respiratory viral infections, acute respiratory infections, bronchitis and pneumonia, the collection of biological materials. Clinical samples (nasopharyngeal swabs) were collected together with medical personnel from polyclinics and infectious disease hospitals located in five regions of Kazakhstan (the northern region – Akmola, North Kazakhstan, Kostanai, Pavlodar oblasts, and Nur-Sultan city; the southern region – Almaty, Kyzylorda, and Turkestan oblasts; the western region – Atyrau, Aktobe, West Kazakhstan, and Mangystau oblasts; the eastern region – East Kazakhstan oblast, Ust-Kamenogorsk city, and the central region - Karaganda oblast). A total of 4,391 swabs were obtained.

The largest number of samples was obtained from patients living in the Northern and Southern Kazakhstan – 1,466 samples (33.38 % of the total number of samples) and 1,002 biosamples (22.81 %), respectively. 806 (18.35%), 723 (16.46 %), and 394 (8.97 %) nasopharyngeal swabs were collected from the Western, Eastern, and Central Kazakhstan, respectively.

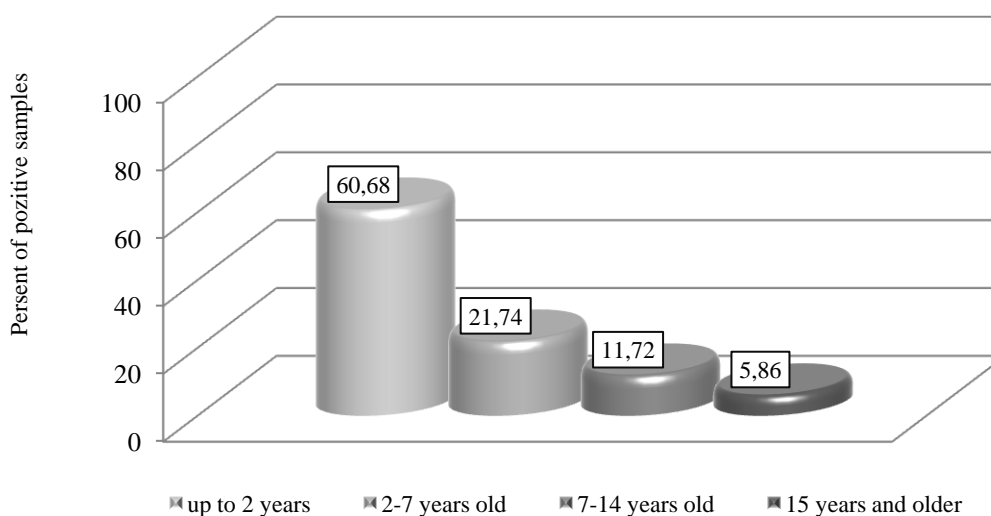


Figure 1 – Age structure of patients examined during the epidemic seasons 2017-2019 (%)

As can be seen from figure 1, 94.30 % of the samples were collected from children (4,141 samples), of which the number of examined children under two years old was 61.50 % (2,700 samples), aged 2-7 years old – 17.30 % (760 samples), 7-14 years old – 15.50 % (681 samples). The number of samples collected from the adult population was 5.70 % (250 swabs) of the total number of samples.

Figure 2 shows the ratio between clinical samples depending on the diagnosis of the examined patients.

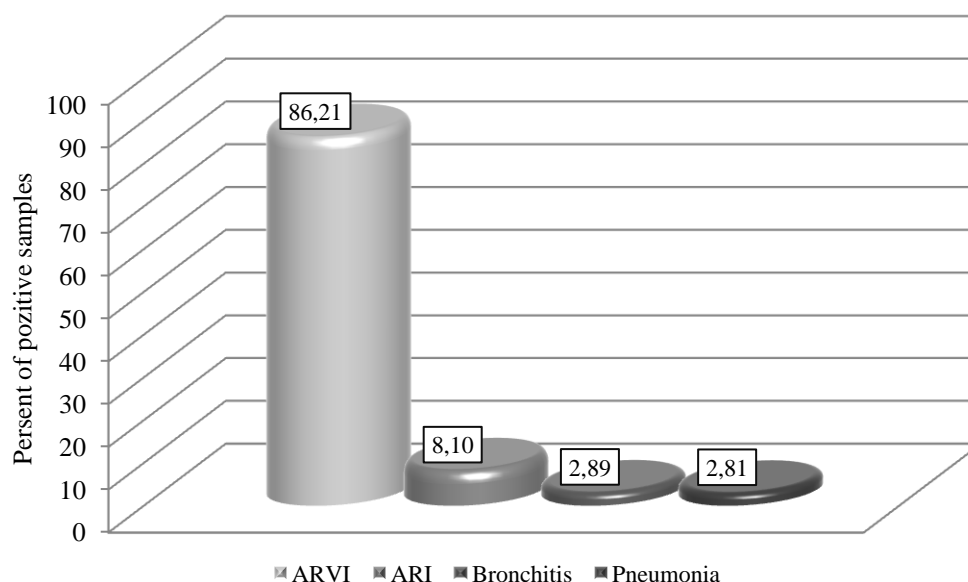


Figure 2 – Primary diagnosis of the examined patients (%)

The percentage of collected samples, depending on the diagnosis, was as follows: ARVI – 87.30 % (3,833 samples), ARI – 8.33 % (366 samples), bronchitis – 2.77 % (122 samples), and pneumonia – 1.60 % (70 samples).

A molecular genetic study of 4,391 nasopharyngeal swabs for the presence of ARVI was carried out. The table demonstrates the results of the primary screening of nasopharyngeal swabs in RT-PCR.

Screening of clinical samples collected during 2017-2019 in RT-PCR for the presence of ARVI causative agents

| Region | Total number of samples | Number of positive samples | Number of PCR positive samples for | | | | | | | |
|----------------------|-------------------------|----------------------------|--|------------------|-----------------|------------------------------|-------------------|------------------------------|----------------------------|-----------------|
| | | | human respiratory syncytial virus hRSv | adeno virus hAdv | rhino virus hRv | parainfluenza virus hPiv 2/4 | corona virus hCov | parainfluenza virus hPiv 1/3 | human metapneumovirus hMpv | boca virus hBov |
| Southern Kazakhstan: | 1002 | 440 | 301 | 18 | 75 | 0 | 10 | 17 | 11 | 8 |
| Northern Kazakhstan: | 1466 | 127 | 76 | 3 | 16 | 0 | 7 | 5 | 16 | 4 |
| Western Kazakhstan: | 806 | 249 | 175 | 13 | 32 | 0 | 8 | 9 | 11 | 1 |
| Eastern Kazakhstan: | 723 | 130 | 71 | 5 | 40 | 0 | 3 | 4 | 7 | 0 |
| Central Kazakhstan: | 394 | 126 | 47 | 39 | 28 | 0 | 8 | 3 | 1 | 0 |
| Total: | 4391 | 1072 | 670 | 78 | 191 | 0 | 36 | 38 | 46 | 13 |

As can be seen from the table, the genetic material of ARVI pathogens was detected in 1,072 samples (24.41 % of the total number of examined samples). Adenovirus was found in 78 (1.78 %), rhinovirus in 191 (4.34 %), coronavirus in 36 (0.82 %), parainfluenza virus type I/III in 38 (0.87 %), metapneumovirus in 46 (1.04 %), bocavirus in 13 (0.30 %) samples. The number of samples tested positive for respiratory syncytial virus was the highest (670 samples – 15.25 %).

Data obtained from the primary screening of nasopharyngeal swabs in RT-PCR thereby suggested the circulation of ARVI of mixed etiology in the examined areas of RK.

Conclusion. The incidence of ARVI continues to remain at a high level, increasing annually in the autumn-winter season. According to the WHO, 4 million children under five years of age annually die from acute respiratory viral infections and their complications, and the proportion of children under one year of age among the dead ones is more than 66 %. Acute pneumonia is the cause of infant deaths from ARVI in 75 % of cases [8].

The results of the studies indicate that RSV pathogens, rhino- and adenoviruses, and parainfluenza viruses I/III are most common among the acute respiratory viral infections. The constant variability of viruses and emergence of new causative agents of ARVI, which make up 80-90 % of all cases of infectious pathology, constitute a serious threat.

During the 2017-2019 period, 4,391 biosamples were collected from patients diagnosed with ARVI, ARI, bronchitis, and pneumonia in polyclinics and healthcare facilities located in five regions of Kazakhstan including 13 oblasts and Nur-Sultan and Ust-Kamenogorsk cities. While studying samples in RT-PCR, the genetic material of ARVI pathogens was detected in 22.41 % of cases: adenovirus in 1.78 %, rhinovirus in 4.34 %, coronavirus in 0.82 %, type I/III parainfluenza virus in 0.87 %, metapneumovirus in 1.04 %, and bocavirus in 0.30 % of samples. The number of samples tested positive for respiratory syncytial virus was the highest (15.25 %).

Laboratory diagnosis of clinical samples obtained from patients during the 2016-2017 epidemic season showed the prevalence of parainfluenza viruses, RSV, adenoviruses, metapneumoviruses, and rhinoviruses. Bocaviruses and coronaviruses were detected only in isolated cases [6, 9].

The results of the primary screening in RT-PCR of clinical samples collected from various regions of Kazakhstan during the epidemic seasons 2017-2019 for the presence of ARVI causative agents correlate with the data obtained over the 2016-2017 epidemic season [9]. Circulation of the same causative agents of ARVI is continuing with the predominant prevalence of respiratory syncytial infection, the proportion of which was 15.25 % (670 samples).

At present, unfortunately, capabilities in the diagnosis of respiratory viral infections provided by modern methods of virology and molecular biology do not always coincide with the level of realization of these capabilities in practical laboratories. Due to the limitation in the arsenal of drugs active against respiratory viruses, the etiotropic therapy of ARVI also remains an open issue.

The study was carried out as part of the scientific and technical program BR05226330 "Development of new diagnostic, preventive and medicinal preparations for combating influenza and acute respiratory viral infections in humans, development of technologies for their production".

The work was carried out as part of the scientific and technical programme: BR05226330 "Creation of new diagnostic, preventive and medicinal products for combating influenza and acute respiratory viral infections of a person, development of technologies for their production".

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2017-2019 ЖЫЛДАРДАҒЫ ҚАЗАҚСТАНДАҒЫ ЖІТІ РЕСПИРАТОРЛЫ ВИРУСТЫҚ ИНФЕКЦИЯ

Аннотация. Жұқпалы аурулардан келтірілген экономикалық залал тұрғысынан жедел респираторлық вирустық инфекциялар әлемде және біздің елімізде бірінші орында тұр. Әлеуметтік мәртебесіне, тұрғылықты жеріне, жасына қарамастан, адамдардың тыныс алу жолдарын зақымдау және клиникасы ұқсас респираторлы вирустық инфекцияларға әртүрлі аурулар тобы жатады.

Тұмаудың клиникалық-эпидемиологиялық маңыздылығына қарамастан, адамдар үшін бірінші орынды этиологиясы тұмау емес ЖРВИ алады. Этиологиясы тұмау емес респираторлы инфекциялардың мәселесі олардың кең таралуы, полиэтиологиялық және нақты алдын алудың болмауына байланысты. Сонымен қатар осы инфекция ошақтарында эпидемияға қарсы іс-шараларды ұйымдастыруға жеткілікті көңіл бөлінбейді.

Осыған байланысты, инфекцияның таралуын бақылау, оның ішінде қоздырғышты дер кезінде диагностикалау, респираторлық вирустық инфекциялармен күресуде өте маңызды.

Жұмыстың мақсаты 2017-2019 жылдардағы эпидемиялық маусымдарда Қазақстан Республикасының тұрғындары арасында жедел респираторлы вирустық инфекциялар қоздырғыштарын РТ-ПТР-да анықтау.

2017-2019 ж. Қазақстанның әртүрлі аймақтарындағы емханалар мен медициналық мекемелердегі жедел респираторлы вирустық инфекция, бронхит және пневмония диагнозы бар науқастардан 4391 клиникалық сынама алынды.

4391 назофарингальді үлгілерді полимеразды тізбектік реакциясында зертханалық балауда нәтижесінде 24,41 %-дық жағдайда ЖРВИ қоздырғыштарының генетикалық материалы анықталды. Солардың ішінде аденовирус 1,78 % сынамада, риновирус 4,34 %, коронавирусы 0,82 % анықталды, I/III парагрипп вирусы – 0,87 %, метапневмовирус – 1,04 %, бокавирус – 0,30 %. Оң нәтиже көп берген сынамалар респираторлық синцитиальды вирус үшін 15,25 %-ды құрады.

Назофарингальды сынамаларды полимеразды тізбектік реакциясында скрининг жүргізу нәтижесі, ҚР зерттелген облыстарында ЖРВИ аралас этиологиясын көрсетті.

2017-2019 ж. эпидемиялық маусымында Қазақстанның әртүрлі аймақтарынан жиналған клиникалық үлгілерді полимеразды тізбектік реакцияда тұмау қоздырғыштары және ЖРВИ спекторы бойынша алынған нәтижелерді, 2016-2017 ж. эпидемиялық маусыммен салыстырғанда ұқсас болды. ЖРВИ бірдей нұсқаулары және респираторлық синцитиальды инфекция қоздырғыштарының үлесі 15,25 % басымдылығымен айналымда жалғасуда.

Жедел респираторлы вирустық инфекциялардың дифференциалды балау нәтижесі, науқас адамдардан қоздырғышты уақтылы анықтауға және санитарлық-профилактикалық шараларды тиімді жүргізуге ықпал етеді.

Түйін сөздер: ПЦР-диагностика, эпидбақылау, тұмау, ЖРВИ.

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ОСТРЫЕ РЕСПИРАТОРНЫЕ ВИРУСНЫЕ ИНФЕКЦИИ В 2017-2019 ГГ. В КАЗАХСТАНЕ

Аннотация. По величине экономического ущерба, наносимого инфекционными заболеваниями, первое место как в мире, так и в нашей стране занимают острые респираторные вирусные инфекции. К респираторным вирусным инфекциям относится разнообразная группа заболеваний, объединяемых вирусной природой возбудителя, общим механизмом передачи и клиникой поражения респираторного тракта человека независимо от возраста, места проживания и социального статуса.

Несмотря на наибольшее клиническое и эпидемиологическое значение гриппа для людей, первое место стабильно принадлежит ОРВИ негриппозной этиологии. Проблема респираторной инфекции негриппозной этиологии определяется их широким распространением, полиэтиологичностью и отсутствием возможности специфической профилактики. При этом не всегда уделяется достаточного внимания вопросам организации противоэпидемических мероприятий в очагах этих инфекций.

В связи с этим крайне важными направлениями борьбы с респираторными вирусными инфекциями являются надзор за их распространением, который включает своевременную диагностику возбудителя.

Целью данной работы явилось выявление возбудителей ОРВИ среди населения РК в эпидемические сезоны 2017-2019 гг. в РТ-ПЦР.

В 2017-2019 гг. в поликлиниках и лечебных учреждениях различных регионов Казахстана от больных людей с диагнозами ОРВИ, ОРЗ, бронхит и пневмония получен 4391 клинический образец.

При лабораторной диагностике в полимеразной цепной реакции в режиме реального времени 4391 носоглоточного смыва, генетический материал возбудителей ОРВИ обнаружен в 24,41% случаев: аденовирус выявлен в 1,78% проб, риновирус – в 4,34%, коронавирус – в 0,82%, вирус парагриппа I/II типов – в 0,87%, метапневмовирус – в 1,04%, бокавирус – в 0,30% проб. Наибольшее количество положительных образцов выявлено к респираторно-синцитиальному вирусу – 15,25%.

Результаты, полученные при скрининге носоглоточных смывов в полимеразной цепной реакции, указывают на циркуляцию в исследованных областях РК ОРВИ смешанной этиологии.

Первичный скрининг в полимеразной цепной реакции клинических образцов, собранных в различных регионах Казахстана в эпидемические сезоны 2017-2019 гг., по спектру возбудителей гриппа и ОРВИ, коррелирует с результатами эпидсезона 2016-2017 гг. Продолжается социркуляция аденовируса, риновируса, коронавируса, вируса парагриппа I/II типов, метапневмовируса, бокавируса с преимущественным преобладанием возбудителя респираторно-синцитиальной инфекции, доля которой составляла 15,25% от общего числа проб.

Дифференциальная диагностика ОРВИ способствует своевременному выявлению возбудителей инфекции у людей и более эффективному проведению санитарно-профилактических мероприятий.

Ключевые слова: ПЦР-диагностика, эпиднадзор, грипп, ОРВИ.

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DANDELION KOK-SAGHYZ (*TARAXACUM KOK-SAGHYZ* L. RODIN) AS A ONE-YEAR CULTURE DEVELOPED UNDER CONDITIONS OF SOUTHEAST KAZAKHSTAN

Abstract. Dandelion kok-saghyz (*Taraxacum kok-saghyz* L.Rodin) is a herbaceous plant, a source of high-quality rubber. At present, *Taraxacum kok-saghyz* (Tks) is introduced into agriculture in Kazakhstan.

"Saryzhaz" is Kazakh variety of Tks tested as a one-year culture on the experimental plots of the South-Eastern Kazakhstan (N43.1471, E77.2977). The vegetation period of Tks "Saryzhaz" from the preparation of seedlings in the greenhouse (early March) until achene development maturity in the open field takes five months. The studies of kok-saghyz "Saryzhaz" as a one-year culture were repeated three times.

From the 200 m² plots, the raw root harvest was 0.35 (2017), 0.32 (2018), and 0.37 centers (2019), with a density of 10 plants per 1 m². The rubber content is 8 ± 3% per the dry weight of the root. By extrapolating the results of research to one hectare (at a plant density of 100,000), one can predict the harvest of a raw root from 16.0 to 18.5 centers per hectare.

This article demonstrates the possibility of Tks "Saryzhaz" cultivating as a one-year culture in the South-East of Kazakhstan. Tks "Saryzhaz" passes the vegetation cycle before flowering, achene development\maturity in a short spring and early summer period of 5 months.

The combination of the following conditions makes it possible to use Tks as a one-year-old culture in the South-East of Kazakhstan: the use of seedlings, sufficient moisture supply (rains, watering), increased (optimal) temperatures of the spring months for the accelerated plant development.

The increase of the root crop of Tks as a one-year-old crop can be achieved through optimization of farming practices (fertilizers, stocking density) and selection work.

Key words: Kok-saghyz, one-year culture, Kazakhstan.

Introduction. Dandelion kok-saghyz (*Taraxacum kok-saghyz* L.Rodin) is a perennial herbaceous plant, with the habitat in the valleys of the mountains of the South-Eastern Kazakhstan [1].

Taraxacum kok-saghyz (Tks) was introduced into agriculture in the last century, as a technical culture with the roots synthesizing natural rubber in the quality not inferior to the natural rubber of the tropical tree of hevea [2].

Natural Rubber (NR) is a strategically important material, used in production of a wide range of different products: tires (automobile, airplane), medical gloves and other medical products.

At present time, there is a real threat of destruction by the diseases of the largest plantations of the traditional source of rubber tree - hevea (*Hevea brasiliensis*) in the countries of South-East Asia - the main world producers of NK, and therefore a threat to the NK market.

In the light of these developments, EU [3], the US, Canada [4] (*PENRA, 2018*), and Kazakhstan are taking measures to develop research and introduction of Tks into agriculture as an alternative source of natural rubber.

In Kazakhstan, from 1932 to 1935, on the fields of the Turkestan district, South Kazakhstan, the Tks was cultivated as a one-year plant and harvest about 1 ton of roots per hectare, with the output of pure natural rubber up to 8%.

By the beginning of 1934, 5 871 hectares had been developed for sowing of natural rubber plants. But, as explained in the documents of the Archive of the Republic of Kazakhstan, "due to the financing cut in 1936, the development of industrial natural rubber production in Kazakhstan was suspended" [5].

Tks studies in Kazakhstan have been resumed since 2005 by the Institute of Plant Biology and Biotechnology (IBBR), Almaty [2].

There is a need for Tks genotypes with high root yield, high rubber concentration, and high seed vigor [6].

The purpose of this study was to test the first Kazakh variety Tks "Saryzhaz" as a one-year culture on the experimental plots of the South-East of Kazakhstan [7].

Materials and methods. Tests of Tks "Saryzhaz" were carried out in the open ground in the territory of the agricultural farm "Mirnoe": village "Ostemir": Talgar district, Almaty region, Kazakhstan (N43°37'49', E77°15'41'). The presence of artesian wells provides low-cost water supply, irrigation of farming areas "Ostemir".

The experimental plot of 200 m² combined eight small sections of 25 m² each. The soil of the site is sandy loam, with manure fertilization applied (400 kg per 200 m² plot) to a depth of 15 cm.

The seedling method of cultivation of Tks was used. In a greenhouse, seed sowing was carried out on peat pills, the seedlings developed for two months (March, April) under 25°C [8].

The planting of the Tks "Saryzhaz" seedlings was carried out in the open ground of the experimental plots "Ostimir". Density of planting is 10 plants per square meter. Care of the plantings consisted of the following measures: fertilization (manure), watering, loosening of rows, weeding.

The climate in "Ostemir" is steppe, continental with hot summers and cold winters. The spring and autumn rainy, average air temperatures in April are +18.2° C, in May + 23.9°C, that is optimal for the development of plants Tks.

The hottest months are July, August. Weather with the temperature close to +30°C is observed on average in 36 days a year (Weather in Ostemir, 2017, 2018, 2019) [9].

The collected roots were washed and dried under 80°C till the constant weight was achieved. The method of alkaline extraction of rubber from dry roots was used, followed by gravimetric determination of the rubber content by Koyalovich method [10]. The results were statistically processed [11].

Results and discussion. The life cycle of Tks "Saryzhaz" was documented across the testing period of nine months (March-November) 2017, 2018 and 2019. That is, the studies of kok-saghyz "Saryzhaz" as a one-year culture were repeated three times. The chronology and duration of various stages of Tks "Saryzhaz" growth under the conditions of the village of "Ostemir", Southeast Kazakhstan are shown in figure 1.

| Growth stage | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Preparation of seedlings. Development seedling. | | | | | | | | | |
| Planting seedlings. Adaptation of seedlings to the open soil. Leaf development/rosette growth. | | | | | | | | | |
| Inflorescence emerge | | | | | | | | | |
| Flowering. achene development\maturity. Peak. | | | | | | | | | |
| Summer resting | | | | | | | | | |
| Autumn flowering | | | | | | | | | |
| Winter resting | | | | | | | | | |

Figure 1 – Chronology and duration of various stages of growth of Tks "Saryzhaz" under the conditions of "Ostemir"

In early May, seedlings with 6-8 real leaves were planted in the open ground of the experimental site (figure 2).



Figure 2 – Experimental plots "Ostemir".
Planting Tks "Saryzhaz" seedlings in April (a, b), the plots in June (c) and July (d)

The period of adapting Tks "Saryzhaz" seedlings to open soil conditions took two weeks - the leaves of the seedlings died off and then new leaves formed, a new rosette.

In early June, the beginning of flowering Tks "Saryzhaz" was marked.

The period of active flowering and achene development\maturity was mainly in July and early August. In early August, the number of leaves in the rosette reached 40-56, the length of the leaf plate 10 cm, the leaf width 1.5 cm.

The height of the aerial part with the peduncle was 22 ± 5 cm, of the total number of plants, non-flowering forms amounted to 49%, flowering forms had from 8 to 26 peduncles. Mature seeds appeared about 8-12 days later. On one peduncle there are 42-56 seeds.

The leaves of Tks "Saryzhaz" are green, in shape a leaf is entire, incised or dissected. The shares of the cut or incised leaf are wide and round, without small burrs. The leaves of the basket wrapper have carob-shaped appendages.

In August, in "Ostemir" even under the conditions of watering, the leaves dry up as Tks "Saryzhaz" has the "summer resting", which lasts until the end of September.

With a decrease in temperature in October ($+ 16$ °C) and due to rain falls, Tks "Saryzhaz" leaves come out from the "summer resting".

New leaves grow, an outlet is formed, and then an autumn flowering is observed. After the period of "summer break" in October, the regenerated plants did not have time to recover up to the mass of the first fruiting period before "summer resting", and also 1/3 of the number of plants died.

The growth stages of the Tks "Saryzhaz" are shown in figure 3.



Figure 3 – Growth stages of Tks “Saryzhaz” as one-year culture. 60 -days-old seedlings (a), adaptation of seedlings to open ground (b), rosette growth (c), the beginning of flowering and maturity (d), the peak of flowering and of achene development\maturity (f), summer resting (g), plant regeneration (h), autumn flowering (i)

In the beginning of August, during the period of the fruiting Tks “Saryzhaz” root harvesting was carried out. Illustrations of the samples of the harvest of the roots and rubber of Tks "Saryzhaz" are shown in figure 4.

Tks "Saryzhaz" has a fibrous root system (which does not have the main root). The sternal root was less common (18-22% of the total number of roots).



Figure 4 – Samples of the harvest of Tks "Saryzhaz". Fibrous root types (a), raw root samples (b), dry root samples (c), and rubber samples (d)

Similar results were obtained in the last century in the South of Kazakhstan by Mynbayev K.

When manure is applied (40 tons per ha) to a small depth of up to 15 cm, about 80 percent of the total number of plants form branched roots; when applied the same amount of manure deeper up to 20-25 cm, the branching percentage drops down to 58%.

The more favorable the conditions in the surface layers of the soil, the more branched roots and the higher the yield of the root mass [12].

From the 200 m² plots, the raw root harvest were 0.35 (2017) 0.32 (2018) and 0.37 centers (2019), with a density of 10 plants per 1 m².

The average weight of one raw root of Tks "Saryzhaz" is 16 ± 5 grams, with the rubber content of 8 ± 3% per the dry weight of the root.

By extrapolating the results of research to one hectare (at a plant density of 100,000), one can predict the harvest of the raw root from 16.0 to 18.5 centers per a hectare.

Thus, this article demonstrates the possibility of Tks "Saryzhaz" cultivating as a one-year culture in the South-East of Kazakhstan. Tks "Saryzhaz" passes the vegetation cycle before flowering, achene development\maturity in a short spring and early summer period of 5 months.

The combination of the following conditions makes it possible to use Tks as a one-year-old culture in the South-East of Kazakhstan: the use of seedlings, sufficient moisture supply (rains, watering), increased, optimal temperatures of the spring months for the accelerated plant development.

The increase of the root crop Tks as a one-year-old crop can be achieved through optimization of farming practices (fertilizers, stocking density) and selection work.

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ОҢТҮСТІК-ШЫҒЫС ҚАЗАҚСТАН ЖАҒДАЙЫНДАҒЫ КӨК-САҒЫЗ (*TARAXACUM KOK-SAGHYZ* L. *RODIN*): БІРЖЫЛДЫҚ ЕКПЕ ӨСІМДІГІ РЕТІНДЕ

Аннотация. Көк-сағыз (*Taraxacum kok-saghyz* L.Rodin) шөбі – жоғары сапалы каучук көзі болатын өсімдік. Қазіргі кезде көк-сағыз Қазақстанда егістікке енгізіліп келеді.

Оңтүстік-Шығыс Қазақстан тәжірибе алқаптарында (N43.1471, E77.2977) бір жылдық екпе өсімдік ретінде бірінші қазақстандық «Сарыжаз» атты сұрыптың сынақтары өткен.

«Сарыжаз» көк-сағызының вегетациялық мерзімі жылыжайда өскіндерді дайындаудан бастап (наурыз айының басында), тұқым беруге дейін ашық жерде бес айды қамтиды. Көк-сағызды «Сарыжаз» жыл сайынғы мәдениет ретінде зерттеу үш рет қайталанды.

1 м²-де 10 өсімдік тығыздығының 200 м² алқабында дымқос тамырдан 0,35 (2017), 0,32 (2018) және 0,37 центнер (2019) алынған.

Тамырдың орташа құрғақ салмағы 8±3 % каучук мөлшеріне бір тал «Сарыжаз» көк-сағызының дымқос тамырының 16 ±5 граммына тең.

Бір гектарда (100 000 өсімдік тығыздығында) зерттеу нәтижелерін экспроприациялап, 16,0-дан 18,5 центнерге дейін дымқос тамыр өнімін бір гектардан алуды болжауға болады.

Сол себепті бұл мақала Оңтүстік-Шығыс Қазақстан аумағында «Сарыжаз» ТКС-ың бір жылдық екпе өсімдік ретінде өсіру мүмкіншілігін көрсетеді. «Сарыжаз» ТКС-ы 5 айлық көктемдегі қысқа және ерте жаздық мерзімде гүлденуге, жетіліп пісуге дейін вегетациялық кезеңінен өтіп жатыр.

Келесі жағдайлардың үйлесуі ТКС-ның бір жылдық екпе өсімдік ретінде қолданылуы: көшеттерді қолдану, жеткілікті ылғалдық (жауын, суару), өсімдіктердің тез дамуы үшін көктем айларының оптималды температурасы мүмкіндік береді.

Бір жылдық ретіндегі өнімінде ТКС тамырының ұлғаюы, ауыл шаруашылық (тыңайтқыштар, отырғызу тығыздығы) пен селекциялық жұмыстар жүргізу әдістерін үйлесімділеуде жүзеге асады.

Түйін сөздер: көк-сағыз, бір жылдық екпе өсімдік, Оңтүстік-Шығыс Қазақстан.

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ОДУВАНЧИК КОК-САГЫЗ (*TARAXACUM KOK-SAGHYZ* L. RODIN) КАК ОДНОЛЕТНЯЯ КУЛЬТУРА В УСЛОВИЯХ ЮГО-ВОСТОЧНОГО КАЗАХСТАНА

Аннотация. Одуванчик кок-сағыз (*Taraxacum kok-saghyz* L.Rodin) – травянистое растение, источник каучука высокого качества. В настоящее время кок-сағыз вводится в культуру в Казахстане.

На экспериментальных участках Юго-Восточного Казахстана (N43.1471, E77.2977) были проведены испытания первого казахстанского сорта кок-сағыза «Сарыжаз» как одногодичной культуры.

Вегетационный период кок-сағыза "Сарыжаз" от подготовки рассады в оранжерее (начало марта) до плодоношения в открытом грунте занимает пять месяцев. Исследования кок-сағыза «Сарыжаз» как однолетней культуры повторялись трижды.

С участков по 200 м² получены урожаи сырого корня 0,35 (2017) 0,32 (2018) и 0,37 центнеров (2019) при плотности 10 растений на 1 м².

Средний вес одного сырого корня кок-сағыза «Сарыжаз» равен 16±5 грамм с содержанием каучука 8±3 % на сухой вес корня.

Экстраполируя результаты исследований на один гектар (при плотности растений 100 000), можно прогнозировать урожай сырого корня от 16,0 до 18,5 центнеров с одного гектара.

Таким образом, в настоящей работе продемонстрирована возможность возделывания кок-сағыза на территории Юго-Восточного Казахстана как одногодичной культуры. Кок-сағыз «Сарыжаз» проходит вегетационный цикл до цветения, плодоношения за короткий весенний и ранний летний период – 5 месяцев.

Сочетание следующих условий позволяет использовать кок-сағыз как одногодичную культуру на юге Казахстана: использование рассады, достаточное влагообеспечение (дожди, полив), повышенные (оптимальные) температуры весенних месяцев для ускоренного развития растений.

Увеличение урожая корня однолетнего кок-сағыза может быть достигнуто через оптимизацию агротехнических приемов (удобрения, плотность посадки) и селекционную работу.

Ключевые слова: кок-сағыз, однолетняя культура, Казахстан.

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RESEARCH RESULTS OF DECOY DUCK ECOLOGY

Abstract. The results of long-term observations of the population of the Russian decoy duck in the nursery of decoy ducks of the Hunting Club with decoy and call ducks (HCDCD) and the study of its biology features are presented. As a result of these studies, significant differences were found between the exterior signs of mallard and decoy duck. The biology features of decoy ducks were studied, which led to changes in the process of domestication, molting, nutrition, reproduction, and behavioral changes characteristic of poultry (attitude to the aviary, people, and loss of migratory instinct). This showed that the Russian decoy duck is a breed of domesticated duck with specific hunting signs, which can be considered as a variety of domestic hunting duck with specific hunting features.

Key words: hunting, decoy duck, aviculture, biology, breed.

Relevance. In Western Europe, commercial hunting for waterfowl was widespread among people of the Baltic states as early as the 15th century. Hunting for birds of passage and wintering waterfowl was carried out in the autumn-winter period. There is a known description of duck hunting using net traps, in which game bird was lured using domestic decoy ducks in the Netherlands, Denmark and other countries. To service one of them, up to 600 decoy ducks were kept on Kevler Dune (near Geldern, the Netherlands) [1,2,3]. The use of guns for hunting for waterfowl began in the middle of the 16 century after the invention of the shot. Industrialists hunted first with muzzle-loading shotguns which were relatively heavy and slowly recharged. Therefore, the firing was conducted from legs or support and only from a shelter. The muzzle-loading guns were successfully used by hunters in wintering of waterfowl in the Netherlands, Belgium, France, Denmark, Venice, as well as in Asian countries [1].

In Russia, mallard hunting using net traps and decoy ducks was most likely born at the end of the 15th century [1].

At the same time at the end of the 19 century, the Russian hunting community has banned the use of net traps. Hunters began to catch ducks using traps of various designs, snares, etc. They began to use decoy ducks to lure birds into traps. This hunt was especially widely developed in the Nizhny Novgorod, Tula, Voronezh and Penza provinces. It can be assumed that from there this type of hunting began to spread further, first along the Don River, and then along the Volga to Saratov [14]. The earliest description of hunting with a decoy is given by L.P. Sabaneev in the "Hunting Calendar" [5].

Initially, decoy ducks were bred from domestic ducks that occurred as a result of mallard domestication [6]. In the first half of the 19 century, in Western Europe and Russia, there were call ducks.

German breeders S. Horst, P. Perlhühner, G. Enten [7], studying the history of the creation of call duck breed, suggested several options for its occurrence. Presumably, the call duck breed was bred in the Baltic countries as a result of a targeted selection of small domestic ducks. They also considered another option for the appearance of this breed. Call ducks became popular in the Netherlands around 1800 and were widely distributed among poultry farmers in a relatively short period, which is somewhat contrary to the practice of poultry breeding [7]. S. Horst, P. Perlhühner, G. Enten suggested that such a rapid spread of these ducks occurred because they were introduced to Holland as an already mature breed.

On the exterior, call ducks are significantly different from other breeds of ducks, since a dwarfism mutation is manifested genetically, from generation to generation. This feature is well shown in their German name - zwergenten - dwarf ducks. Thus, to create a call duck from scratch and make it a new breed in such a short time, it would have been possible only by chance [7].

In works on classical private duck genetics, using a hybridological analysis, more than 15 genes responsible for the color of plumage and other discrete morphological characters were identified in the mallard duck. In particular, a dwarf growth gene was found in mallard ducks [7,9]. In 1949, the English breeder geneticist Hutt discovered a mutation of dwarf gen (dw). In contrast to the previously described autosomal dominant the dwarf gene, the dwarf bird bred by Hutt showed no pathological abnormalities [2].

The greatest success in breeding call ducks was achieved by Tula and Nizhny Novgorod breeders, who until the beginning of the 20th century. managed to keep this breed group. Subsequently, in Russia, the call duck as an independent breed was lost, but as a result of the consolidation of various varieties of decoy ducks, the Russian decoy duck was formed, in which the exterior features of the call and local decoy ducks were largely preserved [3].

A major contribution to the study of issues related to the content, behavior patterns and methods of hunting with a decoy duck was made by Ya.S. Rusanov [10].

Aim of the research. To study the morphometric parameters of the decoy duck and the ecology of their distribution.

Materials and research methods. We studied the biological features of decoy ducks from 2000 to 2018 in the decoy duck nursery of the Hunting Club with decoy and call birds (HCDCD). The population of decoy ducks was formed by birds brought from different regions of the USSR and Russia (from Smolensk, Moscow, Tula, Vladimir regions, as well as from the decoy duck nursery of the Central Research Laboratory of Glavohota of the RSFSR). The number of the observed population varied annually from 90 to 120 ducks. For 10 years of research, about 2600 decoy ducks were studied.

During the observations, it was supposed to find out the degree of domestication of decoy ducks and the features of their biology (molting, behavior, feeding and reproduction features) when maintaining in a nursery [1].

To solve the objectives in terms of studying the biology of the Russian decoy duck, we used the following methods:

- the methodology of comparative morphometric studies of mallard and decoy duck;
- statistical methodology for determining the genetic and selective parameters of the decoy duck;
- standard methods used in poultry farming for breeding and maintenance of domestic ducks [11].

We carried out selection work with decoy ducks according to standard methods used in poultry farming for breeding and keeping domestic ducks [12].

Exterior characteristics were studied by us according to the results of expert inspections at poultry exhibitions, in the HCDCD nursery, at the Club owners, as well as in hunting establishments and on the private farms of the breeders of the Moscow, Smolensk, Tver, and Tula regions. Based on the research results, a comparison of the exterior and morphometric parameters of decoy ducks bred in different regions of Russia was conducted. The working (hunting) qualities of decoy ducks were studied both by the results of hunting and by the results of field tests [13].

Every year after spring hunting, we analyzed data obtained from hunters using specifically designed questionnaires based on the performance indicators of decoy ducks, the success and profit of the hunt in different regions.

Due to the polygenic conditionality of most morphological characters of birds and the influence of external conditions on their variability, we used statistical methods to determine the genetic selection

parameters of the studied decoy duck group. Similar methods are widely used in poultry to improve the productive and breeding qualities of geese and ducks [11].

To get an overview of the group being studied, according to generally accepted methods, we calculated the following values by signs: arithmetic mean, mean square (standard) deviation, and coefficient of variation. In order to determine the reliability of the obtained indicators and the results of the comparative analysis, the errors were determined by the calculated values [14].

For comparative morphometric investigations of the body parts of decoy duck and mallard, we carried out morphometric measurements according to six exterior indicators. The measurements were carried out according to the method proposed for conducting breeding work on poultry farms [15] and used for morphometric measurements of mallards at the Central Research Laboratory of Glavokhota [16]. For statistical analysis, the following exterior parameters of the parts of the decoy duck body were selected: body length, wing length, length of the beak with head, tarsometatarsus length, beak length, and width. The results of measurements of these parts of the duck's body are methodologically characterized by obtaining the most accurate measurement values in the absence of seasonal morphometric fluctuations. It is these parts of the duck's body that most fully reflect the degree of domestication in poultry [11].

In the process of morphological studies of the body parts of decoy duck and mallard, we measured the body parts of 695 cock ducks and 535 ducks kept in the HCDCD nursery and Club owners. For a comparative analysis of the body parts of decoy ducks and mallards, the results of measurements of 60 decoy ducks (32 cock ducks and 28 ducks) were selected. The choice of such a number of decoy ducks was determined by the number of mallard individuals participating in the morphometric research of the Central Research Laboratory of Glavokhota [16], with the morphometric parameters of which we compared our data.

For statistical analysis, we selected six indicators of body parts that characterize the length of the body, wing, tarsometatarsus, length and width of the beak, and the length of the beak with the head. These indicators most objectively reflect the degree of domestication and are methodically the most accurate, since they relate to those body parts that are not subject to seasonal changes. In total, 92 individuals of Russian decoy ducks (48 ducks and 44 cock ducks), 73 mallards (35 ducks and 38 cock ducks) were measured.

As a result of these studies, significant differences were found between the exterior characteristics of mallard and decoy duck, and criteria for voice variations of decoy duck, which were very different from the mallard, were identified and fixed. This allows considering the Russian decoy duck as a breed to select for the preservation and improvement of its exterior and hunting qualities and to breed decoy ducks with good voice features and specific "hunting" behavior [19].

To describe the appearance of the Russian decoy duck, we applied the principles used in poultry farming to describe the poultry breeds [13].

Research results. In the studied decoy ducks, the prevalence of common exterior and interior features, persistently inherited, was established, which characterizes the studied duck population as a breed. In 2004, the HCDCD Coordinating Council developed a draft standard for the Russian decoy duck breed, which was approved at the HCDCD general meeting on March 20, 2001.

Comparative morphometry of decoy ducks and mallards allowed us to obtain a reliable difference in the measurements of their body parts (table 1-3).

Table 1 – Results of a comparative analysis of the average values of the morphometric parameters of mallard (38♂ 35♀) and Russian decoy duck (44-1.0 and 48-0.1)

| Body parts of decoy duck (1) and mallard (2) | Arithmetic mean | | Dispersion (variance) | | Error of mean | | Coefficient of variation | |
|--|-----------------|-------------|-----------------------|---|---------------|---|--------------------------|-----|
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Wing length | 268.8 ± 7.9 | 266.0 ± 1.6 | 61.9 | | 8.9 | | 2.9 | 2.7 |
| Tarsometatarsus length | 56.9 ± 2.7 | 53.2 ± 0.6 | 7.46 | | 0.4 | | 2.9 | 2.6 |
| Beak length | 48.8 ± 3.4 | 52.8 ± 0.4 | 11.9 | | 0.49 | | 6.96 | 4.0 |
| Head length | 106.7 ± 0.8 | 105.3 ± 4.3 | 18.6 | | 0.6 | | 4.08 | 3.9 |

Table 2 – Results of a comparative analysis of the average values of the morphometric parameters of mallard (38♂ and 35♀) and Russian decoy duck (44-1.0 and 48-0.1) (Student criterion)

| Object | Headlength | Beaklength | Winglength | Tarsometatarsuslength |
|--------------|------------|------------|------------|-----------------------|
| Mallard♂♂ | 112.6±0.8 | 55.3±0.5 | 268.9±3.1 | 55.8±0.7 |
| Decoy duck♂♂ | 106.7±0.8 | 48.8±3.4 | 267.7±14.0 | 58.9 ± 3.0 |
| Mallard♀♀ | 106.7±0.8 | 52.8±0.4 | 266.0±1.6 | 53.2 ±0.6 |
| Decoy duck♀♀ | 105.3± 4.3 | 48.8±3.4 | 268.8 ±7.9 | 56.9 ± 2.7 |

Table 3 – Comparison results of significant differences between the variance relation of features in Russian decoy duck (44-1.0 and 48-0.1) and mallard (38♂ and 35♀) (Fisher criterion)

| Comparableforms | Headlength | | Beaklength | | Winglength | | Tarsometatarsuslength | |
|-----------------|------------|------|------------|------|------------|------|-----------------------|------|
| | F | β | F | β | F | β | F | β |
| Mallard♂♂ | 1.77 | – | 1.76 | – | 1.75 | – | 2.24 | – |
| Decoy duck♂♂ | 14.6 | 0.95 | 14.6 | 0.95 | 14.6 | 0.95 | 14.6 | 0.95 |
| Mallard♀♀ | 1.14 | – | 1.02 | – | 1.09 | – | 1.82 | – |
| Decoy duck♀♀ | 14.6 | 0.95 | 14.6 | 0.95 | 14.6 | 0.95 | 14.6 | 0.95 |

Notes: F – Fisher criterion; β – the probability of error-free forecasts; – - unreliably.

Table 4 – Morphometric parameters of the body parts of the Russian decoy duck (0.1 duck)

| Body parts | Arithmeticmean | Dispersion (variance) | Error of mean | Coefficient of variation |
|-----------------------|----------------|-----------------------|---------------|--------------------------|
| Body length | 559.6 ± 15.7 | 246.8 | 2.3 | 2.8 |
| Winglength | 268.8 ± 7.9 | 61.9 | 8.9 | 2.9 |
| Tarsometatarsuslength | 56.9 ± 2.7 | 7.46 | 0.4 | 4.7 |
| Beaklength | 48.8 ± 3.4 | 11.9 | 0.49 | 6.96 |
| Beakwidth | 24.2 ± 0.93 | 0.87 | 0.13 | 3.8 |
| Beak length with head | 105.3 ± 4.3 | 18.6 | 0.6 | 4.08 |

Table 5 – Morphometric parameters of the body parts of the Russian decoy duck (1.0 cock duck)

| Body parts | Arithmeticmean | Dispersion (variance) | Error of mean | Coefficient of variation |
|-----------------------|----------------|-----------------------|---------------|--------------------------|
| Body length | 559.6 ± 15.7 | 246.8 | 2.3 | 2.8 |
| Winglength | 268.8 ± 7.9 | 61.9 | 8.9 | 2.9 |
| Tarsometatarsuslength | 56.9 ± 2.7 | 7.46 | 0.4 | 4.7 |
| Beaklength | 48.8 ± 3.4 | 11.9 | 0.49 | 6.96 |
| Beakwidth | 24.2 ± 0.93 | 0.87 | 0.13 | 3.8 |
| Beak length with head | 105.3 ± 4.3 | 18.6 | 0.6 | 4.08 |

The results of the average values of the morphometric parameters studied by us for cock ducks (1.0) and ducks (0.1) of the Russian decoy duck, as well as a statistical analysis of the average values and variance relations are given in tables 4, 5. As a result of the analysis of morphometric parameters of the Russian decoy duck, we proposed parameters that it is desirable to observe when conducting breeding work.

Suggestions. In order to maintain and improve the breeding population of decoy ducks of the Russian decoy duck breed, it is necessary to:

Create a center for the organization and conduction of breeding work with decoy ducks.

Clarify the number and distribution of the breeding stock of decoy ducks in the regions of the Russian Federation.

Conduct regular exterior exhibitions and field tests of decoy ducks according to uniform rules.

Monitor the impact of hunting with decoy ducks on the mallard population using the example of the Central Federal District of the Russian Federation.

Develop hunting technology with decoy duck.

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ОТЫРҒЫЗАТЫН ҮЙРЕКТІҢ ЭКОЛОГИЯСЫН ЗЕРТТЕУ НӘТИЖЕЛЕРІ

Аннотация. «Орыс қонымды үйрегінің» биологиялық ерекшеліктерін зерттеудің және бақылаудың нәтижелері келтірілген. Бақылау қонымды үйрекке аңшылық жасаушылардың әуесқойлар клубында жүргізілді. Осы зерттеулердің нәтижесінде барылдауық үйректің және қонымды үйректің экстерьерлік ерекшеліктері анықталды. Қолға үйрету, түлеу, азықтану, көбею, мінез-құлық өзгеруі (торға, адамға үйренуі және миграциялық инстинктінен айырылу) нәтижесінде орын алған қонымды үйректердің биологиясындағы ерекшеліктер зерттелді. Нәтижелер ерекше аңшылық қасиеттерге ие орыстың қонымды үйрегін қолға үйретілген аңшылық түр ретінде қолдануға болатынын көрсетті.

Зерттелген морфометрикалық көрсеткіштердің орташа мәндері кежек үйректер (1.0) және орыс қонымды үйректеріне байланысты (0.1). Дисперсионды қатынастардың және орташа мәндерінің статистикалық талдауы нәтижесі селекциялық жұмыстарды жасау кезінде сақтауға тиіс параметрлерді ұсынды.

XV ғасырда қонымды үйректердің екі шығу ошағы анықталды (Батыс Еуропа және Ресейдің Еуропа бөлігі, Волга алабы). XIX екінші жартысында аңшылық қарудың кең таралуына байланысты, қонымды үйректердің саны ұлғайды.

Ресей Федерациясының және дәстүрлі түрде қонымды үйректермен аңшылық жасайтын аймақтарда қонымды үйректердің (Russian Decoy Duck) генетикалық біртекті басы қалыптасты, олар ұқсас тұқымдық белгілерге ие және тұрақты морфометрикалық параметрлерін – мінез-құлық ерекшелігі және жұмысшы аңшылық қасиеттері ұрпағына береді. Ол екі үйрек түрлерін шағылыстыру барысында алынған – қонымды үйрек (Decoy Duck) және ақжелкен үйрек (Call Duck).

Орыс қонымды үйрегінің статусын анықтау үшін қонымды үйректің және барылдауық үйректің дене бөліктерінің морфометрикалық талдауы жасалды, олардың айқын ерекшеліктері көрсетілді.

Орыс қонымды үйрегі түріне стандарттар және далалық сынақтар ережелері жасалған. Қазіргі кезде ол экстерьерлік, аңшылық жұмысшы қасиеттерін бағалау үшін қолданылады.

Үй жағдайында қонымды үйректерді ұзақ селекциялау оны барылдауық үйректен және үй үйрегінен ерекшелейтін экстерьерлік сипаттамасының қайтымсыз өзгерістеріне алып келді. Барылдауық үйректен салыстырғанда, қонымды үйректің дене өлшемі 20 %-ға ұлғайды, өкпесінің, жүрегінің салыстырмалы массасы және қанатының ұзындығы және тұмсығы 10 %-ға қысқарған. Ұшу апаратының бұлшықет массасы азайған. Барылдауық үйректен салыстырғанда, морфометрикалық талдау нәтижелері қонымды үйректің қолға үйретілгенін аңғартады. Ұзақ қолға үйрету нәтижесінде фенотиптік және генетикалық өзгергіштіктің

ұлғаюына алып келді. Бұл заңдылықтар үйге үйрету және селекциялар нәтижесінде орын алды. Бұл құбылыс қолға үйретілген жануарлар мен құстардың барлық түрлерінде байқалады.

Қонымды үйректі этологиялық бақылаулар оларда тек үй құстарына тән сипаттар бар екенін көрсетті. Қонымды үйректер торда ұстауға үйренген. Барылдауық үйректермен салыстырғанда, олардың мінез-құлығы өзгерген: адамнан қорықпайды, миграциялық инстинктен айырылған, ұяға келуге үйренген, үй жағдайында көбеюге және азықтануға үйренген.

Ресейде өсірілетін асыл тұқымды орыс қонымды үйрегінің басын сақтау үшін келесі жұмыстарды жүргізу қажет: қонымды үйректермен селекция жұмыстарын жасайтын және ұйымдастыратын бұрынғы орталық; санын анықтау және Ресей аймақтарына асыл тұқымды қонымды үйректерді тарату; бырынғы ережелер бойынша экстерьерлі көрмелер және далалық сынақ жұмыстарын жасау; РФ орталық аймағында қонымды үйрекпен аңшылық еткенде, барылдауық үйрек санына әсер етуіне мониторинг жасау.

Түйін сөздер: аңшылық, қондырмалы үйрек, өсіру, биология, тұқым.

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РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ ЭКОЛОГИИ ПОДСАДНОЙ УТКИ

Аннотация. Приводятся результаты многолетних наблюдений за поголовьем породы «русская подсадная утка» в питомнике подсадных уток Клуба любителей охоты с подсадными утками (КЛОСПИМП) и изучение особенностей ее биологии. В результате этих исследований были установлены достоверные отличия экстерьерных признаков кряквы и подсадной утки. Были изучены особенности биологии подсадных уток, приведшие к изменениям в процессе доместикации, линьки, питания, размножения и изменения в поведении, свойственные домашней птице (отношение к вольеру, людям и утрата миграционного инстинкта). Это показало, что русская подсадная утка представляет породу подружейной домашней утки, обладающую специфическими охотничьими качествами, что можно рассматривать как разновидность домашней охотничьей утки со специфическими особенностями охотничьего характера.

Результаты средних значений исследованных нами морфометрических показателей для селезней (1.0) и уток (0.1) русской подсадной утки, а также статистический анализ средних значений и дисперсионных соотношений позволили предложить параметры, которые желательно соблюдать при ведении селекционной работы.

Установлены два очага происхождения подсадных уток в XV в. (Западная Европа и европейская часть России, бассейн Волги). Здесь же, но уже во второй половине XIX в. произошло увеличение поголовья разводимых подсадных уток, связанное с изобретением и широким распространением охотничьего оружия и дроби.

На территории Российской Федерации в регионах традиционной охоты с подсадными утками сформировалось генетически однородное поголовье подсадных уток (RussianDecoyDuck), обладающее сходными породными признаками и передающее по наследству стойкие морфометрические параметры, особенности поведения и рабочие охотничьи качества. Она была получена в результате метизации двух разновидностей – подсадной утки (DecoyDuck) и манной утки (CallDuck).

Для установления статуса русской подсадной утки был проведен морфометрический анализ частей тела подсадных уток и кряквы, который показал их достоверные отличия.

На породу русская подсадная утка были разработаны стандарт и правила полевых испытаний, которые в настоящее время применяются для оценки экстерьерных и охотничьих рабочих качеств, что необходимо для ведения селекционной работы.

Длительная селекция подсадных уток в условиях домашнего содержания привела к необратимым изменениям экстерьерных характеристик, отличающих ее от кряквы и пород домашних уток. У подсадной утки по сравнению с кряквой увеличилась на 20% масса тела, уменьшилась относительная масса легких, сердца и несущая поверхность крыла, произошло укорочение клюва на 10%, уменьшилась масса мышц летательного аппарата. Не менее показательны результаты сравнительного морфометрического анализа,

отражающие степень domestikации подсадных уток и одновременно показывающие четкие различия между кряквой и подсадной уткой. Объясняется это тем, что в результате длительной domestikации произошла разблокировка естественного стабилизирующего отбора, что привело к увеличению фенотипической и генетической изменчивости. Это явление закономерно произошло в результате domestikации и последующей селекции. Оно наблюдается у всех видов domestikированных животных и птиц и приводит к образованию пород.

Этологические наблюдения за подсадными утками выявили у них черты поведения, присущие только домашней птице. Подсадные утки отлично приспособлены к содержанию в вольерах. У них по сравнению с кряквой произошли изменения поведения: пропал страх перед человеком, пропал миграционный инстинкт, выработался хоминг на птичник и развились приспособительные свойства к приему пищи и размножению в условиях домашнего содержания.

В целях сохранения и улучшения разводимого в России поголовья племенных подсадных уток породы русская подсадная утка необходимо: создание единого центра по организации и проведению селекционной работы с подсадными утками; выяснение численности и распределения племенного поголовья подсадных уток в регионах РФ; проведение регулярных экстерьерных выставок и полевых испытаний подсадных уток по единым правилам; проведение мониторинга воздействия охоты с подсадными утками на популяцию кряквы на примере Центрального федерального округа РФ.

Ключевые слова: охота, подсадная утка, разведение, биология, порода.

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THE ESTIMATED BREEDING VALUE OF SERVICING BULLS OF DOMESTIC BREEDS BY OFFSPRING QUALITY USING THE BLUP METHOD

Abstract. The official method for the estimated breeding value of bulls by the quality of offspring in the Republic of Kazakhstan is the Guidelines for examination bulls of dairy and dairy and meat breeds on the quality of the offspring. This method is easily applicable in practice, but it takes a long time to get the results. In particular, it does not take into account genetic differences between groups of animals and the genetic trend in the population. For the assessment of the breeding value of the servicing bulls according to the Guidelines to give an unbiased forecast of the bulls' genotype, a closed breeding system is necessary, which is impossible under current conditions of the widespread use of imported bulls.

The research aimed at improving breeding programs, including assessing the breeding value of servicing bulls of dairy breeds using BLUP methods based on the productive qualities of a dairy cattle array in Kazakhstan, determines the essence of this work.

Research in this sphere is driven by the need to harmonize domestic and international methods for evaluating the breeding value of dairy cattle and to introduce the BLUP method in the domestic livestock industry.

At this stage, the planned studies are relevant and it will contribute to the improvement of selective and breeding work, taking into account the relationship of dairy productivity with their linear belonging and assessment by the quality of the offspring using the BLUP methods.

The work is aimed at identifying the best servicing bulls for subsequent custom mating. At the same time, the possibilities of electronic animal databases are widely used, as well as the possibilities of genomic selection.

It is assumed that this selection method will track all genetic variation according to economically valuable traits, which will allow obtaining accurate EBV from candidates for selection. Thus, it can be summarized that the improvement of breeding programs in Kazakhstan using world experience in introducing the latest technologies and programs will make it possible to do breeding of farm animals at an entirely different level. Along with these technologies, the introduction of the genomic evaluation of breeding value in practical breeding will significantly accelerate the rate of genetic improvement of domestic dairy cattle breeds.

It was established that the use of the BLUP method in the calculation gives a more accurate selection of animals for mating with the desired traits. Depending on the changing conditions, other factors and effects of influence on the trait can be additionally added to the BLUP AM base model.

As of 2013, in all the countries cited, the index of somatic cells in milk has already been taken into account in the structure of the EBV (Estimated Breeding Value) of Holstein animals. At the same time, the structural share of this indicator for countries can be up to 15%. It is noted that for the first time, in 1996, the indicator of the number of somatic cells in milk was included in the calculation of the EBV in countries such as Germany and Israel.

It was found that in Israel, the formula for calculating the EBV (PD - Predicated difference) was as follows:

$$PD_{96} = -0,274 \times \text{milk yield, kg} + 6,41 \times \text{fat, kg} + 34,85 \times \text{protein, kg} - 300 \times KCK,$$

where PD_{96} – Israelitic EBV 1996 of Holstein cows; KCK – the number of somatic cells in one milliliter of milk.

In Germany, the estimation of the breeding value of cows by the number of somatic cells in milk has been carried out since 1996. Before calculating the indices directly, to achieve a normal distribution of the result values of the milk analysis by the number of somatic cells, the data obtained are subjected to a logarithmic transformation.

In accordance with international standards, the so-called Linear Somatic CellScore (SCS) scale was chosen for the logarithmic transformation of data, the formula:

$$\overline{SCS} = \log_2 (\overline{Zellzahl} / 100000) + 3,$$

where, SCS – an estimate of the number of somatic cells; Zellzahl – concentration of somatic cells in 1 ml of milk; \log_2 – logarithm to base 2.

Based on the results of our research, we consider it appropriate to offer for use in Kazakhstan the following formulas for calculating the estimated breeding value by the udder health:

$$\overline{Cp} = |(\log C_k - \log C_n)| * h^2,$$

where: Cp – absolute genetic difference of the number for somatic cells of the estimated cow from the average in the population; $\log C_k$ – logarithm of somatic cell concentration of the evaluated cow; $\log C_n$ – the average of the logarithms of the concentration of somatic cells in the population; h^2 – somatic cell heritability estimate of 0.1.

$$\overline{Ic} = \left| \frac{C_n - C_p}{C_n} \right| \cdot 100,$$

where: Ic – relative index of the udder health; C_n – the average of the logarithms of the somatic cells concentration in the population; Cp – an absolute genetic difference of the logarithm of the somatic cells concentration of the evaluated cow from the average population value obtained by the formula 15.

The statistical model for the estimated breeding value of animals by the exterior is expressed by the following formula.

$$Y_{ijklmnopqr} = m + BJ_i + JS_j + Kn_k + Ak_l + Ab_m + Eka_n + Betr_o + BJ_{p+} + Tier_p + e_{ijklmnopqr},$$

where, Y – trait estimate Y; m – an average of all animals for this trait; BJ_i – permanent effect of the appraiser-classifier*year of evaluation; JS_j – permanent effect of the appraiser-classifier*year of evaluation; Kn_k – constant effect of maternal calving count; Ak_l – permanent effect of the duration of the calving interval; Ab_m – constant effect of the duration of the period between milkings; Eka_n – permanent effect of cow age at first calving; Betr_o – permanent effect of the enterprise or region * herd * year; BJ_{p+} – random effect of the enterprise * year; Tier_p – random effects of individual traits of the animal; $e_{ijklmnopqr}$ – error of the impact of random effects of the unaccounted factors.

It is appropriate to use as a basis the principles of international methods to evaluate breeds related to domestic breeds. So, as of today, for the assessment of domestic Holstein and black-and-white cattle, it is opportunistically to use the approaches of international methods to assessing Holstein cattle, for fawn-motley breeds - the European methodology for assessing Simmental cattle.

Key words: dairy cattle, servicing bulls, evaluation, BLUP method, genotype.

Introduction. An accurate forecast of breeding value of servicing bulls plays an extremely important role in programs of genetic improvement for dairy cattle populations. 60-80 % or more of selection efficiency is determined by the selection of breeders tested by offspring [1].

The official method for evaluation of the breeding value of bulls by the quality of offspring in the Republic of Kazakhstan is the Instructions for assessment of bulls of dairy and dairy-meat breeds by the quality of offspring. This method is easily applicable in practice, but it takes a long time to get the results. In particular, it does not take into account genetic differences between groups of animals and the genetic trend in the population. For the assessment of the breeding value of breeders according to the Instructions to give an unbiased forecast of the bulls' genotype, a closed breeding system is necessary, which is impossible under current conditions of the widespread use of imported servicing bulls. Therefore, the procedure for assessing breeding value does not exclude mistakes and, therefore, selection for the further breeding operation of animals [2].

The purpose of assessing breeding value is to get information on the genotype of a bull with maximum accuracy. These requirements are most fully met by the Best Linear Unbiased Prediction (BLUP) procedure based on mixed linear statistical models. BLUP takes into account both environmental and genetic factors affecting the variability of traits of dairy productivity. Besides, all factors considered in the model are evaluated at the same time, thereby achieving the most reliable, unbiased forecast of the bull genotype and, accordingly, increasing the likelihood of selecting bulls-improvers [3].

Compared to methods involving the use of simplified models that take into account one breeding trait, BLUP allows evaluating the breeding values as a whole. It is noted that the widespread use of this method was accelerated by the development of computer technology [4].

The application of the BLUP method for the selection of servicing bulls according to their indicators improves the efficiency of selection by 20-30 % [5].

It should be noted that the results of calculations of breeding value, regardless of the used method, are largely determined by the quality and quantity of the inputs [6].

The reliability and sufficiency of the primary information impact on the correctly predicted genetic value of animals. This, in turn, increases the likelihood that the best individuals will be selected as producers [7].

The research aimed at improving breeding programs, including assessing the breeding value of servicing bulls of dairy breeds using BLUP methods based on the productive qualities of a dairy cattle array in Kazakhstan, determines the essence of this work.

Research methods. To calculate the index estimate of the genetic breeding value of cattle according to economically useful breeding traits, the development of special software is necessary. It must implement all the necessary computational algorithms of matrix algebra, which are required to solve the problem of finding unknowns in the biometric model and to calculate the estimates of economic traits using the BLUP AM method.

The equation of the biometric linear model of cows, in general, is defined by the formula (1):

$$\bar{Y}_{ijklm} = \mu + a_i + l_j + d_k + h_l + p_m + e_{ijklm} \quad (1)$$

where y_{ijklm} – economic traits, in our case: milk yield, fat and protein contents in milk; μ – overall mean of all animals for this trait; a_i – additive genetic effect of the evaluated animal, according to the breed; l_j – lactation by order; d_k – calving year-season; h_l – herd or farm; p_m – groups with the same keeping and feeding conditions; e_{ijklm} – model error due to the influence of unaccounted factors.

Research results. Research in this sphere is driven by the need to harmonize domestic and international methods for evaluating the breeding value of dairy cattle and to introduce the BLUP method in the domestic livestock industry.

At this stage, the planned studies are relevant and it will contribute to the improvement of selective and breeding work, taking into account the relationship of dairy productivity with their linear belonging and assessment by the quality of the offspring using the BLUP methods.

The work is aimed at identifying the best servicing bulls for subsequent custom mating. At the same time, the possibilities of electronic animal databases are widely used, as well as the possibilities of genomic selection [8].

It is assumed that this selection method will track all genetic variation according to economically valuable traits, which will allow obtaining accurate EBV from candidates for selection. Thus, it can be summarized that the improvement of breeding programs in Kazakhstan using world experience in introducing the latest technologies and programs will make it possible to do breeding of farm animals at an entirely different level. Along with these technologies, the introduction of the genomic evaluation of breeding value in practical breeding will significantly accelerate the rate of genetic improvement of domestic dairy cattle breeds.

It was established that the use of the BLUP method in the calculation gives a more accurate selection of animals for mating with the desired traits. Depending on the changing conditions, other factors and effects of influence on the trait can be additionally added to the BLUP AM base model.

As the data in Fig. 1 show, as of 2013, in all the countries cited, the index of somatic cells in milk has already been taken into account in the structure of the EBV (Estimated Breeding Value) of Holstein animals. At the same time, the structural share of this indicator for countries can be up to 15%.

It is noted that for the first time, in 1996, the indicator of the number of somatic cells in milk was included in the calculation of the EBV in countries such as Germany and Israel.

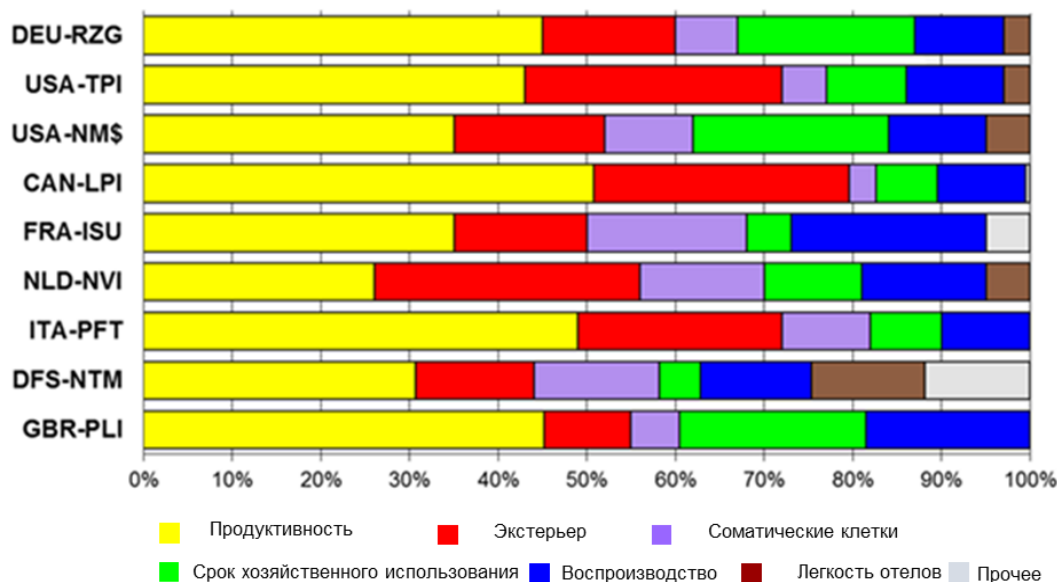
It was found that in Israel, formula (2) for calculating the EBV (PD - Predicated difference) was as follows:

$$PD_{96} = -0,274 \times \text{milk yield, kg} + 6,41 \times \text{fat, kg} + 34,85 \times \text{protein, kg} - 300 \times KCK, \quad (2)$$

where PD_{96} – Israelitic EBV 1996 of Holstein cows; KCK – the number of somatic cells in one milliliter of milk.

Following the modern Belarusian methodology, the calculation of the estimated breeding value of a cow for udder health is carried out according to the formulas (3, 4). If the number of somatic cells is less than their presence in the population, the calculation is carried out as follows:

$$I_{3B} = h^2 \cdot \frac{CK_{\kappa} - \overline{CK}_n}{\overline{CK}_n} \cdot 100 + 100, \quad (3)$$



Structure of Estimated breeding value of Holstein cows by country as of 2013

In the case when the number of somatic cells is greater than the population average mean, formula (10) has the following form:

$$I_{3B} = h^2 \cdot \frac{CK_{\kappa} - \overline{CK}_n}{\overline{CK}_n} \cdot 100 - 100, \quad (4)$$

where, I_{3B} – udder health index; h^2 – somatic cell heritability estimate (0,25); CK_{κ} – the number of somatic cells in one ml of milk of the evaluated cow; \overline{CK}_n – the average number of somatic cells in one ml of milk of the estimated cow population; 100 – constant for conversion to relative value.

Data on the content of the number of somatic cells are used in calculating the EBV by the duration of economic use (DEU) of cows. According to the Methodology for the comprehensive assessment of breeding and economic traits of cows of the Belarusian black-and-white breed, the formula (5) for calculating the DEU is as follows:

$$I_{\text{DEU}} = 0,3 \cdot \left(h_{\text{KCK}}^2 \cdot \frac{KCK_{\kappa} - \overline{KCK}_n}{\overline{KCK}_n} \cdot 100 + 100 \right) + 0,3 \cdot \left(h_{\text{GB}}^2 \cdot \frac{GB_{\kappa} - \overline{GB}_n}{\overline{GB}_n} \cdot 100 + 100 \right) + 0,25 \cdot \left(h_{\text{X}}^2 \cdot \frac{X_{\kappa} - \overline{X}_n}{\overline{X}_n} \cdot 100 + 100 \right) + 0,15 \cdot \left(h_{\text{CII}}^2 \cdot \frac{\overline{CII}_n - CII_{\kappa}}{\overline{CII}_n} \cdot 100 + 100 \right), \quad (5)$$

where h_{KCK}^2 – somatic cell heritability estimate (0,25); KCK_{κ} – number of somatic cells in the evaluated cow; \overline{KCK}_n – the average number of somatic cells in the evaluated population; h_{GB}^2 – udder depth heritability coefficient; GB_{κ} – an indicator of the udder depth of the evaluated cow; \overline{GB}_n – the average

indicator of the udder depth in cows of the population; h_k^2 – limb heritability coefficient; X_k – limb estimate trait indicator; \bar{X}_k – limb estimate mean value in population; h^2 – fertility heritability estimate (0,12); $\bar{C\Pi}_n$ – an average service period of cows in the population; $C\Pi_k$ – service period of the evaluated cow.

As noted earlier, in Germany, the estimation of the breeding value of cows by the number of somatic cells in milk has been carried out since 1996. Before calculating the indices directly, to achieve a normal distribution of the result values of the milk analysis by the number of somatic cells, the data obtained are subjected to a logarithmic transformation.

Under international standards, the so-called Linear Somatic CellScore (SCS) scale was chosen for the logarithmic transformation of data, the formula (6):

$$\overline{SCS} = \log_2 (Zellzahl / 100000) + 3, \quad (6)$$

where, SCS – an estimate of the number of somatic cells; Zellzahl – concentration of somatic cells in 1 ml of milk; \log_2 – logarithm to base 2.

An example of the transformation of the number of somatic cells in SCS according to the German rating scale from 1 to 9 points is shown in table.

Based on the results of our research, we consider it appropriate to offer for use in Kazakhstan the following formulas (7, 8) for calculating the estimated breeding value by the udder health:

$$\overline{Cp} = |(\log Ck - \log Cn)| * h^2, \quad (7)$$

where: Cp – absolute genetic difference of the number for somatic cells of the estimated cow from the average in the population; $\log Ck$ – logarithm of somatic cell concentration of the evaluated cow; $\log Cn$ – the average of the logarithms of the concentration of somatic cells in the population; h^2 – somatic cell heritability estimate of 0.1.

The example of the transformation of the number of somatic cells in SCS according to the German rating scale from 1 to 9 points

| Number of somatic cells | SCS | Number of somatic cells | SCS |
|-------------------------|-----|-------------------------|-----|
| 25 000 | 1 | 800 000 | 6 |
| 50 000 | 2 | 1 600 000 | 7 |
| 100 000 | 3 | 3 200 000 | 8 |
| 100 000 | 4 | 6 400 000 | 9 |
| 400 000 | 5 | | |

To transfer the absolute genetic difference into the relative index, we propose the following formula (8):

$$\overline{Ic} = \left| \frac{Cn - Cp}{Cn} \right| * 100, \quad (8)$$

where: Ic – relative index of the udder health; Cn – the average of the logarithms of the somatic cells concentration in the population; Cp – an absolute genetic difference of the logarithm of the somatic cells concentration of the evaluated cow from the average population value obtained by the formula 15.

The statistical model for the estimated breeding value of animals by the exterior is expressed by the following formula (9).

$$Y_{ijklmnopqr} = m + BJ_i + JS_j + Kn_k + Ak_l + Ab_m + Eka_n + Betr_o + BJ_p + Tier_p + e_{ijklmnopqr}, \quad (9)$$

where, Y – trait estimate Y; m – an average of all animals for this trait; BJ_i – permanent effect of the appraiser-classifier*year of evaluation; JS_j – permanent effect of the appraiser-classifier*year of evaluation; Kn_k – constant effect of maternal calving count; Ak_l – permanent effect of the duration of the calving interval; Ab_m – constant effect of the duration of the period between milkings; Eka_n – permanent effect of cow age at first calving; $Betr_o$ – permanent effect of the enterprise or region * herd * year;

B_{J_p} – random effect of the enterprise * year; $Tier_p$ – random effects of individual traits of the animal; $e_{ijklmnopqr}$ – error of the impact of random effects of the unaccounted factors.

Conclusions. When developing a methodology for the index of the estimated breeding value of the servicing bulls of domestic breeds by the offspring quality using the BLUP method, it is appropriate to use as a basis the principles of international methods to evaluate breeds related to domestic breeds. So, as of today, for the assessment of domestic Holstein and black-and-white cattle, it is opportunisticly to use the approaches of international methods to assessing Holstein cattle, for fawn-motley breeds - the European methodology for assessing Simmental cattle.

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BLUP ӘДІСІ АРҚЫЛЫ ОТАНДЫҚ ТҰҚЫМ САПАСЫ БОЙЫНША ОТАНДЫҚ ТҰҚЫМ ӨНДІРУШІНІҢ – БҰҚАЛАРДЫҢ АСЫЛ ТҰҚЫМДЫ ҚҰНДЫЛЫҒЫН ИНДЕКСТІК БАҒАЛАУ

Аннотация. ҚР-да ұрпақтарының сапасы бойынша бұқалардың асыл тұқымдық құндылығын бағалаудың ресми әдісі – сүтті және сүтті-етті тұқымды бұқаларды ұрпақтарының сапасы бойынша тексеру жөніндегі нұсқаулық. Бұл әдіс практикада оңай қолданылады, бірақ нәтиже алу үшін ұзақ уақыт қажет. Атап айтқанда, ол мал топтары арасындағы генетикалық айырмашылықты және популяциядағы генетикалық трендті ескермейді. Тұқымдық бұқалардың асыл тұқымдық құндылығын нұсқаулық бойынша бағалауда, бұқалар генотипінің орналастырылмаған болжамын беру үшін өсірудің жабық жүйесі қажет, бұл, қазіргі жағдайда импорттық тұқымдық бұқаларды жаппай пайдалану кезінде мүмкін болмайды.

Селекциялық бағдарламаларды жетілдіруге бағытталған зерттеулер, оның ішінде Қазақстанның сүтті тұқымдары мал массивінің өнімділік сапасы негізінде BLUP әдістерін пайдалана отырып, сүтті тұқымды тұқымдық бұқалардың асыл тұқымдық құндылығын бағалау осы жұмыстың мәнін анықтайды.

Осы бағыттағы зерттеулер сүтті малдардың асыл тұқымдық құндылығын бағалаудың отандық және халықаралық әдістерін үйлестіру қажеттілігіне және отандық мал шаруашылығы саласына BLUP әдісін енгізу мақсатына негізделген.

Осы кезеңде жоспарланған зерттеулер өзекті болып саналады және BLUP әдістерін пайдалана отырып, сүт өнімділігінің олардың желілік тиістілігімен және ұрпақтарының сапасы бойынша бағалаумен өзара байланысын ескере отырып, селекциялық-асылдандыру жұмыстарын жүргізуді жақсартуға ықпал ететін болады.

Аталған жұмыс кейін тапсырыс беру үшін үздік өндірушілерді анықтауға бағытталған. Бұл ретте малдар туралы электрондық деректер қорының мүмкіндіктері, сондай-ақ геномдық селекция мүмкіндіктері кеңінен пайдаланылады.

Селекцияның бұл әдісі шаруашылық жағынан құнды белгілері бойынша барлық генетикалық өзгергіштікті қадағалайтын болады, бұл іріктеуге кандидаттардан дәл EBV алуға мүмкіндік береді. Осылайша, жаңа технологиялар мен бағдарламаларды енгізудің әлемдік тәжірибесін пайдалана отырып, Қазақстан жағдайында селекциялық бағдарламаларды жетілдіру ауыл шаруашылығы малдарының селекциясын мүлдем басқа деңгейде жүргізуге мүмкіндік береді. Осы технологиялармен қатар, асыл тұқымды құндылықты геномдық бағалау рәсімін практикалық селекцияға енгізу сүтті малдың отандық тұқымдарын генетикалық жақсарту қарқынын айтарлықтай жеделдетеді.

BLUP әдісін есептеу кезінде, пайдалануға қажетті сипаттамалары бар будандастыру үшін малдарды іріктеуді дәл жүзеге асыруға мүмкіндік беретіні анықталды. Өзгеретін жағдайларға байланысты BLUP AM базалық моделіне селекциялық белгіге әсер ететін факторлар мен әсерлер қосымша қосылуы мүмкін.

2013 жылғы жағдай бойынша барлық келтірілген елдерде голштин тұқымды малдардың АТҚИ жүйесінде (асыл тұқымды құндылық индексі) сүттігі соматикалық клеткалар құрамының көрсеткіші есепке алынды. Бұл ретте елдер бойынша осы көрсеткіштің құрылымдық үлесі 15 %-ға дейін жетуі мүмкін. Сүттігі соматикалық жасушалар санының көрсеткіші алғаш рет 1996 жылы Германия мен Израиль сияқты елдерде АТҚИ есебіне енгізілді.

Израилде АТҚИ (PD – Predicated difference) есептеудің формуласы келесідей көрсеткішке ие:

$$PD_{96} = -0,274 \text{ хсауын, кг} + 6,41 \text{ хмай, кг} + 34,85 \text{ хақуыз, кг} - 300 \text{ хСКС}$$

мұндағы PD_{96} – 1996 жылғы голштин тұқымы сиырларының АТҚИ; СКС – сүттің бір миллиметріндегі соматикалық клеткалар саны.

Германияда сүттегі соматикалық жасушалардың құрамы бойынша сиырлардың асыл тұқымдық құндылығын бағалау 1996 жылдан бастап жүзеге асырылады. Тікелей индекстерді есептеу алдында, соматикалық жасушалардың саны бойынша сүтті талдау нәтижелерінің мәндерін қалыпты бөлуге қол жеткізу үшін алынған деректер логарифмиялық трансформацияға ұшырайды.

Деректерді логарифмдік трансформациялау үшін халықаралық стандарттарға сәйкес, Linear Somatic CellScore (SCS) шкаласы таңдап алынды, формула:

$$\sqrt{SCS} = \log_2(Zellzahl / 100000) + 3,$$

мұндағы SCS – соматикалық жасушалар санын бағалау көрсеткіші; Zellzahl – 1 мл сүтке соматикалық жасушалардың концентрациясы; \log_2 – 2 негіз бойынша логарифм.

Зерттеу нәтижелері бойынша 1-ден 9 балға дейінгі германдық бағалау шкаласы бойынша SCS соматикалық жасушалар санын трансформациялау мысалы келтірілген.

Жүргізілген зерттеулердің нәтижелеріне сүйеніп, Қазақстанда пайдалану үшін желінінің денсаулығы бойынша асыл тұқымды құндылық индексі есептеудің мынадай формулаларын ұсыну орынды деп санаймыз:

$$\sqrt{C_p} = |(\log C_k - \log C_p)| * h^2,$$

мұндағы C_p – бағаланатын сиырдың соматикалық жасушалары көрсеткіштерінің популяция бойынша орташа статистикалық мәннен абсолюттік генетикалық айырмашылығы; $\log C_k$ – бағаланатын сиырдың соматикалық жасушалары концентрациясының логарифмі; $\log C_p$ – популяция бойынша соматикалық жасушалардың шоғырлану логарифмдерінің орташа статистикалық мәні; h^2 – 0,1-ге тең соматикалық жасушалардың ұрпағына берілу коэффициенті.

$$\sqrt{I_c} = \left| \frac{C_p - C_p}{C_p} \right| * 100,$$

мұндағы I_c – желін саулығының салыстырмалы индексі; C_p – популяция бойынша соматикалық жасушалардың шоғырлану логарифмдерінің орташа статистикалық мәні; C_p – 15-формула арқылы алынған популяция бойынша орташа статистикалық мәнмен бағаланатын сиырдың соматикалық жасушалары концентрациясы логарифмінің абсолюттік генетикалық айырмашылығы.

Экстерьер бойынша малдың асыл тұқымдық құндылығын бағалаудың статистикалық моделі келесі формуламен көрсетіледі: (9)

$$Y_{ijklmnopqr} = m + BJ_i + JS_j + Kn_k + Ak_l + Ab_m + Eka_n + Betr_o + BJ_p + Tier_r + e_{ijklmnopqr} \quad (9),$$

мұндағы Y – Y белгісін бағалау мәні; m – берілген белгінің барлық малдар бойынша орташа мәні; BJ_i – бонитер-жіктегіш* бағалау жылының тұрақты әсері; JS_j – жыл мезгілінің тұрақты әсері; Kn_k – енесінің кезекті туу есебінің тұрақты әсері; Ak_l – төлдеу кезені арасындағы ұзақтығының тұрақты әсері; Ab_m – сауын аралығындағы кезең ұзақтығының тұрақты әсері; Eka_n – алғаш туатын сиырлардың жасының тұрақты әсері; $Betr_o$ – кәсіпорынның немесе өңірдің тұрақты әсері * табын * жыл; BJ_p – кәсіпорынның кездейсоқ әсері * жыл; $Tier_r$ – малдардың жеке сипаттамаларының кездейсоқ әсері; $e_{ijklmnopqr}$ – ескерілмеген факторлардың кездейсоқ әсерлерінің әсер ету қатесі.

BLUP әдісімен ұрпақтарының сапасы бойынша отандық тұқымды өндіруші бұқалардың асыл тұқымдық құндылығын индекстік бағалау әдістемесін әзірлеу кезінде негіз ретінде отандық тұқымдарға ұқсас тұқымдарды бағалау үшін қолданылатын халықаралық әдістемелердің принциптерін пайдалану орынды. Мәселен, бүгінгі таңда отандық голштин және қара-ала малды бағалау үшін голштин малын бағалаудың халықаралық әдістемелерінің тәсілдерін, ал сары-ала тұқымдары үшін – симментал малын бағалаудың еуропалық әдістемелерін тиімді пайдалану қажет.

Түйін сөздер: сүтті мал, өндіргіш бұқалар, бағалау, BLUP әдісі, генотип.

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ИНДЕКСНАЯ ОЦЕНКА ПЛЕМЕННОЙ ЦЕННОСТИ БЫКОВ-ПРОИЗВОДИТЕЛЕЙ ОТЕЧЕСТВЕННЫХ ПОРОД ПО КАЧЕСТВУ ПОТОМСТВА МЕТОДОМ BLUP

Аннотация. Официальным методом оценки племенной ценности быков по качеству потомства в РК является Инструкция по проверке быков молочных и молочно-мясных пород по качеству потомства. Данный метод легко применим на практике, но для получения результатов требуется длительное время. В частности,

он не учитывает генетические различия между группами животных и генетический тренд в популяции. Для того чтобы оценка племенной ценности производителей по Инструкции давала несмещенный прогноз генотипа быков, необходима закрытая система разведения, что в современных условиях повсеместного использования импортных быков-производителей невыполнимо.

Исследования, направленные на совершенствование селекционных программ, в том числе оценки племенной ценности быков-производителей молочных пород с использованием методов BLUP на основе продуктивных качеств массива скота молочных пород Казахстана, определяют суть данной работы.

Исследования в данном направлении обусловлены необходимостью гармонизации отечественных и международных методов оценки племенной ценности молочного скота и с целью внедрения в отечественной отрасли животноводства метода BLUP.

На данном этапе планируемые исследования являются актуальными и будут способствовать улучшению ведения селекционно-племенной работы с учетом взаимосвязи молочной продуктивности с их линейной принадлежностью и оценкой по качеству потомства с использованием методов BLUP.

Работа направлена на выявление лучших производителей для последующего заказного спаривания. При этом широко используются возможности электронных баз данных о животных, а также возможности геномной селекции.

Предполагается, что данный метод селекции будет отслеживать всю генетическую изменчивость по хозяйственно ценным признакам, что позволит получить точную EBV у кандидатов на отбор. Таким образом, можно резюмировать, что совершенствование селекционных программ в условиях Казахстана с использованием мирового опыта по внедрению новейших технологий и программ, позволит вести селекцию сельскохозяйственных животных на совершенно другом уровне. Наряду с данными технологиями, внедрение процедуры геномной оценки племенной ценности в практическую селекцию значительно ускорит темпы генетического улучшения отечественных пород молочного скота.

Установлено, что использование метода BLUP при расчете позволяет более точно осуществлять отбор животных для спаривания с желаемыми характеристиками. В зависимости от изменяющихся условий в базовую модель BLUP AM могут быть дополнительно добавлены факторы и эффекты влияния на селекционный признак.

По состоянию на 2013-й год во всех приведенных странах в структуре ИПЦ (индекс племенной ценности) животных голштинской породы уже был учтен показатель содержания соматических клеток в молоке. При этом структурная доля данного показателя по странам может составлять до 15%. Означается, что впервые показатель количества соматических клеток в молоке был включен в расчет ИПЦ в 1996 году в таких странах, как Германия и Израиль.

Установлено, что в Израиле формула расчета ИПЦ (PD – Predicated difference) выглядела следующим образом:

$$PD_{96} = -0,274 \times \text{удой, кг} + 6,41 \times \text{жир, кг} + 34,85 \times \text{белок, кг} - 300 \times KCK,$$

где PD_{96} – израильский ИПЦ 1996 года коров голштинской породы; KCK – количество соматических клеток в одном миллилитре молока.

В Германии оценка племенной ценности коров по содержанию соматических клеток в молоке осуществляется с 1996 года. Перед расчетом непосредственно индексов для достижения нормального распределения значений результатов анализа молока по количеству соматических клеток полученные данные подвергают логарифмической трансформации.

В соответствии с международными стандартами для логарифмической трансформации данных была выбрана так называемая шкала Linear Somatic CellScore (SCS), формула:

$$SCS = \log_2(\text{Zellzahl} / 100000) + 3,$$

где SCS – показатель оценки числа соматических клеток; Zellzahl – концентрация соматических клеток в 1 мл молока; \log_2 – логарифм по основанию 2.

По результатам исследований приведены пример трансформации количества соматических клеток в SCS по германской шкале оценки от 1 до 9 баллов.

Исходя из результатов проведенных исследований, считаем целесообразным предложить для использования в Казахстане следующие формулы расчета индекса племенной ценности по здоровью вымени:

$$Cp = |(\log Ck - \log Cn)| * h^2,$$

где: Cp – абсолютная генетическая разница показателя по соматическим клеткам оцениваемой коровы от среднестатистического значения по популяции; $\log Ck$ – логарифм концентрации соматических клеток оцениваемой коровы; $\log Cn$ – среднестатистическое значение логарифмов концентрации соматических клеток по популяции; h^2 – коэффициент наследуемости соматических клеток, равный 0,1.

$$Ис = \left| \frac{Сп-Ср}{Сп} \right| \cdot 100,$$

где Ис – относительный индекс здоровья вымени; Сп – среднестатистическое значение логарифмов концентрации соматических клеток по популяции; Ср – абсолютная генетическая разница логарифма концентрации соматических клеток оцениваемой коровы от среднестатистического значения по популяции, полученная по формуле 15.

Статистическая модель оценки племенной ценности животных по экстерьеру выражается следующей формулой (9).

$$Y_{ijklmnopqr} = m + BJ_i + JS_j + Kn_k + Ak_l + Ab_m + Eka_n + Betr_o + BJ_p + Tier_p + e_{ijklmnopqr} \quad (9),$$

где, Y – значение оценки признака Y; m – среднее по всем животным для данного признака; BJ_i – постоянный эффект бонитер-классификатор*год оценки; JS_j – постоянный эффект сезона года; Kn_k – постоянный эффект счета отела матери; Ak_l – постоянный эффект длительности межотельного периода; Ab_m – постоянный эффект длительности периода между дойками; Eka_n – постоянный эффект возраста коровы при первом отеле; Betr_o – постоянный эффект предприятия или региона * стадо * год; BJ_p – случайный эффект предприятия * год; Tier_p – случайные эффекты индивидуальных характеристик животного; e_{ijklmnopqr} – ошибка влияния случайных эффектов неучтенных факторов.

При разработке методики индексной оценки племенной ценности быков-производителей отечественных пород по качеству потомства методом BLUP целесообразно в качестве основы использовать принципы международных методик, применяемых для оценки пород, родственных отечественным породам. Так, по состоянию на сегодняшний день, для оценки отечественного голштинского и черно-пестрого скота рационально использование подходов международных методик оценки голштинского скота, для палевопестрых пород – европейских методик оценки симментальского скота.

Ключевые слова: молочный скот, быки-производители, оценка, BLUP метод, генотип.

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GENETIC VARIABILITY OF PERSPECTIVE BTREEDING MATERIAL OF SPRING BREAD WHEAT FOR RESISTANCE TO LEAF RUST IN RUSSIA AND KAZAKHSTAN

Abstract. Leaf rust, caused by *Puccinia triticina* Erikss., is one of the major diseases of wheat in Russia and Kazakhstan. The resistance and genetic diversity of 61 spring wheat genotypes from Russia and 50 ones from Kazakhstan were studied. Field evaluation of Kazakhstani wheat material allowed to select 27 lines as resistant and 8 lines as moderate resistant to leaf rust. Molecular screening revealed 29 wheat lines characterized by the presence of *Lr* genes. As a result of phytopathological and molecular screening of Kazakhstani material, carriers of 2, 3, and 4 *Lr* genes were selected. The 92 % of Chelyabinsk⁴ lines were characterized by high level of resistance to leaf rust both at the adult and seedling stages. Using molecular markers *Lr24*, *Lr9*, *Lr19*, *LrSp*, *Lr1*, *Lr3*, *Lr10*, *Lr26*, *Lr21* and *Lr34* genes separately or in different combinations has been revealed in Russian wheat lines. In the field conditions of the Southern Urals, isogenic lines with genes *Lr24*, *Lr25*, *Lr26*, *Lr28*, *Lr45*, *Lr47*, *Lr49*, *Lr51* and *Lr57* showed high resistance, and in lines with the genes *Lr17*, *Lr23*, *Lr29* and *Lr64* moderate resistance was observed. At the seedling stage all single pustule isolates were avirulent to Tc-lines with *Lr16*, *Lr19*, *Lr24*, *Lr28* and *Lr29* genes. In Kazakhstan virulence of *P. triticina* population collected in South-East and North-Kazakh regions was studied. Against the Almaty population *Lr9*, *Lr19*, *Lr24*, *Lr25* and *Lr28* genes with high efficacy, and gene *Lr45* with moderate efficacy were identified. All of the lines with the rest *Lr* genes were susceptible to the pathogen. The isogenic lines with genes *Lr19*, *Lr24*, *Lr25*, *Lr28*, *Lr36* and *Lr45* were characterized by high efficacy to the Kostanai *P. triticina* population. Virulence studies of *P. triticina* showed a similarity of pathogen structure on the Southern Urals of Russia and Northern Kazakhstan.

Key words: wheat, leaf rust, *Lr* genes, molecular markers, isolates, virulence.

Introduction. Leaf rust, caused by *Puccinia triticina* Erikss., is one of the major diseases of wheat in Russia and Kazakhstan. Its harmfulness varies by year and region. The yield loss of genotypes may achieve 30-60 % depending on the environment and severity of infection [1]. The use of genetically resistant cultivars is considered to be the most effective, economic and environmentally safe method for disease control. The region of Central Asia is one of the world's most important producers of wheat, encompassing a production area of more than 15 million ha [2, 3]. Winter wheat cultivars are grown in the southern regions of the country, and spring wheats – in the Northern, Western and Eastern regions. Developing high yielding and leaf rust, stripe rust and stem rust resistant cultivars is an important objective of winter and spring wheat (*Triticum aestivum* L.) improvement programs in Central and West Asia [4-8]. Production of wheat in Kazakhstan is being constrained also by leaf spotting diseases, including tan spot, caused by *Pyrenophora tritici-repentis* [9-13] and common bunt, caused by *Tilletia caries* [14]. In the West Siberian and Ural regions of the Russian Federation, bordering Northern Kazakhstan, spring soft wheat (*Triticum aestivum*) is the leading grain crop. The development of resistant varieties, including leaf rust, is a priority in the breeding of this crop in Russia [15]. It was shown that there is one common population of *P. triticina* in the Urals and Western Siberia of Russia and Kazakhstan [16-18]. This should be taken into account when developing and locating cultivars with *Lr* genes in this

vast territory. For successful control of leaf rust in a single epidemiological zone, information on the genetic diversity of promising new wheat material and monitoring of the virulence of pathogen populations in these areas needed. The present study aims to study the genetic diversity of leaf rust resistance sources in advanced spring bread wheat lines developed in Russia and Kazakhstan. The aim of this study was 1) to screen advanced wheat breeding lines for resistance to leaf rust, 2) to determine of *Lr*-genes by molecular markers and 3) to compare effectiveness of *Lr*-genes at the seedling and adult plant stages in Kazakhstan and Russian Southern Ural.

Materials and methods. The study of resistance to leaf rust carried out in laboratory conditions at the seedling stage and in the field at the adult plant stage. Russian material included 61 advanced spring bread wheat lines, developed with the participation of donors carrying genetic material from *Aegilops speltoides*, *Ae. tauschii*, *Agropyron elongatum*, *Ag. intermedium*, and *Secale cereale*. This material developed in Chelyabinsk Research Institute of Agriculture (CARI). In addition, 40 isogenic wheat lines with *Lr* genes were included in field trials. All wheat tested in the field in 2019 in CARI under natural disease infection. The study of field resistance of 50 Kazakhstani wheat advanced spring wheat lines, developed in Scientific-Production Center of Grain Farming named after Barayev carried out during the 2018-2019 cropping seasons at the experimental station in v. Almalybak, Almaty region. Field leaf rust resistance of entries evaluated using the modified Cobb scale [19].

To assess the seedling resistance of the studied material in Kazakhstan the method of detached leaf segments preserved in water – benzimidazole solution was used (40 mg/L); virulence studies was performed using detached leaf method [20]. For inoculation, the combined Almaty and Kostanai populations *P. trititica* collected in 2019 were used. Before use, these populations were characterized by virulence. In Russia 10-days-old seedling were used for inoculation by urediniospores of each isolate *P. trititica*. To study leaf rust resistance, four test clones marked with virulence for the *Lr9*, *Lr19*, and *Lr26* genes, and the combined Chelyabinsk and Krasnodar populations were used. The virulence profile of this infectious material presented in table 1. Seedlings for their infection types to leaf rust according to Mains & Jackson (1926) were assessed [21].

Table1 – Characterization of the virulence of Russian clones and populations of *Puccinia trititica*

| Populations and isolates | Origin | Virulence | Avirulence |
|--------------------------|------------------------|---|-------------------------------|
| | | to Thatcher lines with <i>Lr</i> genes | |
| Test-clon 1 (K9) | Chelyabinsk reg., 2017 | 1, 2a, 2b, 2c, 3a, 3bg, 3ka, 9, 10, 11, 14a, 14b, 15, 16, 17, 18, 20, 30 | 19, 23, 24, 26, 28, 29, 44 |
| Test-clon 2 (K19) | Tambov reg., 2016 | 1, 2a, 2b, 2c, 3a, 3bg, 3ka, 10, 14a, 14b, 15, 17, 18, 19, 20, 30, 44 | 9, 11, 16, 23, 24, 26, 28, 29 |
| Test-clon 3 (K26) | Krasnodar reg., 2017 | 1, 2a, 2b, 2c, 3a, 3bg, 3ka, 10, 11, 14a, 14b, 15, 17, 18, 20, 23, 26, 30, 44 | 9, 16, 19, 24, 28, 29 |
| P_Kr | Krasnodar reg., 2018 | 1, 2b, 2c, 3a, 3bg, 3ka, 10, 11, 14a, 14b, 16, 17, 18, 23, 26, 30, 44 | 9, 2a, 15, 19, 20, 24, 28, 29 |
| P_Chel | Krasnodar reg., 2018 | 1, 2a, 2b, 2c, 3a, 3bg, 3ka, 9, 10, 11, 14a, 14b, 15, 16, 17, 18, 20, 30 | 19, 23, 24, 26, 28, 29, 44 |

In Russia 10-day-old seedling were used for inoculation. Urediniospores of each isolate were inoculated on a differential host series consisting of 20 wheat single-gene near-isogenic lines known to possess resistance genes (*Lr*) 1, 2a, 2c, 3, 3bg, 3ka, 9, 10, 11, 14a, 14b, 15, 16, 17, 18, 19, 20, 24, 26, 28, 29, and 30 in a Thatcher genetic background. Additionally, lines with the *Lr28*, *Lr29*, *Lr44*, and *TcLr47* genes were included in the virulence analysis. To characterize the virulence of Kazakhstan populations, 32 Thatcher isogenic lines with the *Lr* genes were used.

DNA was extracted according to Dorokhov and Kloke (1997) [22]. The presence of molecular markers to resistance genes *Lr1* (WR003), *Lr3* (Xmwg798), *Lr9* (SCS5), *Lr10* (Fi.2245/Lr10-6/r2), *Lr19/Sr25* (SCS265), *Lr20/Sr15* (STS638), *Lr21* (Lr21F/R), *Lr24/Sr24* (Sr24#12), *Lr26/Sr31/Yr9/Pm8* (SCM9), *Lr28*(SCS421570), *Lr29*(Lr29F24), *Lr34/Sr57/Yr18* (csLV34), *Lr37/Sr38/Yr17* (Ventriup/LN2), *Lr41*(GDM35), *Lr47*(PS10), *Lr66*(LrSp) (S13), *Lr28* (Wmc 313), *Lr68* (csGS), *Lr19/Sr25* (PSY-E1), *Lr35/Sr39* (Sr39#50), *Lr37/Yr17/Sr38* (Ventriup/LN), *Lr39* (Xgwm 210) was determined. The amplification products were separated on 2%-agarose gels. Gels were visualized on Gel Documentation System (Gel Doc XR+, BIO-RAD, Hercules, USA) for documentation of allele types in cultivars.

Table 2 – Phytopathological evaluation and molecular screening of advanced lines of wheat to leaf rust in Kazakhstan

| Name of genotype | Field evaluation to leaf rust | | | <i>Lr28</i> 320 b.p. | <i>Lr68</i> 385 b.p. | <i>Lr19/ Sr25</i> 191b.p. | <i>Lr35/ Sr39</i> 250 b.p. | <i>Lr37/Yr17/ Sr38</i> 262 b.p. | <i>Lr39</i> 182 b.p. |
|------------------|-------------------------------|----------|----------|----------------------------|----------------------------|----------------------------------|-----------------------------------|--|----------------------------|
| | 1-record | 2-record | 3-record | | | | | | |
| 304/14 | 0 | 0 | 0 | + | - | - | + | - | - |
| 351/12 | 0 | 0 | 0 | - | - | + | - | + | - |
| 39/14 | 0 | 0 | 0 | - | - | + | - | - | - |
| 64/15 | 0 | 0 | 0 | + | + | + | - | - | - |
| 297/13 | 10MS | 10MS | 30MS | - | - | - | - | - | - |
| 385/12 | 0 | 0 | 0 | + | - | - | + | + | + |
| 29/13 | 0 | 10MR | 20MS | - | - | - | - | - | - |
| 125/14 | 0 | 0 | 10MS | + | - | - | + | - | - |
| 319/14 | 0 | 0 | 5MR | + | - | - | + | + | - |
| 189/14 | 0 | 0 | 10MS | + | - | - | - | - | - |
| 206/14 | 20MS | 20MS | 40MS | - | - | - | - | - | - |
| 89/14 | 0 | 0 | 10MS | - | - | - | + | + | - |
| 129/12 | 0 | 0 | 0 | - | - | - | + | + | + |
| 348/13 | 10MS | 20MS | 20S | - | - | - | - | - | - |
| 42/14 | 0 | 10MS | 30MS | - | - | - | - | - | - |
| 386/13 | 0 | 0 | 10MS | - | - | - | + | + | - |
| 398/13 | 0 | 0 | 10MS | - | - | - | + | + | - |
| 3/14 | 0 | 0 | 0 | - | + | - | - | + | + |
| 182/14 | 0 | 0 | 10MS | - | - | - | - | - | + |
| 362/13 | 0 | 0 | 10MR | - | - | - | + | - | + |
| 221/14 | 0 | 0 | 0 | + | - | - | - | + | + |
| 221/14 | 0 | 0 | 0 | + | - | - | - | - | + |
| 162/14 | 0 | 0 | 0 | - | - | + | - | - | - |
| 56/14 | 20MS | 20MS | 40MS | - | - | - | - | - | - |
| 268/13 | 0 | 0 | 30S | - | - | - | - | - | - |
| 320/12 | 0 | 0 | 20MS | - | - | - | - | - | - |
| 89/13 | 20MS | 30MS | 50MS | - | - | - | - | - | - |
| 339/13 | 0 | 0 | 0 | - | + | - | - | - | + |
| 186/14 | 5MR | 10MS | 20MS | - | - | - | - | - | - |
| 25/13 | 0 | 0 | 0 | - | + | + | - | - | + |
| 100-11-17 | 0 | 0 | 5MR | - | - | - | - | - | + |
| 94-11-19 | 0 | 0 | 0 | - | - | - | - | - | - |
| 365-12-1 | 0 | 0 | 5MR | - | - | - | - | - | - |
| 399-12-3 | 0 | 0 | 0 | - | - | - | + | - | - |
| 399-12-7 | 0 | 0 | 0 | - | - | - | - | - | - |
| 116-10-4 | 0 | 0 | 0 | - | - | - | + | - | + |
| 211-10-10 | 0 | 0 | 0 | - | - | - | + | - | + |
| 211-10-12 | 0 | 0 | 0 | - | - | - | + | - | - |
| 239-10-15 | 0 | 0 | 0 | - | - | - | - | - | - |
| 239-10-17 | 0 | 0 | 0 | - | - | - | - | + | + |
| 239-10-18 | 0 | 0 | 0 | - | - | - | - | - | + |
| 66-10-6 | 0 | 0 | 10MR | - | - | - | - | - | - |
| 66-10-12 | 0 | 0 | 0 | - | - | - | - | - | - |
| 56-10-13 | 0 | 0 | 5MR | - | - | - | - | + | + |
| 56-10-15 | 0 | 0 | 0 | - | - | - | - | - | - |
| 366-13-5 | 0 | 0 | 0 | - | - | - | + | + | + |
| 151-13-6 | 0 | 0 | 10MR | - | - | - | - | - | - |
| 149-12-15 | 0 | 0 | 0 | - | - | - | - | - | - |
| 353-12-22 | 0 | 0 | 10MR | - | - | - | - | - | - |
| 206-11-3 | 0 | 0 | 0 | - | - | - | - | - | - |

Results. As a result of the field evaluation of leaf rust resistance in 50 Kazakhstani spring wheat advanced lines the group of immune samples included 27 wheat lines in which no symptoms of *P. triticina* disease were detected (table 2). A moderately resistant reaction (MR) was observed in 8 wheat lines (319/14, 362/13, 100-11-17, 365-12-1, 66-10-6, 56-10-13, 151-13-6 and 353-12-22).

Molecular identification of carriers of *Lr* genes in wheat advanced lines was carried out. It was found that 29 wheat lines contain *Lr* genes (table 2). Twelve lines had 2 *Lr* genes. The lines 304/14 and 125/14 contains *Lr28* and *Lr35/Sr39* genes; the line 351/12 – *Lr19* and *Lr37/Yr17/Sr38* genes; the lines 89/14 and 386/13 – *Lr35/Sr39*, *Lr37/Yr17/Sr38* genes; the lines 362/13, 116–10–4 and 211–10–10 – *Lr35/Sr39* and *Lr39* genes; line 221/14 – *Lr28* and *Lr39* genes; the line 339/13 – *Lr68* and *Lr39* genes; the lines 239–10–17 and 56–10–13 – *Lr37/Yr17/Sr38* and *Lr39* genes. In 7 wheat lines, 3 *Lr* genes were detected: the line 64/15 contains *Lr28*, *Lr68*, and *Lr19/Sr25* genes; the line 319/14 – *Lr28*, *Lr35/Sr39* and *Lr37/Yr17/Sr38* genes; the line 129/12 – *Lr35/Sr39*, *Lr37/Yr17/Sr38* and *Lr39* genes; the line 3/14 – *Lr68*, *Lr37/Yr17/Sr38* and *Lr39* genes; line 221/14 – *Lr28*, *Lr37/Yr17/Sr38*, *Lr39* genes; the line 25/13 – *Lr68*, *Lr19/Sr25* and *Lr39* genes; the line 366–13–5 – *Lr35/Sr39*, *Lr37/Yr17/Sr38* and *Lr39* genes. Wheat line 385/12 characterized by the presence of 4 *Lr* genes (*Lr28*, *Lr35/Sr39*, *Lr37/Yr17/Sr38* and *Lr39*). As a result of phytopathological and molecular screening of Kazakhstani advanced lines, carriers of 2, 3, and 4 *Lr* genes of leaf rust resistance were selected.

In the field of the Chelyabinsk region, almost all the studied material was characterized by high level of resistance to rust leaf. Disease severity for other Thatcher isogenic lines varied from 10% to 70% (table 3).

Table 3 – Diseases severity and reaction type to leaf rust of isogenic Thatcher (Tc) lines with *Lr* genes on the Russian Southern Ural in 2019

| Tc-line with gene <i>Lr</i> | Disease severity (%) and reaction type | Tc-line with gene <i>Lr</i> | Disease severity (%) and reaction type | Tc-line with gene <i>Lr</i> | Disease severity (%) and reaction type |
|-----------------------------|--|-----------------------------|--|-----------------------------|--|
| 1 | 30 S | 15 | 15 S | 32 | 5 S |
| 2a | 5 S | 16 | 20 S | 33 | 30 S |
| 2b | 10 S | 17 | 1 S | 34 | 5 S |
| 2c | 30 S | 18 | 20 S | 37 | 30 S |
| 3a | 60 S | 19 | 70 S | 38 | 20 S |
| 3ka | 50 S | 20 | 80 S | 45 | 0 |
| 3bg | 50 S | 21 | 20 S | 47 | 0 |
| 9 | 30 S | 22a | 1 S | 48 | 5 S |
| 10 | 5 S | 23 | 1 S | 49 | 0 |
| 11 | 70 S | 24 | 0 | 51 | 0 |
| 12 | 10 S | 25 | 0 | 53 | 0 |
| 13 | 10 S | 28 | 0 | 57 | 0 |
| 14a | 40 S | 29 | 1 S | 64 | 1 MR |
| 14b | 5 S | | | | |

A resistant type of reaction to leaf rust was observed in 92 % of advanced lines. The lines Lut. 26720, Lut. 26721 and Eritr. 26759 lines were susceptible to all clones and populations of *P. triticina*. The line Lut. 26534 showed a MR reaction when inoculated with a clone virulent to *Lr19* and S reaction to all other clones and populations of *P. triticina*. The line of Eritr. 26775 was susceptible to a clone virulent to *Lr26* and to the pathogen population from Chelyabinsk. The line Ferr. 26635 was struck by all clones and populations avirulent to *Lr9* and had a S reaction when infected with a virulent clone (K9) and the Chelyabinsk population, also virulent to *Lr9*, which suggests that it has this gene. All of the above lines have the adult plant resistance genes, or genes that have lost effectiveness, which individually are not effective, but with certain combinations can provide expression of resistance in the field.

Alien translocation from *Ag. elongatum* with highly effective seedling resistance genes to leaf (*Lr24*) and stem (*Sr24*) rust was detected in 7 breeding lines/ The genes *Lr19* and *Sr25* in the line Lut. 26706 were found. Translocation from *Ae. speltooides* (*LrSp*) was highly efficient for leaf and moderately effective for stem rust in 23 lines. Translocation from *Ae. umbellulata* (*Lr9*) was detected in 9 wheat lines.

Translocation from *S. cereale* (*Lr26*, *Sr31*) was identified in 6 lines. Translocation from *Ae. tauschii* with the APR genes *Lr21* and *Lr34* was identified in 10 lines. The *LrSp* gene is highly effective against leaf rust in the South Urals, although the *Lr9* and *Lr26* genes have lost their effectiveness. We have shown for the first time that in order to extend the useful life of these genes, their effective combination is of great importance. This is due to the fact that there are no isolates in the pathogen population that are simultaneously virulent to these two foreign genes [23]. Confirmation of this is a high level of field resistance of all lines with the *Lr26* + *Lr9* genes and the susceptibility of the line Ferr. 26635 and also the isogenic TcLr9 line. Cultivars with the *Lr26* gene susceptible in the Southern Urals, but the line Erit. 26762 with *Lr26*, had a high level of resistance in the field and laboratory conditions. The *Lr26* gene cannot ensure its resistance to leaf rust. This fact suggests the presence of additional gene (s) in this wheat line. At the lines Lut. 26729 and Lut. 26721 identified ineffective *Lr3* gene. At the line Eritr. 26759 – *Lr1* and *Lr10*; at the lines Eritr. 26760, Eritr. 26775 – *Lr10*; at the line Lut. 26765 – *Lr3* and *Lr26* genes identified. The study the virulence of the South Ural *P. triticina* population showed that all isolates studied were avirulent to Tc–lines with gene *Lr16*, *Lr19*, *Lr24*, *Lr28* and *Lr29* and virulent to *Lr1*, *Lr3a*, *Lr3bg*, *Lr3ka*, *Lr14a*, *Lr14b*, *Lr17* and *Lr18*. Virulence frequencies to other TcLr–line varied 10 to 30%.

In Kazakhstan virulence of *P. triticina* population collected in Almaty (South–East) and North–Kazakh (North) region of Kazakhstan was studied. Against the Almaty population genes *Lr9*, *Lr19*, *Lr24*, *Lr25* and *Lr28* with high efficacy (reaction type 0, 1 and ;), and gene *Lr45* with moderate efficacy were identified. Tc–lines with genes *Lr17* and *Lr18* had a moderate susceptible type reaction X, and all the rest of the lines were susceptible to the pathogen. The Kostanai population differed in virulence from the Almaty population. The lines with genes *Lr19*, *Lr24*, *Lr25*, *Lr28*, *Lr36* and *Lr45* were characterized by high efficacy in relation to the Kostanai population. Tc–lines with *Lr23*, *Lr29* and *Lr32* genes had a moderate susceptible type reaction X, and all other lines were highly susceptible to *P. triticina* (type 3–4).

Thus, different efficacy of the *Lr9* and *Lr36* genes with respect to the south and north Kazakhstan populations of *P. triticina* were revealed. Russian populations from Chelyabinsk were close in virulence to North Kazakhstan *P. triticina* populations.

Discussion. As a result of the studies, seedling and adult plant resistance to leaf rust in advanced spring bread wheat lines and their diversity in *Lr* genes were characterized. A study of the diversity of Russian lines revealed effective *Lr* genes (*Lr24*, *LrSp*) individually and in combination with ineffective *Lr* genes; an effective combination of the *Lr9* + *Lr26* genes has been revealed. The *Lr9* and *Lr26* genes separately in the South Urals lost their effectiveness.

Identified earlier in the Chelyabinsk advanced lines with *Lr24* and *Lr21* genes were not found in commercial wheat cultivars. In Russia cultivars French (Kanyuk) and German (KVS Akvilon) cultivars with *Lr24* and *Lr21* genes and in Kazakhstan Aina cultivar with the *Lr24* gene are recommended for industrial cultivation [24]. The cultivation of varieties with the *Lr24* gene shows different duration of its resistance: from 5 years to 20 years [25]. The *Lr9* and *Lr19* genes identified in the lines from Chelyabinsk belong to the group widely distributed in Russian cultivars [24, 26]. A positive example is the combination of the *Lr19* (or *Lr9*) genes with the ineffective *Lr26* gene or with *Lr37* APR gene [26, 15]. Most Russian and Kazakhstani isolates of *P. triticina*, are virulent to Tc–lines with the *Lr9* or *Lr19*, *Lr1*, *Lr3*, and *Lr10* genes [15, 24]. The *Lr21* gene detected in a number of lines is new for Russian and Kazakhstan wheat cultivars and belongs to the partially effective group.

It was found that 29 Kazakh wheat lines contain *Lr* genes for leaf rust resistance. As a result of phytopathological evaluation and molecular screening of Kazakhstani advanced breeding material, carriers of 2, 3, and 4 *Lr* genes of leaf rust resistance were selected. An earlier study leaf rust resistance in Kazakhstan, allowed to rank the spring wheat cultivars by level of seedling resistance. It was shown that the North Kazakhstan population of *P. triticina* was characterized by high virulence: 97 % were susceptible and only 4 % were resistant to the pathogen. The latter include cultivars Aktobe 39, Astana and Albidum 31 [27]. Among the 30 wheat entries, the genes *Lr10* and *Lr37* in three (L–1090, Krasnovodapadskaya 210 and Madsen) and *Lr19* and *Lr68* in cultivars (Pallada and Yegemen) were found [5]. The most valuable donor of leaf rust resistance was the line Almaly/Obriy with three identified *Lr* genes (*Lr34/Yr18*, *Lr37/Sr38/Yr17* and *Lr68*) [28].

A population analysis of the virulence of leaf rust *P. triticina* of wheat indicated a similarity of their structure in the Southern Urals of Russia and Northern Kazakhstan. The information obtained should be taken into account when locating genetically protected cultivars in these regions. The study and

development of new cultivars should be carried out taking into account their resistance not only to local pathogen populations prevailing in a particular region, but also to those races that may appear in the population due to possible airborne drift from neighboring regions.

Conclusion. For successful control of leaf rust in a single epidemiological zone (Urals and Western Siberia of Russia, Kazakhstan), the genetic diversity of promising new breeding wheat material and monitoring of the virulence of pathogen populations in these areas was carried out. As a result of this study the genetic diversity of leaf rust resistance sources in advanced spring bread wheat lines developed in Russia and Kazakhstan was revealed. A population analysis of the virulence of leaf rust *P. triticina* of wheat indicated a similarity of their structure in the Southern Urals of Russia and Northern Kazakhstan.

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РЕСЕЙ МЕН ҚАЗАҚСТАНДА ҚОҢЫР ТАТҚА ТӨЗІМДІГІ БОЙЫНША ЖАЗДЫҚ ЖҰМСАҚ БИДАЙДЫҢ ПЕРСПЕКТИВТІ СЕЛЕКЦИЯЛЫҚ МАТЕРИАЛДАРЫНЫҢ ГЕНЕТИКАЛЫҚ АЛУАН ТҮРЛІЛІГІ

Аннотация. Қоңыр тат қоздырушысы *Puccinia triticina* Erikss – Қазақстан мен Ресейдегі бидайдың негізгі ауруларының бірі. Оның зияндылығы жыл мен бидай өсірілетін аймаққа байланысты өзгереді. Орта мен инфекцияның таралуына байланысты генотиптердің өнімділігінің шығыны 30–60 %-ға жетуі мүмкін. Генетикалық төзімді сорттарды қолдану – аурумен күресудің ең эффективті, үнемді және экологиялық жағынан қауіпсіз тәсілі. Қоңыр татпен нәтижелі күресу үшін Челябинск ауылшаруашылық ғылыми-зерттеу институтының 61 жаздық бидай генотиптері мен Бараев атындағы ауылшаруашылық ғылыми-өндірістік орталығының 50 генотипінің генетикалық алуан түрлілігі мен төзімділігі екі елде де зерттелді. Қазақстанда фитопатологиялық скрининг негізінде дала жағдайында бидай перспективті линияларынан қоңыр татқа 27 төзімді линия мен 8 орташа төзімді линия іріктеліп алынды. Қазақстандық перспективті линиялардың молекулалық скринингі қоңыр татқа төзімділік *Lr* гендері бар 29 бидай линиясын анықтауға мүмкіндік берді. Екі төзімділік *Lr* гендері бар 12 линия анықталды: 304/14 және 125/14 линияларында *Lr28* бен *Lr35/Sr39* гендері; 351/12 линиясында – *Lr19* және *Lr37/Yr17/Sr38*; 89/14 және 386/13 линияларында – *Lr35/Sr39*, *Lr37/Yr17/Sr38*; 362/13, 116–10–4 және 211–10–10 линияларында – *Lr35/Sr39* бен *Lr39*; 221/14 линиясында – *Lr28*, *Lr39*; 339/13 линиясында – *Lr68*, *Lr39*; 239–10–17 мен 56–10–13 линияларында – *Lr37/Yr17/Sr38*, *Lr39* гендері идентификацияланды. Үш *Lr* гендері бар бидайдың 7 линиясы анықталды: 64/15 линиясында – *Lr28*, *Lr68* және *Lr19/Sr25*; 319/14 линиясында – *Lr28*, *Lr35/Sr39*, *Lr37/Yr17/Sr38*; 129/12 линиясында – *Lr35/Sr39*, *Lr37/Yr17/Sr38* және *Lr39*; 3/14 – *Lr68*, *Lr37/Yr17/Sr3* және *Lr39*; 221/14 линиясында – *Lr28*, *Lr37/Yr17/Sr38*, *Lr39*; 25/13 линиясында – *Lr68*, *Lr19/Sr25* және *Lr39*; 366–13–5 линиясында – *Lr35/Sr39*, *Lr37/Yr17/Sr38* және *Lr39* гендері идентификацияланды. 4 *Lr* гендері бар бидайдың 385/12 линиясы идентификацияланды: *Lr28*, *Lr35/Sr39*, *Lr37/Yr17/Sr38* және *Lr39*. Бидайдың қазақстандық перспективті селекция материалдарының молекулалық скринингі мен фитопатологиялық бағалауы нәтижесінде қоңыр татқа 2, 3, 4 төзімділік *Lr* гендері бар тасымалдаушылар таңдалып алынды. Зерттелген Челябинскінің селекциялық материалдарының 92 % линиялары өсімдіктің өскін және ересек сатысында да қоңыр татқа жоғары төзімділігімен ерекшеленді. Молекулалық маркерлерді қолданып, бидайдың ресейлік линияларынан *Lr24*, *Lr9*, *Lr19*, *LrSp*, *Lr1*, *Lr3*, *Lr10*, *Lr26*, *Lr21* және *Lr34* гендері жеке немесе әртүрлі комбинацияларда анықталды.

Оңтүстік Оралдың далалық жағдайында *Lr24*, *Lr25*, *Lr26*, *Lr28*, *Lr45*, *Lr47*, *Lr49*, *Lr51*, *Lr57* (зақымдалу деңгейі 0) гендері бар изогенді линиялар жоғары төзімділік танытты, ал *Lr17*, *Lr23*, *Lr29* және *Lr64* гендері бар линияларда орташа төзімділік байқалды (зақымдалу деңгейі 5 %-ға кем). Өскін сатысында барлық монопулалық изоляттар *Lr16*, *Lr19*, *Lr24*, *Lr28* және *Lr29* гендері бар Тс линияларға авирулетті болды. Қазақстанның Алматы (Оңтүстік-шығыс) және Солтүстік Қазақстан (солтүстік) облыстарынан жиналған *P. triticina* популяциясының вируленттілігі зерттелді. Алматылық популяция қоздырушысына жоғары

эффективті (реакция типі 0, 1 және;) *Lr9*, *Lr19*, *Lr24*, *Lr25* және *Lr28* гендері мен орташа эффективті *Lr45* гендері идентификацияланды. Қалған *Lr* гендері бар барлық линиялар патогенге төзімсіз болды. *Lr19*, *Lr24*, *Lr25*, *Lr28*, *Lr36* және *Lr45* гендері бар изогенді линиялар қостанайлық *P. triticina* популяциясына жоғары эффективтілігімен ерекшеленді. Бидайдың *P. triticina* қоңыр татының вируленттілігінің популяциялық анализі Ресейдің Оңтүстік Орал мен Қазақстанның Солтүстігіндегі олардың құрлымының ұқсастығын көрсетті. Алынған мәліметтер осы аймақта генетикалық қорғалған сорттарды орналастыруда ескерілуі қажет. Жаңа сорттарды шығару мен зерттеу кезінде белгілі бір аймақта тек жергілікті патогеннің популяциясына төзімділігін есепке алумен ғана жүргізілмеуі керек, сонымен қатар көршілес аймақтардан ауа арқылы таралуы мүмкін популяцияларға төзімділігін де ескеру қажет.

Түйін сөздер: бидай, қоңыр тат, *Lr* гендері, молекулалық маркерлер, изоляттар, вируленттілік.

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ГЕНЕТИЧЕСКОЕ РАЗНООБРАЗИЕ ПЕРСПЕКТИВНОГО СЕЛЕКЦИОННОГО МАТЕРИАЛА ЯРОВОЙ МЯГКОЙ ПШЕНИЦЫ ПО УСТОЙЧИВОСТИ К БУРОЙ РЖАВЧИНЕ В РОССИИ И КАЗАХСТАНЕ

Аннотация. Бурая ржавчина, возбудитель *Puccinia triticina* Erikss., является одним из основных заболеваний пшеницы в России и Казахстане. Его вредность варьирует в зависимости от года и региона возделывания пшеницы. Потеря урожайности генотипов может достигать 30–60% в зависимости от среды и тяжести инфекции. Использование генетически устойчивых сортов считается наиболее эффективным, экономичным и экологически безопасным методом борьбы с болезнями. Для успешной борьбы с бурой ржавчиной в обеих странах была изучена устойчивость и генетическое разнообразие 61 генотипа яровой пшеницы Челябинского научно-исследовательского института сельского хозяйства и 50 генотипов Научно-производственного центра зернового хозяйства имени Бараева. В Казахстане на основе фитопатологического скрининга в полевых условиях перспективных линий селекции пшеницы отобрано 27 устойчивых линий пшеницы и 8 умеренно устойчивых линий к бурой ржавчине. Молекулярный скрининг казахстанских перспективных линий позволил выявить 29 линий пшеницы, характеризующихся наличием *Lr* генов устойчивости к бурой ржавчине. У 12 линий выявлено по 2 *Lr* гена устойчивости: у линий 304/14 и 125/14 идентифицированы гены *Lr28* и *Lr35/Sr39*; у линии 351/12 – *Lr19* и *Lr37/Yr17/Sr38*; у линий 89/14 и 386/13 – *Lr35/Sr39*, *Lr37/Yr17/Sr38*; у линий 362/13, 116–10–4 и 211–10–10 – *Lr35/Sr39* и *Lr39*; у линии 221/14 – *Lr28*, *Lr39*; у линии 339/13 – *Lr68*, *Lr39*; у линий 239–10–17 и 56–10–13 – *Lr37/Yr17/Sr38*, *Lr39*. В 7 линиях пшеницы выявлено по 3 *Lr* гена: у линии 64/15 – *Lr28*, *Lr68* и *Lr19/Sr25*; у линии 319/14 – *Lr28*, *Lr35/Sr39*, *Lr37/Yr17/Sr38*; у линии 129/12 – *Lr35/Sr39*, *Lr37/Yr17/Sr38* и *Lr39*; у линии 3/14 – *Lr68*, *Lr37/Yr17/Sr38* и *Lr39*; у линии 221/14 – *Lr28*, *Lr37/Yr17/Sr38*, *Lr39*; у линии 25/13 – *Lr68*, *Lr19/Sr25* и *Lr39*; у линии 366–13–5 – *Lr35/Sr39*, *Lr37/Yr17/Sr38* и *Lr39*. Идентифицирована линия пшеницы 385/12 с 4-мя *Lr* генами: *Lr28*, *Lr35/Sr39*, *Lr37/Yr17/Sr38* и *Lr39*. В результате фитопатологической оценки и молекулярного скрининга перспективного казахстанского селекционного материала пшеницы были отобраны носители 2-х, 3-х и 4-х *Lr* генов устойчивости к бурой ржавчине. Из изученного челябинского селекционного материала 92% линий характеризовались высоким уровнем устойчивости к листовой ржавчине как на стадии взрослого растения, так и на стадии проростков. В российских линиях пшеницы с использованием молекулярных маркеров были выявлены гены *Lr24*, *Lr9*, *Lr19*, *LrSp*, *Lr1*, *Lr3*, *Lr10*, *Lr26*, *Lr21* и *Lr34* по отдельности или в различных комбинациях. В полевых условиях Южного Урала высокую устойчивость проявили изогенные линии с генами *Lr24*, *Lr25*, *Lr26*, *Lr28*, *Lr45*, *Lr47*, *Lr49*, *Lr51*, *Lr57* (степень поражения 0), а в линиях с генами *Lr17*, *Lr23*, *Lr29* и *Lr64* наблюдали умеренную устойчивость (степень поражения менее 5%). На стадии проростков все монопустульные изоляты были авирулентны к Тс-линиям с генами *Lr16*, *Lr19*, *Lr24*, *Lr28* и *Lr29*. В Казахстане изучена вирулентность популяции *P. triticina*, собранной в Алматинской (Юго-Восток) и Северо-казахстанской (Север) областях Казахстана. Идентифицированы высокоэффективные (тип реакции 0, 1 и;) против алматинской популяции возбудителя гены *Lr9*, *Lr19*, *Lr24*, *Lr25* и *Lr28*, а также ген *Lr45*, характеризовавшийся умеренной эффективностью. Все линии с остальными *Lr* генами были восприимчивы к патогену. Изогенные линии с генами *Lr19*, *Lr24*, *Lr25*, *Lr28*, *Lr36* и *Lr45* характеризовались

высокой эффективностью по отношению к костанайской популяции *P. triticina*. Популяционный анализ вирулентности бурой ржавчины пшеницы *P. triticina* показал сходство их структуры на Южном Урале России и в Северном Казахстане. Полученная информация должна учитываться при размещении генетически защищенных сортов в этих регионах. Изучение и разработка новых сортов должны проводиться с учетом их устойчивости не только к местным популяциям патогенов, преобладающим в конкретном регионе, но и к тем расам, которые могут появиться в популяции из-за возможного переноса по воздуху из соседних регионов.

Ключевые слова: пшеница, бурая ржавчина, *Lr* гены, молекулярные маркеры, изоляты, вирулентность

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MEASURES TO REDUCE THE MICROBIAL CONTENT AND THE NUMBER OF SOMATIC CELLS IN COW MILK

Abstract. The article presents the research results obtained on a commercial dairy farm. Studies on the use of modern domestic means of processing the udder before and after milking have been conducted. For this, two experimental and one control groups were formed in the farms. In the summer and autumn periods, the udder of cows in the experimental groups was treated with specific cleaning means and disinfectants. In the control group, the udder processing by special means was not carried out. Hygiene of the udder was maintained by washing the dugs with warm water, as is common in farms. It was found that the udder treatment of cows with disinfectants leads to a decrease in the number of mesophilic aerobic and facultative anaerobic microorganisms and somatic cells in cow's milk.

Treatment of the udder dugs of cows in the 1st experimental group before milking with Priolit means, after milking with Algavit helped to reduce NMAFAnM in milk. The milk by microbial contamination meets the high requirements of interstate and national standards.

The research results obtained in the autumn period confirmed the positive effect of udder treatment with agents on reducing the microbial content of milk. Milk of cows of the 1 and 2 experimental and the 3 control groups in terms of NMAFAnM corresponds to the first grade of the national standard.

The number of somatic cells in the summer in the cow's milk of the 3 control group increased 18.42 times, which confirms the relevance of our research. In the milk of cows of the 2nd experimental group, the number of somatic cells decreased 1.39 times, in the 1st experimental group – 6.25 times, which suggests a good combination of the use of means before and after treatment.

Key words: cow, udder, milk, prevention, mastitis, processing means, microbial content, somatic cells, safety, quality.

Introduction. Issues related to obtaining high-quality cow's milk remain relevant. The safety of cow's milk depends on various indicators. Researchers note regions with a high content of cadmium, lead, mercury, arsenic in the environment and, consequently, in cow's milk. The environment of the Chuvash Republic (CR) is favorable for the content of toxic substances. The content of cadmium, lead, mercury, and arsenic in the milk of cows of the CR does not cause anxiety. However, the microbiological safety of milk requires constant monitoring [1].

High microbial content in milk is most often associated with the health of udder of cows. Diseases of the udder cause an increase in the number of somatic cells. It is known that mastitis not only affects the quality of milk, but also reduces the dairy productivity of cows, increases the rate of early culling of cows from the herd, the treatment cost and many other factors [2-12].

Currently, regulatory and technical documents (RTD) are aimed at strengthening the requirements for milk according to microbiological indicators. In the Russian Federation, there are two GOSTs - national and interstate standards.

National Standard – GOST R 52054-2003 “Raw cow's milk. Technical conditions” with amendments No. 1 and 2. Amendment No. 1 approved and put into operation by order of the Federal agency for technical Regulation and Metrology (Rostekhnregulirovaniye) dated 07.10.2009 No. 434-st from 01.01.2010; Amendment No. 2 approved and put into operation by order of the Federal Agency for Technical Regulation and Metrology dated 08.08.2017, No. 885-st from 01.09.2017.

Interstate standard – GOST 31449-2013 “Raw cow's milk. Technical conditions.” By order of the Federal Agency for Technical Regulation and Metrology dated June 28, 2013, No. 267-st, the interstate standard GOST 31449-2013 was put into effect as the national standard of the Russian Federation since July 1, 2014.

Obtaining microbiological safe milk from sick cows that meet modern standards is almost impossible. The importance of research for science in the world is to develop measures aimed at improving the quality of cow's milk.

The aim of the research. The aim of the research is to reduce bacterial content and the number of somatic cells in cow's milk using modern cleaning means and disinfectants for treating the udder before and after milking.

Materials and methods of the research. The first series of experiments to reduce the microbial contamination of milk and the number of somatic cells using Violit, Kliovit, and Lactovit for treating the udder of cows was carried out in commercial dairy farm of the Progress Closed Joint-Stock Company in the Yalchik District of the Chuvash Republic.

The second series of experiments were carried out at the dairy farm of the Niva agricultural production cooperative of the Krasnochetaisky district of the Chuvash Republic. To reduce the number of mesophilic aerobic and facultative anaerobic microorganisms and somatic cells in milk in the summer and autumn periods, the measures were taken to treat the dugs of the udder of cows with concentrated universal means as “Priolit” before milking and “Algavit” and “Elovit” after milking.

The manufacturer of the aforementioned means for treating the udder of cows is PC Vortex LLC, Izhevsk, Udmurt Republic.

For each farm, 2 experimental and 1 control groups of Holsteinized black-and-motley breed were formed according to the method of analog groups taking into account the live weight and age of animals in each farm. During the research period, the cows of ten animals in each group were on the same diet in equal conditions of keeping and milking. The method of keeping cows is stall-pasture using an exercising area. For research, milk sampling was conducted according to the principle of proportionality of milk yield. According to physicochemical parameters, the quality of cow's milk was homogenous.

In the preparatory period, the farms conducted a veterinary-sanitary assessment of the milk quality and revealed an increased number of microorganisms and somatic cells.

Research results. In the first experimental series, at the beginning of the studies, an analysis of the quality of cow's milk was made. At the same time, inhibitory substances and pathogenic microorganisms were not found in milk. The number of mesophilic aerobic and facultative anaerobic microorganisms (NMAFAnM) in cow's milk was 3.8×10^6 CFU/cm³, which does not meet modern standards. The number of somatic cells (NSC) was 4×10^5 in 1 cm³, which corresponds to the requirements of the first grade according to the national standard GOST R 52054-2003.

To reduce microbial content and the number of somatic cells in milk, the cow's udder was treated with concentrated universal means before milking - with Violit, and after milking with Kliovit and Lactovit according to the scheme shown in table 1.

At the beginning of the research, in the preparatory period, before using the means for udder treatment, NMAFAnM in the milk of cows of the experimental and control groups was 4.0×10^5 CFU/cm³, NSC – 3.5×10^5 in 1 cm³. By microbial contamination, such milk belongs to the second grade, by the number of somatic cells – to the first grade according to the requirements of the national standard GOST R 52054-2003 “Raw cow's milk. Technical conditions.” In accordance with the requirements of the interstate standard GOST 31449-2013 “Raw cow's milk. Technical conditions”, the result of NMAFAnM is not subject to acceptance, the NSC is accepted.

In the summer, after 14 days of the udder treatment, in milk of cows of the 1 experimental group, the NMAFAnM decreased by 2.14 times, in the milk of cows of the 2nd experimental group - this number decreased 1.96 times and amounted to $(2.1 \pm 0.04) \times 10^5$ and $(2.3 \pm 0.01) \times 10^5$ CFU/cm³, respectively. In the milk of cows of the 3rd control group, the microbial content decreased by 2.3 % and amounted to $(4.4 \pm 0.01) \times 10^5$ CFU/cm³. The number of somatic cells in the milk of cows of the 1st experimental group decreased by 1.1 % and amounted to $(3.3 \pm 0.01) \times 10^5$ in 1 cm³. The decrease in the number of somatic cells in the milk of cows of the 2 experimental and 3 control groups was not found (table 2).

Table 1 – The scheme of processing the dugs of the udder in cows with means Violit, Kliovit and Lactovit

| Indicator | Group | | |
|--|----------------|----------------|-------------|
| | 1 experimental | 2 experimental | 3 control |
| Number of cows in group, animals | 10 | 10 | 10 |
| <i>Preparatory period (summer), days</i> | 14 | | |
| Cow udder treatment | warm water | warm water | warm water |
| <i>Main period (summer)</i> | | | |
| Cow udder treatment by means: | | | |
| before milking | Violit | Violit | warm water |
| after milking | Kliovit | Lactovit | not treated |
| Duration of treatment, days | 14 | | |
| <i>Interim period (summer-autumn)</i> | | | |
| Cow udder treatment | теплая вода | теплая вода | теплая вода |
| Duration of period, days | 126 | | |
| <i>Main period (autumn-winter)</i> | | | |
| Cow udder treatment by means: | | | |
| before milking | Violit | Violit | warm water |
| after milking | Kliovit | Lactovit | not treated |
| Duration of treatment, days | 28 | | |

Table 2 – Microbiological analysis of cow's milk before and after treatment of the udder with Violit, Kliovit, and Lactovit

| Indicator | Requirements for grades, no more than GOST R 52054-2003 GOST 31449-2013 | Research results | |
|--|--|--|------------------------------|
| | | 1 experimental group 2 experimental group | 3 control group |
| <i>Preparatory period – summer</i> | | | |
| NMAFAnM, CFU/cm ³ | High – 1.0×10^5 first – 3.0×10^5 second – 5.0×10^5 1.0×10^5 | $(4.5 \pm 0.05) \times 10^5$ $(4.5 \pm 0.04) \times 10^5$ | $(4.5 \pm 0.04) \times 10^5$ |
| Somatic cells, in 1 cm ³ | High – 2.5×10^5 first – 4.0×10^5 second – 7.5×10^5 4.0×10^5 | $(3.5 \pm 0.12) \times 10^5$ $(3.5 \pm 0.14) \times 10^5$ | $(3.5 \pm 0.12) \times 10^5$ |
| <i>Main period – summer</i> | | | |
| NMAFAnM, CFU/cm ³ | High – 1.0×10^5 first – 3.0×10^5 second – 5.0×10^5 1.0×10^5 | $(2.1 \pm 0.04) \times 10^{5***}$ $(2.3 \pm 0.01) \times 10^{5***}$ | $(4.4 \pm 0.01) \times 10^5$ |
| Somatic cells, in 1 cm ³ | High – 2.5×10^5 first – 4.0×10^5 second – 7.5×10^5 4.0×10^5 | $(3.3 \pm 0.01) \times 10^{5***}$ $(3.5 \pm 0.01) \times 10^5$ | $(3.5 \pm 0.01) \times 10^5$ |
| <i>Interim period – autumn</i> | | | |
| NMAFAnM, CFU/cm ³ | High – 1.0×10^5 first – 3.0×10^5 second – 5.0×10^5 1.0×10^5 | $(1.2 \pm 0.12) \times 10^{5***}$ $(3.7 \pm 0.11) \times 10^{4***}$ | $(4.4 \pm 0.03) \times 10^5$ |
| Somatic cells, in 1 cm ³ | High – 2.5×10^5 first – 4.0×10^5 second – 7.5×10^5 4.0×10^5 | $(9.0 \pm 0.14) \times 10^{4**}$ $(2.5 \pm 0.08) \times 10^5$ | $(2.5 \pm 0.02) \times 10^5$ |
| <i>Main period – autumn</i> | | | |
| NMAFAnM, CFU/cm ³ | High – 1.0×10^5 first – 3.0×10^5 second – 5.0×10^5 1.0×10^5 | $(1.0 \pm 0.12) \times 10^{5***}$ $(2.4 \pm 0.11) \times 10^{5***}$ | $(8.7 \pm 0.02) \times 10^5$ |

| Continuation of table 2 | | | |
|--|--|---|------------------------------|
| Main period – autumn | | | |
| Somatic cells, in 1 cm ³ | High – 2.5×10^5 first – 4.0×10^5 second – 7.5×10^5 4.0×10^5 | $\frac{(9.0 \pm 0.16) \times 10^4***}{(1.5 \pm 0.02) \times 10^5}$ | $(1.5 \pm 0.05) \times 10^5$ |
| Main period – winter | | | |
| NMAFAnM, CFU/cm ³ | High – 1.0×10^5 first – 3.0×10^5 second – 5.0×10^5 1.0×10^5 | $\frac{(1.0 \pm 0.02) \times 10^5***}{(3.7 \pm 0.15) \times 10^5***}$ | $(8.3 \pm 0.18) \times 10^5$ |
| Somatic cells, in 1 cm ³ | High – 2.5×10^5 first – 4.0×10^5 second – 7.5×10^5 4.0×10^5 | $\frac{(9.0 \pm 0.50) \times 10^4*}{(2.5 \pm 0.20) \times 10^5}$ | $(1.5 \pm 0.15) \times 10^5$ |
| Note. *P≤0.05; **P≤0.01; ***P≤0.001. | | | |

It was found that dugs processing of the udder improves the quality of cow's milk in terms of microbial content and the number of somatic cells.

Thus, during the summer period of the research, the commercial dairy farm was used to harvest the cow's milk from the experimental and control groups in the first grade according to the requirements of the national standard.

The obtained results confirm the need for sanitary-hygienic measures for processing the udder of cows to improve the quality of milk in terms of microbial content and the number of somatic cells.

In the second series of experiments, at the beginning of the studies, it was established that the cow's milk in the experimental and control groups does not meet the requirements of modern regulatory and technical documents. It was revealed that at the beginning of the summer period, the microbial content of milk of all groups meets the requirements of the first grade according to the national standard, but does not meet harder requirements of the international standard. The number of somatic cells in the milk of cows of the 1 experimental and the 3 control groups exceeds the requirements of modern regulatory and technical documents. Cow's milk of the 2nd experimental group in terms of NSC meets the requirements of the highest grade of the national standard and complies with the requirements of the international standard (table 3).

Table 3 – Microbiological analysis of cow's milk before and after processing the udder by means "Priolit", "Algavit" and "Elovit"

| Study Period/Norms | NMAFAnM, CFU/cm ³ | | NSC, in 1 cm ³ | |
|--|---|-------------------|---|-------------------|
| | Group | | | |
| | 1 experimental 2 experimental | 3 control | 1 experimental 2 experimental | 3 control |
| Summer period: | | | | |
| beginning of the experiment | $\frac{2.0 \times 10^5}{1.9 \times 10^5}$ | 2.6×10^5 | $\frac{7.5 \times 10^5}{2.5 \times 10^5}$ | 7.6×10^5 |
| end of the experiment | $\frac{9.7 \times 10^4}{1.3 \times 10^5}$ | 3.5×10^5 | $\frac{1.2 \times 10^5}{1.8 \times 10^5}$ | 1.4×10^6 |
| Autumn period: | | | | |
| beginning of the experiment | $\frac{2.7 \times 10^5}{2.9 \times 10^5}$ | 2.2×10^5 | $\frac{5.0 \times 10^5}{5.0 \times 10^5}$ | 5.0×10^5 |
| end of the experiment | $\frac{1.6 \times 10^5}{2.2 \times 10^5}$ | 2.5×10^5 | $\frac{3.5 \times 10^5}{4.0 \times 10^5}$ | 4.5×10^5 |
| GOST R 52054-2003 requirements by grades: | | | | |
| high, no more than | 1.0×10^5 | | 2.5×10^5 | |
| first, no more than | 3.0×10^5 | | 4.0×10^5 | |
| second, no more than | 5.0×10^5 | | 7.5×10^5 | |
| GOST 31449-2013 requirements, no more than | 1.0×10^5 | | 4.0×10^5 | |

Treatment of the udder dugs of cows in the 1st experimental group before milking with Priolit means, after milking with Algavit helped to reduce NMAFAnM in milk. The milk by microbial contamination meets the high requirements of interstate and national standards.

The research results obtained in the autumn period confirmed the positive effect of udder treatment with agents on reducing the microbial content of milk. Milk of cows of the 1 and 2 experimental and the 3 control groups in terms of NMAFAnM corresponds to the first grade of the national standard.

The number of somatic cells in the summer in the cow's milk of the 3 control group increased 18.42 times, which confirms the relevance of our research. In the milk of cows of the 2nd experimental group, the number of somatic cells decreased 1.39 times, in the 1st experimental group – 6.25 times, which suggests a good combination of the use of means before and after treatment.

In the autumn period, a decrease in the number of somatic cells in the milk of cows of all groups was established. In the 3rd control group, the decrease was 1.11 times, in the 2nd group – 1.25 times, in the 1st group – 1.43 times.

It was found that the milk of cows of the 3 control group by the number of somatic cells does not meet the requirements of the interstate standard, the milk of cows of the experimental groups corresponds. By the number of somatic cells, this milk belongs to the second grade of the national standard.

Conclusion. During the first series of experiments, it was found that treating the dugs of the udder of cows before milking with Violit and after milking with Kliovit leads to a more stable decrease in microbial content and the number of somatic cells in milk. At the beginning of the research, the milk of cows of the 1st experimental group according to microbial contamination meets the requirements of the second grade, and at the end of the experiment, it corresponds to the requirements of the highest grade. By the number of somatic cells, at the beginning of the research – the first grade, at the end of research – the highest grade.

Measures to improve the microbiological safety of milk by dugs treatment of the udder of cows in the second series of experiments allowed us to reduce the microbial contamination and the number of somatic cells in the milk of cows of the experimental groups. The use of Priolit before milking and Algavit after milking resulted in the most stable and best results on the quality of cow's milk.

The research results confirm the need for measures to reduce microbial content and the number of somatic cells in milk using modern means for treating the udder of cows before and after milking.

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СИЫР СҮТІНДЕГІ МИКРОБТЫ ЗАҚЫМДАНУ ЖӘНЕ СОМАТИКАЛЫҚ ЖАСУШАЛАР МӨЛШЕРІН ТӨМЕНДЕТУГЕ БАҒЫТТАЛҒАН ІС-ШАРАЛАР

Аннотация. Сүтті-тауарлы ферма жағдайында алынған ғылыми-зерттеу жұмыстарының нәтижелері келтірілген. Желінді сауғанға дейін және кейін қолданылатын отандық заманауи залалсыздандыру құралы қарастырылды. Бұл үшін шаруашылықтарда екі тәжірибелі және бір бақылау тобы құрылды. Жаз және күз мезгілдерінде тәжірибелі топтардағы сиыр желіндерін арнайы жуғыш және залалсыздандырушы құралдармен өңдеді. Бақылау тобында желіндер ешқандай құралдармен өңделмеді. Бақылау тобында көптеген шаруашылықтарда қабылданғандай, желін гигиенасын тек жылы сумен жуу ғана қолданылды. Сиыр желіндерін зарарсыздандырушы құралдармен өңдеу сиыр сүтіндегі мезофильді аэробты және факультативті анаэробты және соматикалық жасушалардың көлемінің төмендететіндігі анықталды.

Тәжірбиенің бірінші сатысында анықталғандай, сиыр желінін сауу алдында «Виолиит» құралымен, сауғаннан кейін «Клиовит» құралымен өңдеу сүттегі микробты зақымдануды және соматикалық жасуша мөлшерінің алып келетіні анықталды. Зерттеудің басында 1-тәжірибелі топ сиырларының сүті микробты зақымдануы бойынша екінші сұрып талаптарына сәйкес, ал зерттеудің соңында жоғарғы сұрып талаптарына сай болды. Зерттеудің басында соматикалық клетка мөлшері бойынша – бірінші сұрыпқа, зерттеу соңында – жоғарғы сұрыпқа енді. Сиыр желінін өңдеу арқылы зерттеудің екінші бөлімінде жүргізілген сүттің микробиологиялық қауіпсіздігін жақсартуға арналған іс-шаралар тәжірибелі топ сиыр сүттеріндегі микробты

ұрықтану және соматикалық жасуша мөлшерін азайтуға мүмкіндік берді. Сауғанға дейін «Приолит» және сауғаннан кейін «Алгавит» құралдарын қолдану сиыр сүті сапасының жақсаруына алып келді.

Зерттеу нәтижелері сүттегі микробты зақымдану және соматикалық жасуша мөлшерін кеміту үшін сиыр желіндерін сауғанға дейін және кейін өңдеу керектігін растайды.

Сүттегі микробты зақымдану және соматикалық жасуша мөлшерін азайту үшін сиыр желіндерін сауу алдында концентрілі эмбебап «Виолит», сауғаннан кейін «Клиовит» және «Лактовит» құралдарымен нұсқаудық бойынша өңдеу жүргізілді. Зерттеудің басында дайындық сатысында желінді өңдеуге арналған құралдарды қолданғанға дейін тәжірибелі және бақылау топтарындағы мөлшерлері: МАФАНММ – $4,0 \times 10^5$ КТБ/см³, СЖМ – $3,5 \times 10^5$ 1 см³. Жаз мезгілінде 1-тәжірибелі топтағы сиыр желіндерін 14 тәулік өңдеуден кейін МАФАНММ мөлшері 2,14 есеге, ал 2-тәжірибелі топтағы сүтте – 1,96 есе кеміді және $(2,1 \pm 0,04) \times 10^5$ және $(2,3 \pm 0,01) \times 10^5$ КТБ/см³ құрады. Бақылау тобындағы сүтте микробты зақымдану 2,3 %-ға төмендеді және $(4,4 \pm 0,01) \times 10^5$ КТБ/см³ құрады. СЖМ 1-тәжірибелі топтың сиыр сүттерінде 1,1 % төмендеді, 1 см³ $(3,3 \pm 0,01) \times 10^5$ құрады. Желіндерді өңдеу микробты зақымдану және соматикалық жасуша мөлшері бойынша сүт сапасын жақсартады.

Алынған мәліметтер, микробты зақымдану және соматикалық жасуша мөлшерін азайту үшін сиыр желіндерін өңдеу үшін санитарлы-гигиеналық іс-шараларды жүргізу қажеттігін растайды.

Сиыр желіндерін сауғанға дейін «Виолит» және сауғаннан кейін «Клиовит» өңдеу құралдарын қолданғанда, мезофильді аэробты және факультативті анаэробты микроорганизмдердің (МАФАНММ) мөлшері $(1,0 \pm 0,02) \times 10^5$ КТБ/см³ құрады. Алынған нәтижелер жоғарғы сұрып сүт талаптарына сай келді. «Виолит» және «Лактовит» құралдарын сауға дейін және кейін қолданғанда сүттегі (МАФАНММ) мөлшері $(3,7 \pm 0,15) \times 10^5$ КБТ/см³, ал ұлттық стандарт талаптары бойынша $5,0 \times 10^5$ КБТ/см³ ГОСТ Р 52054-2003, халықаралық стандарт талаптары бойынша $1,0 \times 10^5$ КБТ/см³ көп емес, ГОСТ 31449-2013.

Сиыр желіндерін шаюға жылы суды қолдану сүт сұрыпының жоғарлауына алып келмейді және 3 бақылау тобындағы сиырлардың сүтінде МАФАНММ мөлшері $(8,3 \pm 0,18) \times 10^5$ КБТ/см³ құрады, ол халықаралық және ұлттық стандарт талаптарына сай келмейді.

Бірінші топ сиыр желіндерін саууға дейін «Приолит», кейін «Алгавит» құралымен өңдеу МАФАНММ сүттегі мөлшері кеміді. Микробты зақымдануы бойынша сүт мемлекет аралық және ұлттық стандарттың жоғарғы талаптарына сай келеді.

Күз мезгілінде алынған зерттеу нәтижелері желінді өңдеу құралдарын қолдану сүттегі микробты зақымдануына оң әсер ететіндігі айқындалды. 1 және 2 тәжірибелі және 3 бақылау тобының сиырларының сүттерінде МАФАНММ мөлшері ұлттық стандарттың бірінші сұрыпына сай келеді.

Тәжірибенің екінші бөлігінде анықталғандай, тәжірибелі және бақылау тобының сиырларының сүттері заманауи нормативті-техникалық құжаттардың талаптарына сай келмейді. Жаз мезгілінің басында барлық топтарда сиыр сүтінің микробты зақымдануы ұлттық стандарттың бірінші сұрып талаптарына сай келеді, алайда талабы қатаңырақ халықаралық стандарттарға сай келмейді. 1 тәжірибелі және 3 бақылау тобының сиырларының сүттеріндегі соматикалық жасушалардың мөлшері заманауи нормативті-техникалық құжаттардың талаптарынан асады. 2 тәжірибелі тобының сиырларының сүттеріндегі соматикалық жасушалардың мөлшері ұлттық стандарттың және халықаралық стандарттың талаптарына сай келеді.

Түйін сөздер: сиыр, желін, сүт, профилактика, мастит, өңдеу құралы, микробты зақымдану, соматикалық жасушалар, қауіпсіздік, сапа.

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МЕРОПРИЯТИЯ ПО СНИЖЕНИЮ МИКРОБНОЙ ОБСЕМЕНЕННОСТИ И КОЛИЧЕСТВА СОМАТИЧЕСКИХ КЛЕТОК В МОЛОКЕ КОРОВ

Аннотация. В статье представлены результаты научно-исследовательской работы, полученные в условиях молочно-товарной фермы. Проведены исследования по использованию современных отечественных средств обработки вымени до и после доения. Для этого в хозяйствах созданы две опытные и одна контрольная группы. В летний и осенний периоды вымя коров в опытных группах обрабатывали специальными моющими и дезинфицирующими средствами. В контрольной группе обработку вымени специальными средствами не проводили. Гигиену вымени поддерживали обмыванием сосков теплой водой, как принято в хозяйствах. Установили, что обработка вымени коров дезинфицирующими средствами

приводит к снижению количества мезофильных аэробных и факультативно-анаэробных микроорганизмов и соматических клеток в молоке коров.

В первой серии опытов установили, что обработка сосков вымени коров до доения средством «Виолит» после доения средством «Клиовит» приводит к более устойчивому снижению микробной обсемененности и количества соматических клеток в молоке. В начале исследований молоко коров 1 опытной группы по микробной обсемененности соответствует требованиям второго сорта, а в конце исследований – требованиям высшего сорта. По количеству соматических клеток в начале исследований – первому сорту, в конце исследований – высшему сорту. Мероприятия по улучшению микробиологической безопасности молока путем обработки сосков вымени коров во второй серии опытов позволили уменьшить микробную обсемененность и количество соматических клеток в молоке коров опытных групп. Использование средства «Приолит» до доения и «Алгавит» после доения привело к получению наиболее стабильных и лучших результатов по качеству молока коров.

Результаты исследований подтверждают необходимость проведения мероприятий по снижению микробной обсемененности и количества соматических клеток в молоке с использованием современных средств для обработки вымени коров до и после доения.

Для снижения микробной обсемененности и количества соматических клеток в молоке провели обработку вымени коров концентрированными универсальными средствами перед доением – «Виолит», а после доения – «Клиовит» и «Лактовит» по схеме. В начале исследований в подготовительный период до использования средств для обработки вымени КМАФАНМ (количество мезофильных аэробных и факультативно-анаэробных микроорганизмов) в молоке коров опытной и контрольных групп составило $4,0 \times 10^5$ КОЕ/см³, КСК – $3,5 \times 10^5$ в 1 см³. В летний период после 14 суток обработки вымени в молоке коров 1 опытной группы КМАФАНМ снизилось в 2,14 раза, в молоке коров 2 опытной группы – 1,96 раза и составило $(2,1 \pm 0,04) \times 10^5$ и $(2,3 \pm 0,01) \times 10^5$ КОЕ/см³ соответственно. В молоке коров 3 контрольной группы микробная обсемененность снизилась на 2,3% и составила $(4,4 \pm 0,01) \times 10^5$ КОЕ/см³. Количество соматических клеток в молоке коров 1 опытной группы уменьшилось на 1,1% и составило $(3,3 \pm 0,01) \times 10^5$ в 1 см³. Выявили, что обработка сосков вымени улучшает качество молока коров по микробной обсемененности и количеству соматических клеток.

Полученные результаты подтверждают необходимость проведения санитарно-гигиенических мероприятий по обработке вымени коров для улучшения качества молока по микробной обсемененности и содержанию соматических клеток.

Установлено, что при использовании средств для обработки вымени коров до доения «Виолит» и после доения «Клиовит» количество мезофильных аэробных и факультативно-анаэробных микроорганизмов (КМАФАНМ) составляет $(1,0 \pm 0,02) \times 10^5$ КОЕ/см³. Полученные результаты соответствуют требованиям к молоку высшего сорта. При использовании средств «Виолит» и «Лактовит» до и после доения КМАФАНМ в молоке составляет $(3,7 \pm 0,15) \times 10^5$ КОЕ/см³ при норме не более $5,0 \times 10^5$ КОЕ/см³ для молока второго сорта по требованиям национального стандарта ГОСТ Р 52054-2003 и не более $1,0 \times 10^5$ КОЕ/см³ по требованиям международного стандарта ГОСТ 31449-2013.

Использование теплой воды для обмывания вымени коров не приводит к повышению сортности молока и КМАФАНМ в молоке коров 3 контрольной группы составляет $(8,3 \pm 0,18) \times 10^5$ КОЕ/см³, что не соответствует современным требованиям национального и международного стандартов.

Обработка сосков вымени коров 1 опытной группы перед доением средством «Приолит», после доения – «Алгавит» способствовало уменьшению КМАФАНМ в молоке. Молоко по микробной обсемененности соответствует высоким требованиям межгосударственного и национального стандартов.

Результаты исследований, полученные в осенний период, подтвердили положительное влияние средств обработки вымени на уменьшение микробной обсемененности молока. Молоко коров 1 и 2 опытных и 3 контрольной групп по КМАФАНМ соответствует первому сорту национального стандарта.

Во второй серии опытов в начале исследований установили, что молоко коров опытных и контрольной групп не соответствует требованиям современных нормативно-технических документов. Выявили, что в начале летнего периода микробная обсемененность молока коров всех групп соответствует требованиям первого сорта по национальному стандарту, однако не отвечает более жестким требованиям международного стандарта. Содержание соматических клеток в молоке коров 1 опытной и 3 контрольной групп превышает требования современных нормативно-технических документов. Молоко коров 2 опытной группы по КСК соответствует требованиям высшего сорта национального стандарта и выполняет требования международного стандарта

Ключевые слова: корова, вымя, молоко, профилактика, мастит, средства обработки, микробная обсемененность, соматические клетки, безопасность, качество.

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DISTRIBUTION OF SNOW COVER BY CLIMATIC ZONES OF THE TRANSBOUNDARY PYANJ RIVER BASIN

Abstract. The results of monitoring the processes of the snow cover accumulation on upstream of the Transboundary Pyanj river of the Central Asia are presented. It is found that the snow cover formation and the spatial distribution of atmospheric precipitation in the Pamir mountain is mainly determined by the orography of the terrain.

Key words: Mountain Pamir, Pyanj river basin, snow cover, climatic zone, precipitation.

Introduction. Climate change has become the greatest danger of the 21st century. Climate change manifests itself in the form of irregularities and disturbances in the climate cycle because of an increase in the temperature of the Earth due to global warming. Meteorological observations confirm that between two 30-year control periods of 1942-1972 and 1973-2003, surface temperatures in Central Asia increased by 0,65 °C. The serious effects of climate change have already begun to manifest, and the latest example of this is that 2016 has overtaken 2015. It was the warmest year in history. According to the analysis of the World Meteorological Organization (WMO) of the United Nations Climate Agency, the average global temperature in 2016 was 1.1 oC above the previous period [1]. As global temperatures rise, the world's snow resources are predicted to change in significant ways [2]. Long-term changes in global, regional, and local snow depth, snow water equivalent (SWE), and extent will ultimately have major ramifications for ecosystem function, human utilization of snow resources, and the climate itself through feedback mechanisms like snow albedo [3]. Unfortunately, only extent snow cover area (SCA) of the three snow metrics listed above is easily monitored using satellites. This monitoring, under way for several decades [4,5] has shown that global SCA has been decreasing for the past 30 years [6].

Snow accumulation generally increases with elevation because of the combined effect of the prevailing lower temperatures and the increased frequency of precipitation events caused by orographic effects.

Distributed data on snow depth, density and snow water equivalent (SWE) with a high spatial and temporal resolution are essential for validation of and/or as input to snow drift models [7] and snow melt runoff models [8]. Thus, there is a great need for distributed snow data, mainly for SWE data (i.e. snow depth and density). Spatially distributed SWE data is important for many stakeholders, for example, it can be used as an input to the new generation of hydrological models predicting snowmelt runoff [9,10].

By examine glaciers and glacier discharge in Nepal zooming on nine subcatchments of Ganges left tributaries with a total glaciated area of 3,644 km² it was concluded that glaciers contribute 2-3% to the

discharge of all rivers, flowing from Nepal, i.e., 5.38 km³ in total, which indicates that specific glacier runoff from this area is about 1,500 mm/year [11]. In another research, conducted recently in Nepal Himalaya, the summary of glacier and seasonal snow contribution to MAF is estimated as 14 km³, i.e., about 10% of MAF from Nepal [12].

The results of studies on the establishment of the climate-forming role of Pamir, as well as significant differences in its climatic zones, are widely presented in the work [13] on the example of snow cover formation and atmospheric precipitation on the upper parts of the Transboundary River Pyanj of Central Asia. It has been found that the formation of snow cover and the spatial distribution of atmospheric precipitation in mountain Pamir is mainly determined by the orography of the terrain. It was found that the precipitation ratio to the depth of snow cover is determined by the height of the terrain and the temperature regime. There is a process of shifting the precipitation periods of the snow cover maximum amount to different climatic zones, which is facilitated by the predominance of the orography effect on the promotion of air masses in mountainous areas [13].

On the border of the Southern and Central Pamir zones, the vertical gradient is about 40 mm for every 100 m of height, which indicates more humid foothills and the existence of wide basins that have an open exit to the West, towards the wet air flow. As the air flow moves deeper into the mountain area and passes through the ridges, the moist air converts moisture and becomes dry [13]. The lack of precipitation in the Eastern Pamir is due to the fact that in the Western Pamir which is characterized by high mountain ranges (5000-6000 m a. s. l.) the moist air is discharged with heavy precipitation, and the air passes through the ridges of the Western Pamir becomes dry [14].

Objects and Methodology. The diversity of climatic conditions in Central Asia, the finding of the changes patterns in meteorological processes, depending on the geographic and geocological features of the region led to the need for climatic zoning. Pamir is considered as an area where there is a change of moist, cold Mediterranean precipitation to dry Central Asian.

The territory of the Republic of Tajikistan is characterized by four climatic zones. In turn, the Gorno-Badakhshan Autonomous Region (GBAO) that covers almost the entire mountain Pamir and is a formation zone of the Transboundary Pyanj river is characterized by three climatic conditions: (figure 1a). The object of research is the climatic zones of the Southern and Western, Central and Eastern Pamir. The data of the snow cover from meteorological stations in the relevant climatic zones of the Pamir presented by the Agency for Hydrometeorology of Tajikistan was used. Location of meteostations in the studied climatic zones are present on the figure 1b.

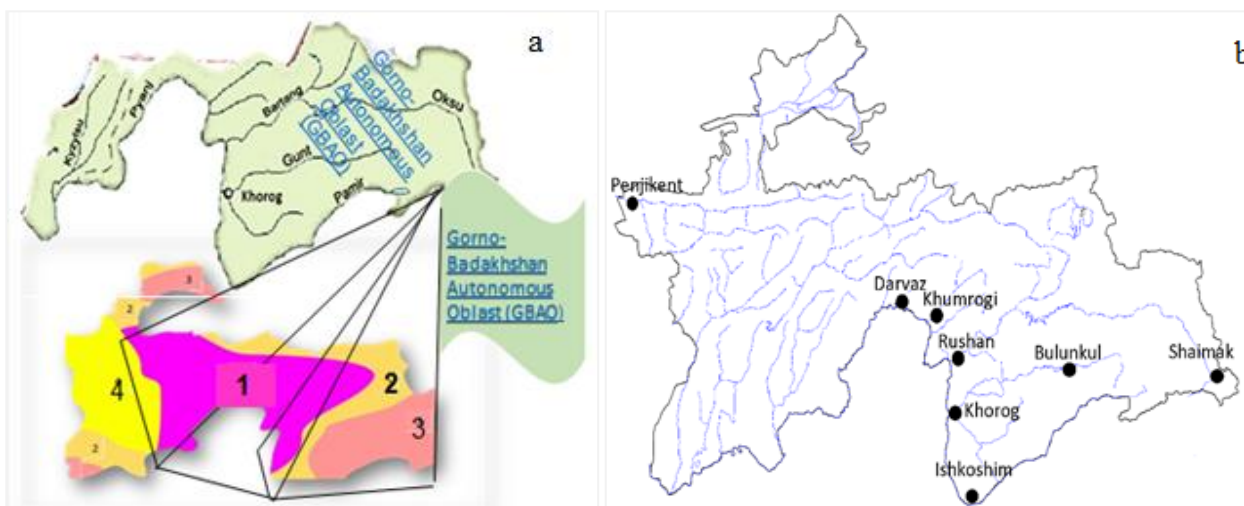


Figure 1 – Climatic zones of the Republic of Tajikistan and Gorno Badakhshan Autonomous Oblast:
 1 - warm continental climate; 2 - cold semi-arid climate; 3 - dry cold climate;
 4 - warm Mediterranean climate [13] (a) and location of meteostation of the studied climatic zones (b)

Results and discussion. Snow accumulation usually increases with increasing altitude due to the combined effect of prevailing low temperatures and increased frequency of precipitation caused by orographic effects [15]. Data on the distribution of snow depth, density, and water equivalent with high spatial and temporal resolution are needed to verify and / or enter data in the snow drift model [16]. Thus, there is a great need for data on snow distribution, mainly for determining the water equivalent of snow. Values of the spatial distribution of water equivalent are important for many stakeholders, for example, they can be used as a contribution to a new generation of hydrological models that predict snowmelt runoff [18-20].

In the Amu Darya and Syr Darya basins, meltwater resources are 69% and 79%, respectively, i.e. the share of seasonal snowmelt in water runoff is much higher than that of glacial ones.

Recent decades' data indicate an increase in reduction of the glaciation and snow cover area in the mountains as the South and North hemisphere of the Earth [21]. It is expected that geographic areas where the hydrology of melting glaciers and snow predominates in water cycles will be more sensitive to climate change, i.e., seasonal flow in river systems [22]. These climatic responses of mountain river hydrology combined with potential changes at the surface of the Earth, population growth and existing water shortages can create serious problems for the mountain regions. The snow accumulation generally increases with altitude due to the combined effect of the prevailing low temperatures and increased frequency of precipitation caused by orographic effects [23].

Snow and ice resources in mountain areas play an important role in providing water to river systems and thus largely determine the dynamics of agricultural development, hydropower and ecosystem components. These aspects become particularly relevant when a river formed high in the mountains is transboundary and its resources are distributed according to relevant agreements between several countries. This places a special requirement on the countries of the upper reaches of Transboundary rivers to assess the actual water resources in the river formation zone. In this aspect, it is important to consistently monitor the state of water, snow and ice resources in Transboundary river basins.

The paper is devoted to the study of the snow cover distribution in the Pamir climatic zones – the formation zone of the transboundary Pyanj river. From figure 2 where the months with the maximum height of the snow cover are presented it can be seen that in different climatic zones of the Pamir they correspond to different seasons. However, at the same time, a certain dependence can be found between periods with a maximum height of snow cover and climatic conditions.

According to the meteorological stations Rushan, Khorog and Irkht in the warm continental climate zone of the Pamir (figure 2) the maximum height of the snow cover is 32%, 44% and 32% respectively and is formed in the month of February.

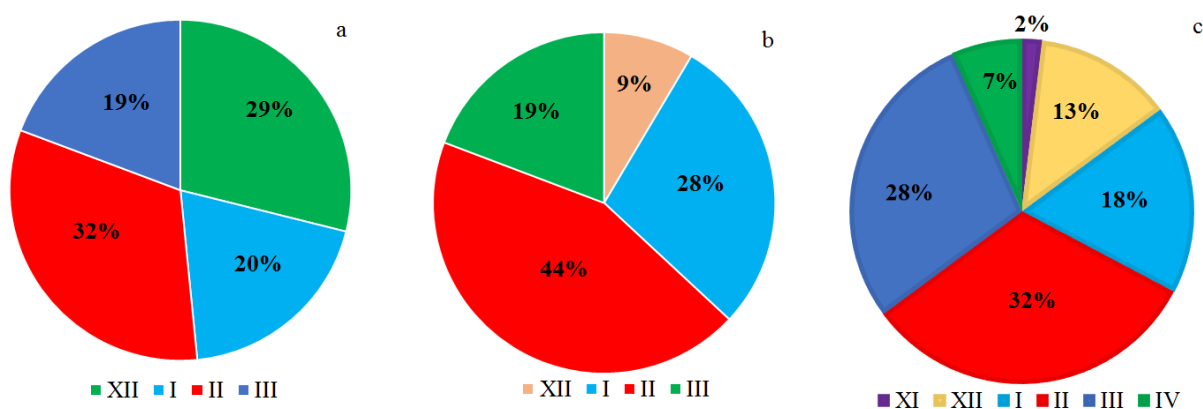


Figure 2 – Long-term average annual value of snow cover by meteorological stations: Rushan (a), Khorog (b) and Irkht (c)

In the cold semi-arid climate zone (Ishkoshim) 30% of the snow cover is formed in December (figure 3a). Bulunkul and Shaimak are located in a dry cold climate zone and the maximum altitude is formed only in March (figure 3b,c) The observed pattern of snow cover distribution across climate zones is primarily due to the influence of mountain orography on the distribution of air masses.

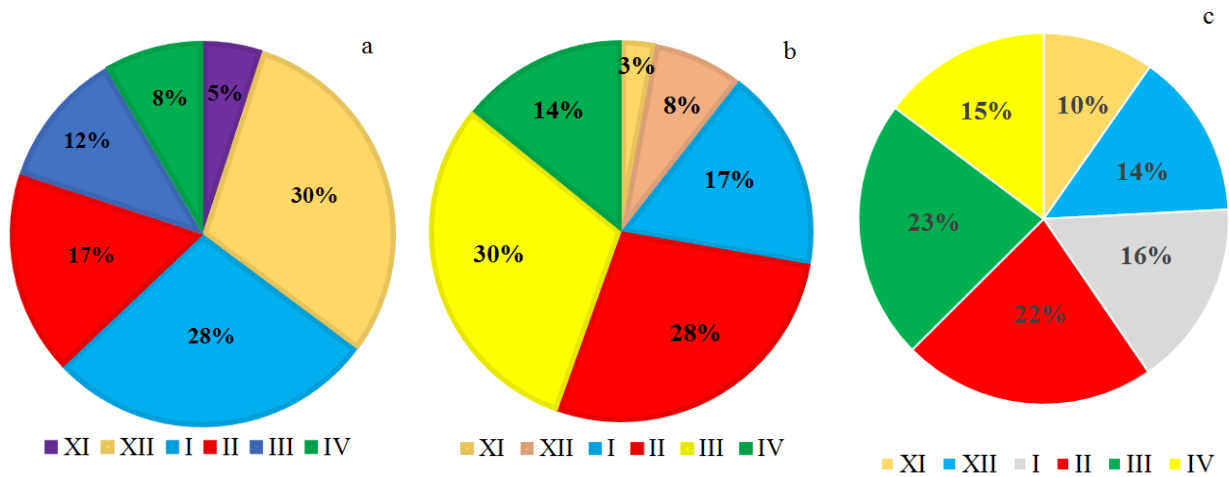


Figure 3 – Long-term average annual value of snow cover by cold semi-arid (a) and dry cold (b, c) climatic zones

The results obtained suggest that the Mediterranean moist air mass penetrates the territory of the Pamir Mountain from the Southwestern part of the Gorno-Badakhshan region, i.e. the warm continental climate zone (Khorog, Rushan). As it can be seen in figure 4, precipitation is also highest in the warm continental climate zone.

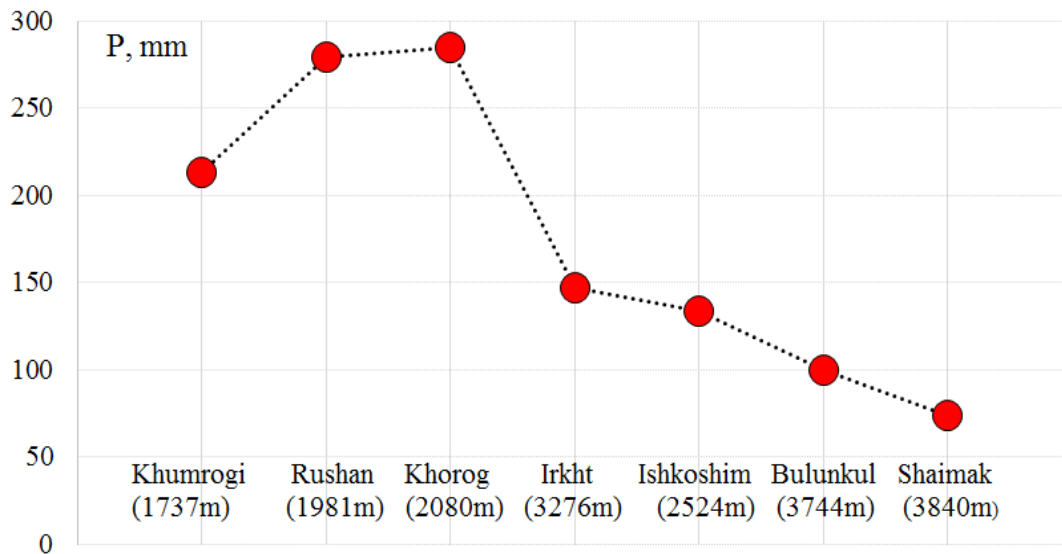


Figure 4 – Average long-term annual precipitation by the climatic zones of the Pyanj River Basin

The maximum value of the snow cover at the Ishkoshim weather station in the month of December, according to [13,24] is associated with the penetration of air masses from Iran and Afghanistan.

The formation of the maximum snow cover in the cold semi-arid climate zone as well as in the warm continental climate zone according to meteostation Penjikent occurs in January although this climate zone is not characterized by heavy precipitation. It is appropriate to note that the cold mass from the North of the Republic of Kazakhstan penetrates into territory of the Republic of Tajikistan from the Northwestern part. The period of penetration of this air mass occurs mainly for the period December - January. Therefore, it can be assumed that the air mass from the Republic of Kazakhstan is the reason for the formation of a sufficient layer of snow cover on the cold semiarid climate zone (figure 5).

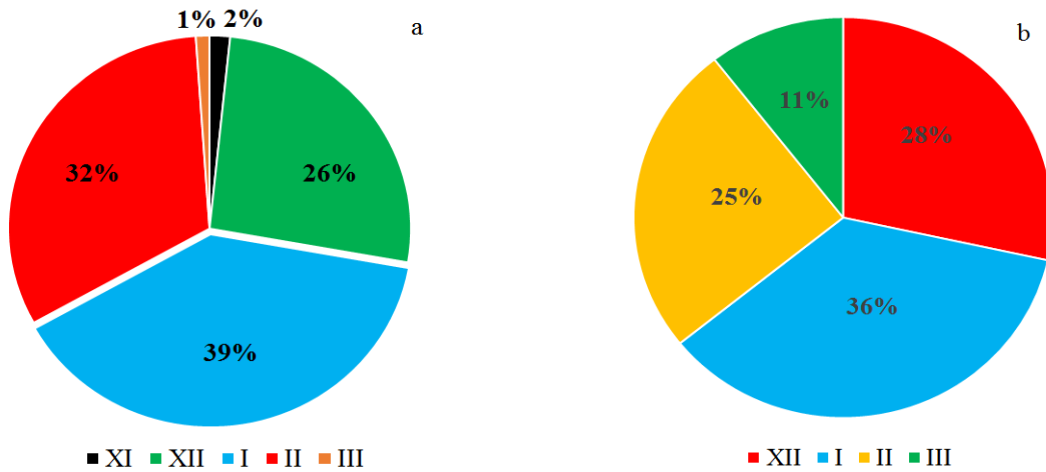


Figure 5 – Long-term average annual value of snow cover by meteorological stations: Khumrogi (a) and Penjikent (b)

The snow cover formation by climatic zones is more clearly illustrated by the example of cold semi-arid (Penjikent), warm continental (Khorog) and dry cold climatic zones (Shaimak) is shown in figure 6. From a comparison of the histograms in Fig. 6, the functional dependence of the snow cover height on the degree of penetration of air masses and the orography of climatic zones becomes apparent.

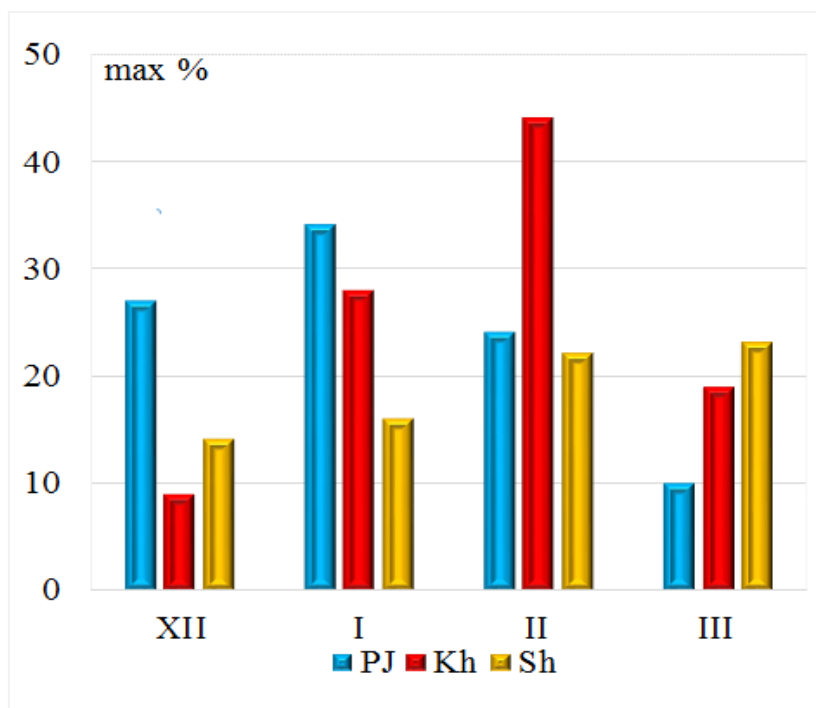


Figure 6 – Long-term average annual value of snow cover by climatic zones Penjikent (PJ), Khorog (Kh) and Shaimak (Sh)

Thus, it can be assumed that the penetration of the predominant part of air masses into the climate zones of the Republic of Tajikistan occurs in the area between 38°07' N 70°07'E and 37°49'N 71°54'E. The Gissar ridge will act as a barrier due to which air masses losing a fair share of moisture reach the cold semi-arid climate zone weakened. This pattern is observed also at air masses move to the Eastern part of the Pamir (figure 7).

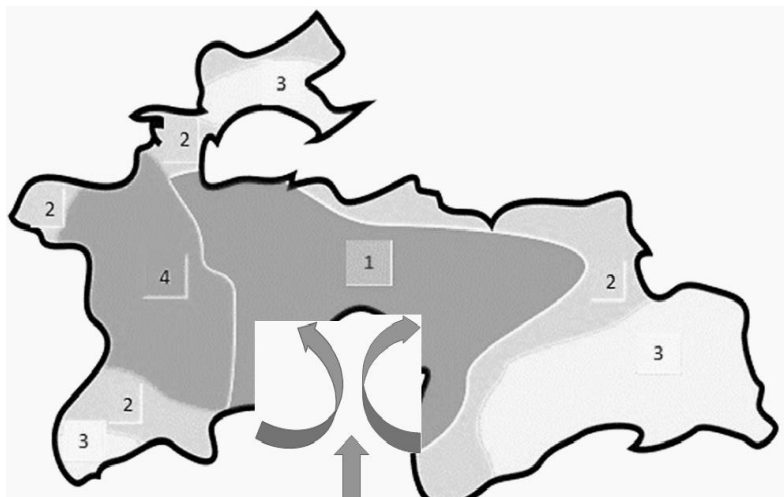


Figure 7 – The air mass penetration scheme to the territory of the Republic of Tajikistan

Conclusion. The heterogeneity spatial distribution of atmospheric precipitation and snow cover on the Pamir climatic zones - due to the orography of the mountainous terrain and the peculiarity of air masses promotion was observed. The Southwestern climate zone is characterized by more abundant precipitation than the Eastern climate zone. It is assumed that the duration of snow cover preservation is determined by the temperature regime of the area.

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ПЯНДЖ ТРАНСШЕКАРАЛЫҚ ӨЗЕНІ БАССЕЙІНІНІҢ КЛИМАТТЫҚ АЙМАҚТАРЫ БОЙЫНША ҚАР ЖАМЫЛҒЫСЫН БӨЛУ

Аннотация. Климаттың өзгеруі мен жаһандық температуралардың артуына қарай, экожүйенің басқа компоненттерімен қатар, қар-мұз ресурстарының қорлары елеулі өзгерістерге және тозуға ұшырайды. Соңғы онжылдықтардың мониторингі қар жамылғысының алаңы айтарлықтай азайғанын көрсетеді. Қардың жиналуы, әдетте орографиялық әсерден туындаған төмен температуралардың аралас әсерінен және жауын-шашынның жоғары түсу жиілігіне байланысты биіктіктің жоғарылауымен артады. Жүйелі мониторинг жүргізу және қардың тереңдігі туралы деректерді жинау, ең алдымен, қар туралы таратылған деректердің үлкен қажеттілігімен байланысты. Ең бастысы, қардың су баламасы туралы деректермен байланысты, олар көптеген мүдделі тараптар үшін маңызды болғандықтан, еріген сулардың ағынын болжайтын гидрологиялық үлгілердің жаңа буыны үшін кіру деректері ретінде пайдаланылуы мүмкін.

Орталық Азияның климаттық жағдайларының алуан түрлілігі, аймақтың географиялық және геоэкологиялық ерекшеліктеріне байланысты метеорологиялық процестердің өзгеру заңдылықтарын табу климаттық аудандастыру қажеттігінен туындады. Памир ылғалды, суық Жерорта теңізіндегі жауын-шашын құрғақ ортаазиялық аймаққа ауысатын аймақ ретінде қарастырылады.

Тәжікстан Республикасының аумағы төрт климаттық зонамен сипатталады. Өз кезегінде, тау-Бадахшан автономды облысы (ГБАО), барлық дерлік тау-кен Памирін алып, Орталық Азия аймағындағы трансшекаралық өзеннің негізгі ағынының бірі – Пяндж трансшекаралық өзенін қалыптастыру аймағы.

Таулы жерлердің климаттың өзгеруіне ерекше сезімталдығын ескере отырып, трансшекаралық өзендердің жоғарғы сағаларында қар-мұз және су ресурстарының жай-күйін және олардың өзгеру серпінін анықтау бойынша кешенді зерттеулер жүргізу перспективасы болашақта өзендердің төменгі сағаларында сумен қамтамасыз ету дәрежесін болжау тұрғысынан өзекті болып табылады.

Осы жұмыстың зерттеу объектісі – Оңтүстік және Батыс, Орталық және Шығыс Памирдің климаттық аймақтары.

Жұмыстың мақсаты – Пяндж өзені бассейнінің климаттық аймақтары бойынша қар жамылғысының қалыптасу процестерін зерттеу және Памир өзен жүйелерінің қалыптасу аймағында ауа массаларының ену аймағын анықтау.

Памирдің түрлі климаттық аймақтарында қар жамылғысының жоғары қабатының пайда болуы жылдың әртүрлі кезеңдеріне сәйкес келеді. Алайда қар жамылғысының ең жоғары биіктігі мен климаттық жағдайлар арасындағы өзара белгілі бір байланыс анықталады. Памирдің жылы континенталды климаттық аймағында қар жамылғысының жеткілікті биіктігінің қалыптасуы ақпан айында, суық жартылай ауарайы аймағында желтоқсан айында орын алады. Құрғақ суық климаттық аймақта орналасқан Бұлункул мен Шаймакада қардың жеткілікті қабаты наурыз айында пайда болады. Памир биік тауының климаттық аймақтарында қар жамылғысының қалыптасуындағы алуан түрлілік, ең алдымен, ауа массаларының таралуына жергілікті жердің орографиясының әсерімен байланысты.

Суық жартылай құрғақ (Пенджикент), құрғақ суық (Шаймақ) және жылы континенталды (Хорог) климаттық аймақтарда қар жамылғысының максималды мәні тиісінше қаңтарда, наурызда және ақпанда қалыптасатыны анықталды.

Жылы континенталды климат – Ирхт аймағында орналасқан метеостанцияда қар жамылғысының ең жоғары биіктігі ақпан айында, ал желтоқсан айында Пенджикентпен салыстырғанда, құрғақ суық климат аймағындағы Пенджикент сияқты орналасқан Ишкочим метеостанциясында қалыптасатыны анықталды.

Ауа массаларының басым бөлігінің Тәжікстан Республикасының климаттық аймақтарына енуі $38^{\circ}07'N$ $70^{\circ}07'E$ және $37^{\circ}49'N$ $71^{\circ}54'E$ арасындағы ауданда болып отыр. Бұл заңдылық Памирдің шығыс бөлігіне ауа массаларының қозғалысы кезінде де байқалады.

Түйін сөздер: Таулы Памир, Пяндж өзенінің бассейні, қар жамылғысы, климаттық аймақ, жауын-шашын.

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РАСПРЕДЕЛЕНИЕ СНЕЖНОГО ПОКРОВА ПО КЛИМАТИЧЕСКИМ ЗОНАМ БАСЕЙНА ТРАНСГРАНИЧНОЙ РЕКИ ПЯНДЖ

Аннотация. По мере нарастания изменения климата и повышения глобальных температур, наряду с остальными компонентами экосистемы, запасы снежно-ледовых ресурсов подвергаются существенным изменениям и деградациям. Мониторинг последних десятилетий показывает, что площади снежного покрова существенно уменьшаются. Накопление снега, как правило, увеличивается с повышением высоты из-за комбинированного воздействия преобладающих низких температур и повышенной частоты выпадения осадков, вызванных орографическими эффектами. Проведение систематического мониторинга и сбор данных о глубине снега, прежде всего, обусловлено большой потребностью в распределенных данных о снеге, главным образом, для данных о водном эквиваленте снега, так как они важны для многих заинтересованных сторон, например, они могут быть использованы в качестве входных данных для нового поколения гидрологических моделей, предсказывающих сток талых вод.

Разнообразие климатических условий Центральной Азии, нахождение закономерностей изменения метеорологических процессов в зависимости от географических и геоэкологических особенностей региона обусловили необходимость климатического районирования. Памир рассматривается как область, где происходит смена влажных, холодных средиземноморских осадков на сухие среднеазиатские.

Территория Республики Таджикистан характеризуется четырьмя климатическими зонами. В свою очередь, Горно-Бадахшанская автономная область (ГБАО), занимающая почти весь горный Памир и являющаяся зоной формирования трансграничной реки Пяндж – одной из главных притоков трансграничной реки региона Центральной Азии Амударья.

Учитывая особую чувствительность горных местностей к изменениям климата проведения комплексных исследований по определению состояния снежно-ледовых и водных ресурсов на верховьях трансграничных рек и динамики их изменения является актуальной с точки зрения предсказания степени водообеспеченности низовий рек в перспективном будущем.

Объектом исследования настоящей работы являются климатические зоны Южного и Западного, Центрального и Восточного Памира.

Целью работы является исследование процессов формирования снежного покрова по климатическим зонам бассейна реки Пяндж и определение зоны проникновения воздушных масс в зоне формирования речных систем Памира.

Установлено, что в разных климатических зонах Памира образование высоких слоев снежного покрова соответствует разным временам года. Однако обнаруживается определенная взаимосвязь между периодами с максимальной высотой снежного покрова и климатическими условиями. Обнаружено, что в теплой континентальной климатической зоне Памира формирование достаточной высоты снежного покрова происходит в феврале, в холодной полуаридной климатической зоне в декабре месяце. На Булункуле и Шаймаке, расположенных в сухой холодной климатической зоне, образование достаточного слоя снега происходит в март месяце. Предполагается, что разнообразие в формировании снежного покрова в климатических зонах высокогорья Памира, прежде всего, обусловлено влиянием орографии местности на распространении воздушных масс.

Обнаружено, что максимальное значение снежного покрова в холодных полусухих (Пенджикент), сухих холодных (Шаймак) и теплых континентальных (Хорог) климатических зонах формируется в январе, марте и феврале соответственно. На метеостанции, расположенной в зоне теплого континентального климата – Ирхт, максимальная высота снежного покрова формируется в феврале, а на метеостанции Ишкошим, расположенной так же, как и Пенджикент в зоне сухого холодного климата, в отличие от Пенджикента – в декабре. Указано, что проникновение преобладающей части воздушных масс в климатические зоны Республики Таджикистан происходит в районе между 38°07'N 70°07'E и 37°49'N 71°54'E. Гиссарский хребет будет выступать в качестве барьера, за счет которого воздушные массы, теряя изрядную долю влаги, достигают ослабленной холодной полусухой климатической зоны. Эта закономерность наблюдается также при движении воздушных масс в восточную часть Памира.

Ключевые слова: Горный Памир, бассейн реки Пяндж, снежный покров, климатическая зона, осадки.

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HYDROLOGY OF THE VANCH RIVER THE TRIBUTARY OF THE TRANSBOUNDARY PYANJ RIVER UNDER CLIMATE CHANGE

Abstract. For the period 1958-2018, the atmospheric precipitation in the Vanch river basin remained almost unchanged, due to the free penetration of wet masses of Mediterranean and Caucasian cyclones and the relatively weak influence of orography of the mountainous area. The average annual temperature of the considered period is characterized by weak increases of $3 \cdot 10^{-3}$ °C/year. The effect of climate change on river runoff was determined by comparing their values in the two periods 1940-1970 and 1986-2016, which showed a significant increase for the period 1986-2018. The Vanch river hydrograph in the corresponding periods showed the shift of maximum runoff value to the left, which indicates an early period of melting of the snow cover and glaciers on the river upstream.

Keywords: Mountain Pamir, Pyanj river basin, snow, runoff, orography, Vanch river, climate, hydrograph.

Introduction. The modern stage of the development of mankind proceeds in the face of constant challenges caused by global climate changes that make significant changes to the functioning of ecosystem components. Now all the efforts of human thought are aimed at developing mechanisms to mitigate the negative impacts and consequences of climate change and to adapt the entire sphere of activity to its cataclysms.

Climate change has become the greatest danger of the 21st century. Climate change manifests itself in the form of irregularities and disturbances in the climate cycle because of an increase in the temperature of the Earth due to global warming. Meteorological observations confirm that between two 30-year control periods of 1942-1972 and 1973-2003, surface temperatures in Central Asia increased by 0,65 °C. The serious effects of climate change have already begun to manifest, and the latest example of this is that 2016 has overtaken 2015; It was the warmest year in history. According to the analysis of the World Meteorological Organization (WMO) of the United Nations Climate Agency, the average global temperature in 2016 was 1.1 °C above the previous period [1].

Among all the components of the ecosystem, the mountain ecosystem is the most vulnerable and particularly sensitive to climate change. The current trend in the development of natural phenomena (climate warming, emergency situations, etc.) is of particular concern to mountain countries and stimulates the adoption of drastic measures to mitigate the effects of climate change.

For example, by the Decree of the Government of the Republic of Tajikistan dated May 3, 2010 No. 209, for the continuous monitoring and study of glaciers in Tajikistan, the State Program for the Study and Preservation of Glaciers of the Republic of Tajikistan for 2010-2030 was approved. The need to approve such a program is justified by the fact that despite the small area (slightly more than 10% of the total area of Central Asia), Tajikistan has more than 11,000 km² of glaciation area, occupied by more than 14 thousand glaciers and forms more than 65% of the region's water resources. The main glaciation zone of the republic is in the Pamirs with a total area of 8500 km² [2].

The problems of water and the consequences of global climate change are relevant and priority now for Central Asia for stimulating scientific, applied, technical, and economic research. The problem of water availability in various sectors of the economy and population has been felt since 60-70 years of the 20th century and manifestations of water scarcity has led to the concept of water security. Since then, the attention of scientists and international communities to the water problem has increased rapidly. In the last decade, studies have been conducted simultaneously on more than 50 international programs, directly or indirectly aimed at solving water security problems [3].

Water resources in the Aral Sea Basin, whose territory belongs to five states former republics of USSR in Central Asia, are mostly used for irrigation and hydropower engineering. These water users require river runoff to be regulated with different regimes. The aim of the hydropower engineering is the largest production and, accordingly, the utilization of the major portion of annual runoff of rivers in the winter, the coldest season of the year. Irrigation requires the largest volume to be available in the summer, during the vegetation period. River runoff regulation is exercised by large reservoirs, which, along with hydropower stations are operated as part of complex-purpose hydrochemes. The largest hydropower stations have been constructed in the republics of the runoff formation zone in the upper reaches of the Amudarya and Syrdarya rivers – in Kyrgyzstan and Tajikistan, while the major land areas to be irrigated are concentrated in the republics in the lower reaches of the rivers-Kazakhstan, Turkmenistan and Uzbekistan. The problems of water resources use and appropriate river runoff regulation were solved in the USSR by administrative-command methods, based on nationwide interests. The situation has radically changed after collapse of the Soviet Union and the formation of five independent states in Central Asia. The conflict of interests between hydropower engineering and irrigated farming has become evident and acquired transnational significance [4].

The total surface runoff resources in the Aral Sea Basin in the average water content year are no more than 148.5 km³/year (116.5 km³/year is natural river runoff) and about 32.0-33.0 km³/year is return water. Taking into account non-productive water losses, these resources do not exceed 125.0-133.0 km³/year [5]. Natural flow resources in the Aral Sea Basin are completely exhausted and the region's economy is developing in conditions of increasing water scarcity. Their total use already is 130-150 % in the Syr Darya basin and 100-110 % in the Amu Darya basin [6,7].

Mountain watersheds serve as important water sources by providing fresh water for downstream human activities [8,9].

As a result of snow and glacier melt, the magnitude and timing of runoff from these watersheds tend to be very sensitive to changes in the climate [10,11]. Changes of melt runoff may even affect the sustainable development of downstream cities in the long run [12,13]. Geographic areas where the water cycle is dominated by snow and glacier melt hydrology are expected to be more susceptible to climate change as it affects the seasonality of runoff [14]. Changes in seasonal snow covered and glaciated regions may alter the variability of stream flow and hence water availability that sustains a large population downstream. Despite its regional importance, there is uncertainty associated with the rates and magnitude of climate change impacts on snow cover and snow and glacier melt hydrology. These climate driven responses of mountainous river hydrology when combined with potential land cover changes, population growth, and already stressed water resources may pose significant challenges for this region. Regional climate projections by IPCC (2007) indicate Central Asia to be warmed by a median temperature of 3.7°C by the end of the 21st century, with largest warming over higher altitudes particularly in the Tibetan Plateau and the Himalayas [15].

In the Amu Darya and Syr Darya basins, meltwater resources contribute 69% and 79%, respectively, to mean annual streamflow, and the share of seasonal snowmelt by far outweighs that of glaciers.

According to the forecast data of the Scientific Information Center of the Interstate Coordination Water Commission of the Central Asia (SIC ICWC) in the middle of XXI the water deficit in the countries of the Amu Darya basin will be 8-11 km³ including a decrease in runoff from climate change in 1.5-3 km³. At population growth rate of 320 Th. people, water demand will increase by 2.5 km³ and economic growth will require 1.5 km³ of water. Due to the melting of glaciers, the water content of transboundary Amu Darya and Syr Darya to decrease by 12-15% by the middle of the century. For the past 35 years, water supply per capita in the Aral Sea basin has decreased from 4.500 m³ per year to 2.150 m³. Nevertheless, the countries of Central Asia occupy the leading places in the world in terms of water consumption per capita [10].

Planning the development of agriculture and the hydropower industry in the region is largely dependent on the current state and prospects of the water resources of the formation zone.

The results of studies on the establishment of the climate-forming role of Pamir, as well as significant differences in its climatic zones, are widely presented in the work [16] on the example of snow cover formation and atmospheric precipitation on the upper parts of the Transboundary River Pyanj of Central Asia. It has been found that the formation of snow cover and the spatial distribution of atmospheric precipitation in mountain Pamir is determined by the orography of the terrain.

On the border of the Southern and Central Pamir zones, the vertical gradient is about 40 mm for every 100 m of height, which indicates foothills that are more humid and the existence of wide basins that have an open exit to the West, to meet the wet air flows. As the air current moves deeper into the mountain area and passes through the ridges, the moist air converts moisture and becomes dry [16].

The average annual amount of atmospheric precipitation in the Eastern Pamir is insignificant and varies between 40-140 mm with an average long-term value of about 76 mm [17]. The lack of precipitation in the Eastern Pamir is due to that in the Western Pamir which is characterized by high mountain ranges (5000-6000 m a. s. l.) moist air is discharged with heavy precipitation, and the air that passes through the ridges of the Western Pamir becomes dry [18].

Objects and Methodology. The object of research is Vanch river Basin. The meteorological and hydrological data presented by the Agency for Hydrometeorology of Tajikistan were used. Statistical data processing to determine the trend of changes in meteorological and hydrological parameters and Vanch river hydrograph was used.

Hydrology of the Vanch river of the tributary of the Transboundary Pyanj river. The penetration of air masses from the Mediterranean and Caspian seas is also characteristic of the Vanch River basin. The Vanch River is one of the tributaries of the transboundary Pyanj River that is formed after the confluence of equivalent rivers Kasholyakh and Abdukahor (figure 1).

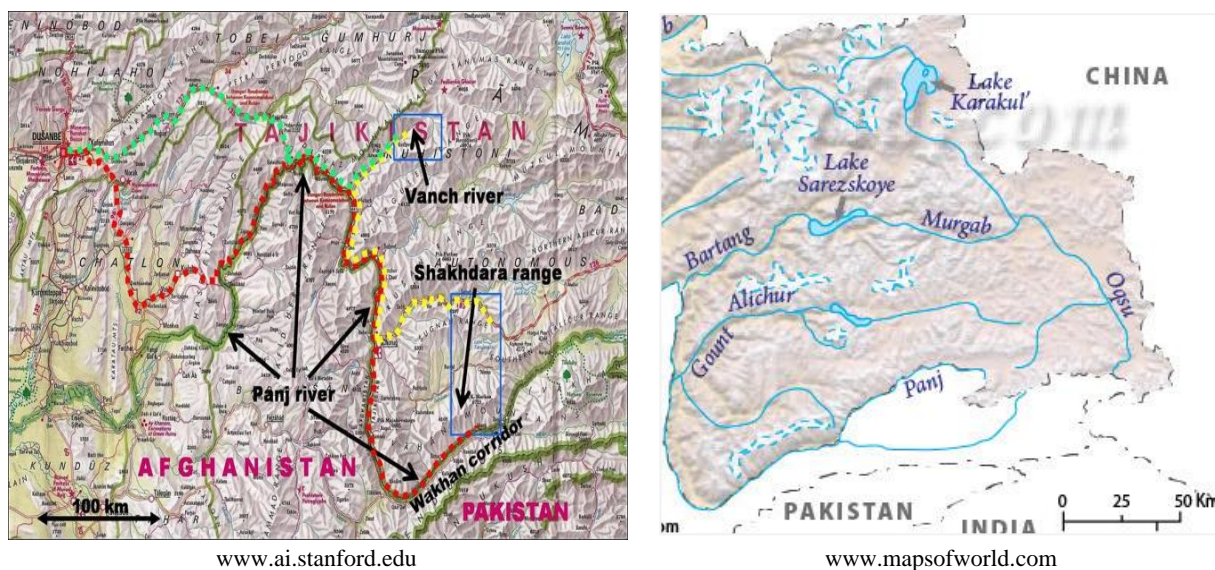


Figure 1 – Maps of Pyanj river basin

The Vanch is a representative of river arteries, in the formation of runoff of which an important place is played groundwater, dictated by the geological structure and distribution in the basin of permeable rocks. Measurements carried out in 1965 showed that the annual runoff module in the basin of the Geographical society glacier on the upstream of Vanch River (basin area 206 km, the share of glacial runoff 62%) is $15-60 \text{ l/km}^2 \cdot \text{sec}$. In the Abdukahor river basin on the upstream of Vanch river (the basin area is 329 km, the share of glacial runoff is 42%) $28.4 \text{ l/km}^2 \cdot \text{sec}$ [19]. The general tendency reduction of glaciers in Central Asia in the last century also covered the glaciers of the Vanch river basin. The processing of satellite images LANDSAT ETM + and TERRA (ASTER) allowed the authors [20,21] to establish that the glacier area of the Vanch river basin for the period 1961-2000 decreased by 23.4% and throughout the basin of the transboundary Pyanj river by 32.7%.

The average annual runoff of the Vanch river in relation to the long-term for the period 1940-2018 is present on the figure 2a.

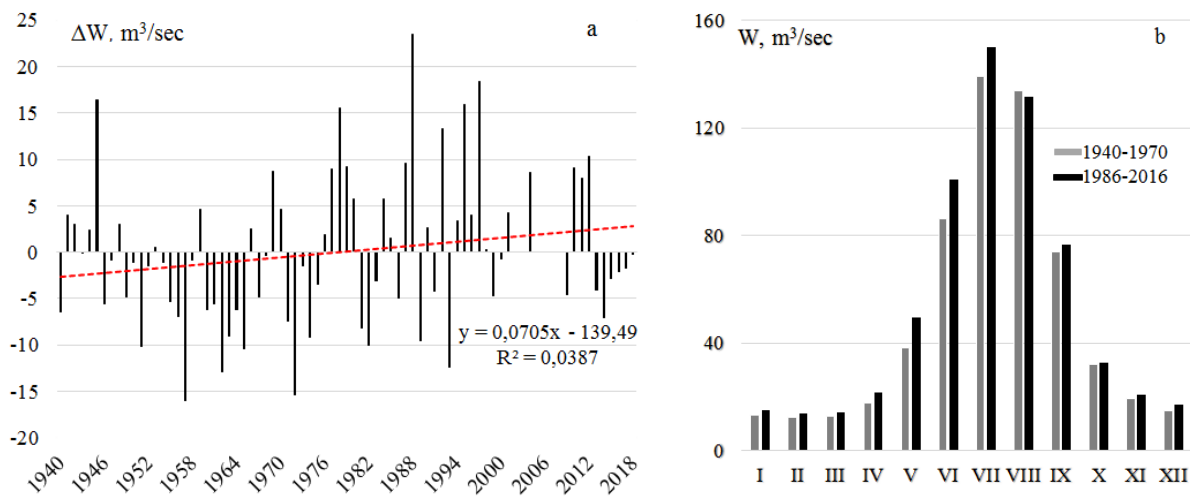


Figure 2 – The runoff (a) and hydrograph (b) of the Vanch river in relation to the long-term for the period 1940-2018

The period is characterized by an increasing trend of river flow. In order to determine the influence of the climatic factor on the hydrological regime of the Vanch River a comparison of the dynamics of changes in the water flow of the river was made for the periods 1940-1970 and 1986-2018 (figure 2b). The hydrograph of the river for two periods (1940-1970, 1986-2018) presented on the figure 2b. It can see that the average monthly value of the water flow of the Vanch River for the period 1986-2018 exceeds the analogous values of the period 1940-1970. The nature change of river runoff in two periods indicates about the impact of climate change on the state of the ice-snow reserves of the basin on the river upstream. If take into account the low temperature changes ($3 \cdot 10^{-3} \text{ }^\circ\text{C/year}$) for considered period, as can be seen from figure 3a and the almost constant value of atmospheric precipitation (figure 3b) then what factors contribute to the positive development trend of the river runoff.

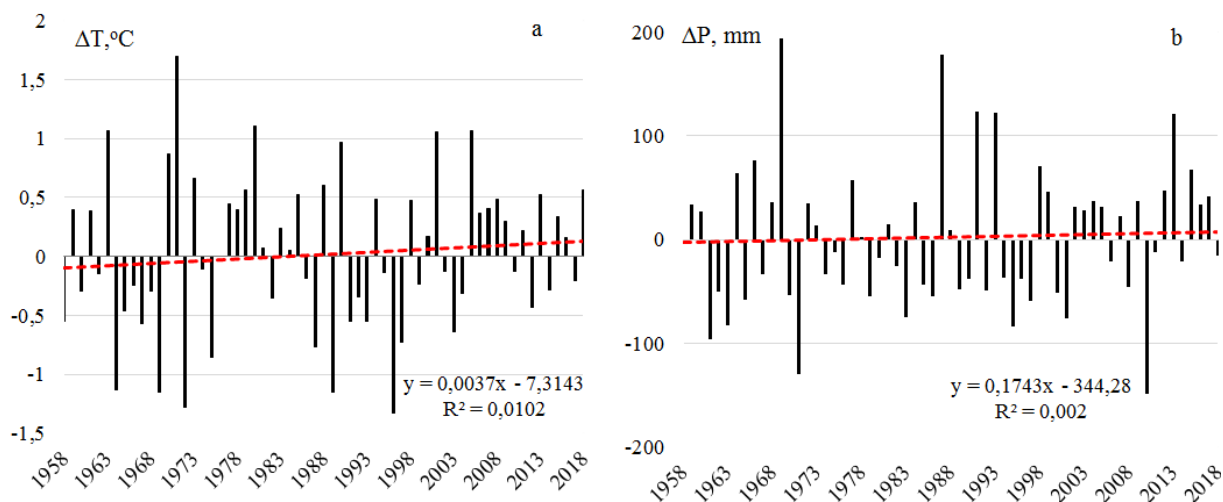


Figure 3 – A change of temperature (a) and atmospheric precipitation (b) in relation to the long-term value in the Vanch river basin for the period 1956-2018

To receive an answer to this question the Vanch river hydrograph make up in the form shown on the figure 4a. As can see from the figure 4a the maximum of the hydrograph of the Vanch river for the period 1986-2018 is shifted to the left. Therefore, the maximum value of the water runoff is observed earlier than

the corresponding value of the period 1940-1970. The observed phenomenon can be explained in the framework of the assumption that the source of the river (glacier) is subject to degradation as a result of warming and is not a dense but loosened structure. For such structures, a small impact is sufficient to effect an aggregate transformation. Based on the obtained results it can be concluded that the glacial area of the Vanch river upstream is subject to a significant reduction. In order to establish the type of supply of the Vanch river it is sufficient to look to the figure 4b.

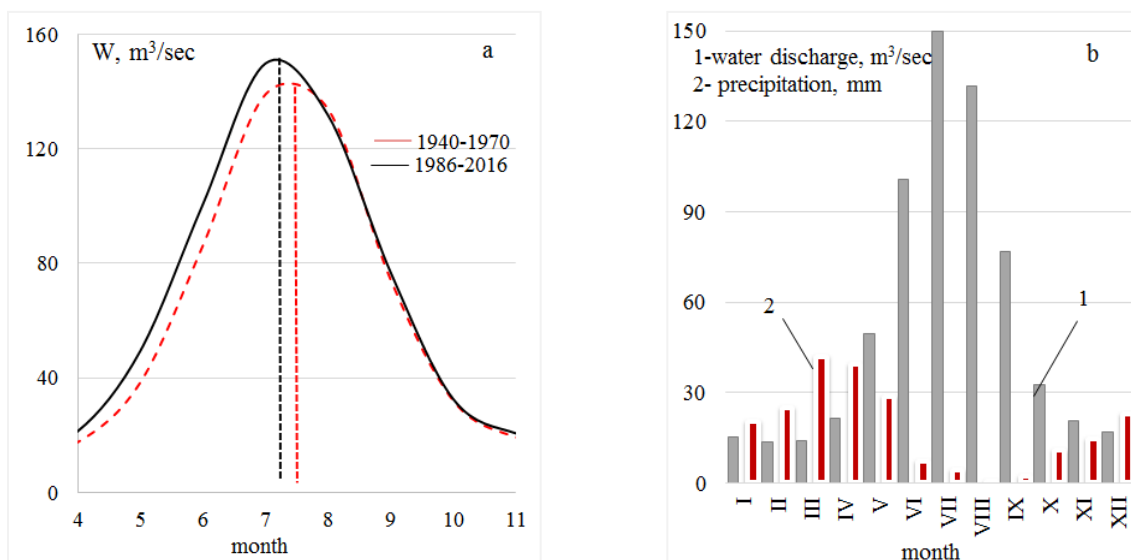


Figure 4 – Hydrograph of the Vanch river for the period 1940 -1970 (1), 1986-2018 (2) (a) and the average monthly discharge values of the Vanch river and atmospheric precipitation for the period 1940-2018 (b)

As can be seen from figure 4b, the maximum amount of precipitation in the Vanch river basin is March-April but the maximum runoff of the river is July. This means that the Vanch river is characterized by glacier feeding. Naturally, the contribution of seasonal snows to the formation of the river's water flow is not excluded. The value of water flow observing on the figure 4b indicates the predominance of the glacial feeding of the river.

Conclusion. It has been established that in the Vanch River basin, the inflow of the transboundary Pyanj River the precipitation for the period 1956-2018 remained almost constant although the temperature trend was characterized by a slight increase. Comparison river runoff in the two periods 1940-1970 and 1986-2018 was showed a significant increase for last period. The Vanch river hydrograph in the corresponding periods showed the shift of maximum runoff value to the left, which indicates an early period of melting of the snow cover and glaciers on the river upstream.

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КЛИМАТТЫҢ ӨЗГЕРУІ ЖАҒДАЙЫНДАҒЫ ТРАНСШЕКАРАЛЫҚ ПЯНДЖ ӨЗЕНІ АҒЫСЫ ВАНЧ ӨЗЕНІНІҢ ГИДРОЛОГИЯСЫ

Аннотация. Су ресурстарының проблемалары және климаттың жаһандық өзгеру салдарлары ғылыми, қолданбалы, техникалық және экономикалық зерттеулерді ынталандыру тұрғысынан қазіргі уақытта Орталық Азия үшін өзекті болып отыр. Экономиканың түрлі салалары мен халықты сумен қамтамасыз ету проблемасы ХХ ғасырдың 60, 70-жылдарынан бері сезіледі, ал су тапшылығының пайда болуы су қауіпсіздігі тұжырымдамасының пайда болуына алып келді. Содан бері ғалымдар мен халықаралық қоғамдастықтың су проблемасына деген қызығушылығы қарқынды түрде өсті. Соңғы онжылдықта

зерттеулер су қауіпсіздігі проблемаларын шешуге тікелей немесе жанама бағытталған 50-ден астам халықаралық бағдарламалар бойынша бір мезгілде жүргізілді. Өңірде ауыл шаруашылығы мен гидроэнергетиканы дамытуды жоспарлау көп жағдайда қалыптастыру аймағының су ресурстарының ағымдағы жағдайы мен даму перспективасына байланысты.

Демек, Орталық Азияның трансшекаралық өзендері жоғарғы су-мұз ресурстарының жай-күйін жүйелі түрде зерттеу және жаһандық жылыну жағдайындағы сипаттарын анықтау да, сөзсіз, өзекті болып отыр.

Жұмыстың зерттеу объектісі – Пяндж трансшекаралық өзені ағынының бірі – Ванч өзенінің бассейні.

Ванч өзенінің гидрологиялық режиміне климаттық фактордың әсерін анықтау мақсатында 1940-1970 және 1986-2018 жылдары өзеннің су ағысының өзгеру серпінін салыстыру жүргізілді. Егер қарастырылып отырған кезеңде температураның төмен өзгеруін ($3 \cdot 10^{-3}$ °C/жыл) ескеретін болса, онда атмосфералық жауын-шашынның іс жүзінде тұрақты шамасы кезінде қандай факторлар өзен ағынының оң даму үрдістеріне ықпал ететіні аныкталады.

1940-1970 жылдары және 1986-2018 жылдары Өзен гидрографының құрылысымен 1986-2018 жылдары Өзен гидрографының максимумының солға ығысуы анықталды. Байқалатын құбылысты өзеннің көзі (мұздақ) жылыну нәтижесінде тозуға ұшырайды және тығыз емес, жыртылған құрылымды білдіреді деген болжам шеңберінде түсіндіруге болады. Мұндай құрылымдар үшін агрегаттық түрлендіруді жасау аз әсер етеді. Алынған нәтижелер негізінде Ванч өзенінің мұз айдыны ағыс бойынша айтарлықтай қысқаруға ұшырайды деген қорытынды жасалды.

Осылайша, Ванч өзенінің бассейнінде Пяндж трансшекаралық өзені ағынының 1956-2018 жж. аралығындағы атмосфералық жауын-шашыны тұрақты болды, бірақ температуралық тренд аздаған өсумен сипатталды. Өзен ағынын салыстыру екі кезеңде – 1940-1970 және 1986-2018 жылдары жүргізілді

Түйін сөздер: Памир тауы, Пяндж өзені бассейні, қар, ағыс, орография, өзен Ванч, климат, гидрограф.

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ГИДРОЛОГИЯ РЕКИ ВАНЧ ПРИТОКА ТРАНСГРАНИЧНОЙ РЕКИ ПЯНДЖ В УСЛОВИЯХ ИЗМЕНЕНИЯ КЛИМАТА

Аннотация. Проблемы водных ресурсов и последствий глобального изменения климата являются актуальными и приоритетными в настоящее время для Центральной Азии с точки зрения стимулирования научных, прикладных, технических и экономических исследований. Проблема водообеспеченности различных отраслей экономики и населения ощущается с 60-70-х годов XX века, а проявления дефицита воды привели к появлению концепции водной безопасности. С тех пор внимание ученых и международного сообщества к водной проблеме стремительно возросло. В последнее десятилетие исследования проводились одновременно по более чем 50 международным программам, прямо или косвенно направленным на решение проблем водной безопасности. Планирование развития сельского хозяйства и гидроэнергетики в регионе во многом зависит от текущего состояния и перспектив развития водных ресурсов зоны формирования.

Следовательно, систематическое изучение состояния водно-ледовых ресурсов верховья трансграничных рек Центральной Азии и их поведение в условиях глобального потепления, несомненно, является актуальной.

Объектом исследования настоящей работы был бассейн реки Ванч – одной из притоков трансграничной реки Пяндж.

С целью определения влияния климатического фактора на гидрологический режим реки Ванч проведено сравнение динамики изменения водного стока реки за периоды 1940-1970 и 1986-2018 гг. Установлено, что среднемесячное значение стока воды реки Ванч за период 1986-2018 гг. превышает аналогичные значения периода 1940-1970 гг. Изменение характера речного стока в два периода свидетельствует о влиянии климатических изменений на состояние ледово-снежных запасов бассейна реки выше по течению. Если учесть низкие изменения температуры ($3 \cdot 10^{-3}$ °C/год) за рассматриваемый период, то при практически постоянной величине атмосферных осадков такие факторы способствуют положительной тенденции развития речного стока. При составлении гидрографа реки за периоды 1940-1970 гг. и 1986-

2018 г. было обнаружено смещение максимума гидрографа реки за период 1986-2016 гг. влево, что указывает на ранний период таяния снежного покрова и ледников на реке выше по течению. Наблюдаемое явление можно объяснить в рамках предположения, что исток реки (ледник) подвержен деградации в результате потепления и представляет собой не плотную, а разрыхленную структуру. Для таких структур достаточно небольшого воздействия, чтобы произвести агрегатное преобразование. На основании полученных результатов был сделан вывод, что ледниковая площадь реки Ванч выше по течению подвержена значительному сокращению.

Таким образом, было установлено, что в бассейне реки Ванч – притока трансграничной реки Пяндж – атмосферные осадки за период 1956-2018 гг. оставались практически постоянными, хотя температурный тренд характеризовался незначительным повышением. Сравнение речного стока в два периода 1940-1970 и 1986-2018 гг. показало значительный рост за последний период.

Ключевые слова: Горный Памир, бассейн реки Пяндж, снег, Сток, орография, река Ванч, климат, гидрограф.

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GEV DISTRIBUTION AND PARAMETER ESTIMATION FOR VAN EARTHQUAKE DATA

Abstract. Probabilistic extreme value theory is an interesting and fascinating theory with a great variety of applications. In probability theory and statistics, this distribution is used to model extreme (maximum or minimum) observations. Generalized Extreme Value (GEV) distribution is frequently applied to forecast natural events such as floods, air pollution, extreme sea levels, hydrology, meteorology, climatology, insurance, finance, geology and seismology. In this study general information about Maximum Likelihood Estimation and Bayesian Inference were investigated using the parameter estimation methods. The application of the study was completed using earthquake data from Van provincial center in Turkey from 1995 to 2017. This data used the Maximum Likelihood Estimation and Bayesian Estimation methods in an attempt to predict the severity of earthquakes expected to occur in the future.

Key words: Generalized Extreme Value, GEV, Earthquake Estimation.

Introduction. This theory is applied to model the maximum or minimum distribution of a series of observations. Extreme value theory deals with probabilistic and statistical problems involving the maximum or minimum values of random variables. The theory attempts to answer questions about extreme distribution; for example, the possibility of the occurrence of a windspeed in a given place during a certain year or the possibility of a river exceeding a certain height, etc [1]. The distinguishing property of extreme value analysis is measurement of the stochastic behavior of a process at unlikely large or small levels. Especially, it attempts to estimate the probability of things that exceed the monitored values [2]. This distribution was developed as the largest of a set of values. It is first thought to have been applied to the estimation of flood levels and it was also applied to the estimation of the magnitude of earthquakes [3]. In addition, the distribution is applied in forecasting natural events such as floods, earthquakes, volcanic eruptions [4] global warming problems, offshore modeling, rainfall modeling, and wind speed modeling [5]; in engineering such as breaking strength of materials [6]; and in insurance and finance [7].

[8] and [9] state that the three types of extreme value distributions can be combined to form a formula like 1.1 for a single parametric family (GEV) with parameters μ , σ , and ξ .

$$G(x) = \exp \left[- \left\{ 1 + \xi \frac{(x-\mu)}{\sigma} \right\}_+^{1/\xi} \right] \quad (1.1)$$

The GEV family of distributions can be classified as Gumbel (type I), Fréchet (type II) and reverse-Weibull (type III) [10]. Gumbel distribution is a special case within the GEV distributions (Fisher-Tippett distributions). In addition, the Gumbel distribution is also a member of the Gompertz–Verhulst (GV) family of distributions [11,12]. Although these three types of EV distributions are used for sample maxima, reverse-Gumbel, reverse-Fréchet, and Weibull distributions are used for modeling sample minima. Gumbel distribution is a transitional form between the Fréchet and the inverse-Weibull distributions. The GEV distribution is an irregular one which means that the distribution depends on the parameters [13].

The GEV distribution has three parameters; $-\infty < \mu < +\infty$ and $\sigma > 0$ are location and scale parameters, while ξ is a shape parameter $-\infty < \xi < +\infty$. The ξ value determines the type of GEV distribution. $\xi \rightarrow 0$ corresponds to Fréchet distribution with $\alpha = 1/\xi$, $\xi < 0$ corresponds to Weibull distribution with $\alpha = -1/\xi$, and $\xi \rightarrow 0$ corresponds to Gumbel distribution [1,2,9,14].

Provided that for $i=1,2,\dots,n$

$$z = 1 + \left(\frac{x-\mu}{\sigma}\right)\xi > 0 \quad (1.2)$$

the probability density function (pdf) is given by

$$g(x; \mu, \sigma, \xi) = \begin{cases} \sigma^{-1} \left(1 + \xi \left(\frac{x-\mu}{\sigma}\right)\right)^{-\left(\frac{1}{\xi}+1\right)} \exp\left[-\left(1 + \xi \left(\frac{x-\mu}{\sigma}\right)\right)^{-\frac{1}{\xi}}\right], & \xi \neq 0 \\ \sigma^{-1} \exp\left[-\left(\frac{x-\mu}{\sigma}\right) \exp\left(-\left(\frac{x-\mu}{\sigma}\right)\right)\right] & , \xi \rightarrow 0 \end{cases} \quad (1.3)$$

To model extremes in observational data, the ranges of observations of n length must form a block. Most of the time, these blocks are chosen as annual time periods. An attempt is made to predict the expected maximum numbers occurring after k years taking z_p (recurrence period) with the aid of equation (1.4) with $p = 1/k$ and $p \in [0,1]$ [1,2,15].

$$z_p = \begin{cases} \mu - \frac{\sigma}{\xi} [1 - \{-\log(1-p)\}^{-\xi}] & , \xi \neq 0 \\ \mu - \sigma \log\{-\log(1-p)\} & , \xi = 0 \end{cases} \quad (1.4)$$

Earthquakes occurred with magnitude 7.0 in Van-Erciş county in September 1941, with magnitude 7.3 in Van-Muradiye county in November 1976 and with magnitude 7.2 in Van-Erciş county in October 2011 [16]. These earthquakes occurred nearly every 30-35 years, and it is thought that generalized extreme value distribution may provide an answer to the question of what is the highest magnitude earthquake that will occur in Van province in future years.

Estimating the location and time of earthquakes with maximum magnitude is a topic that makes assessment of seismic risk parameters difficult. The extreme value statistics developed by Gumbel provide an appropriate method to estimate the frequency and recurrence intervals of naturally occurring events [17].

Generally, for earthquake prediction methods the $\log(N) = a - bM$ equation developed by Gutenberg-Richter in 1956 is used. This equation estimates using the total number of earthquakes occurring within one year. However, in this study instead of using Gutenberg-Richter's recommended equation, an attempt is made to predict the expected earthquake magnitude for future years by taking the highest earthquake magnitudes (xM) occurring in Van province in Turkey during 23 years. This is similar to studies by [2] about "annual maximum sea levels", [18] about national data buoy center (NDBC) using 21-year wave height (Hs), De Paola et al [19] about precipitation data from Dar Esamam and Addis Ababa, and Gilleland et al. [15] about excessive ozone amounts observed in 184 days from 72 stations in North Carolina.

Parameter estimation. GEV distribution is as follows: the random variable $x_i, i = 1, \dots, n$, $F = \{f(x; \theta): \theta \in \Theta\}$ The GEV distribution, with μ, σ and ξ parameters, is denoted as in equation 1.1. A wide variety of parameter estimation techniques are available but, in this section, we chose to use MLE and Bayesian inference for estimation of GEV parameters.

A variety of techniques including graphical procedures, moment and probability-based estimators are recommended to predict extreme value models [20]. Each technique has its own positive and negative aspects. In this study, we chose to use MLE and Bayesian techniques.

1. Maximum Likelihood Estimation (MLE). MLE is a method that determines values for the parameters of a model. This method attempts to find the parameters reaching the highest levels of a probability function and is among the commonly used approaches. ML estimators are more effective when asymptotic. In some cases, MLE may remain irresolute (i.e., small sample estimators); in these cases, numerical methods like ML Newton-Raphson may be applied.

There are many reasons for using MLE for extreme value models. It is easy to numerically assess log-probability functions. Asymptotic theory ensures mere approaches for standard deviation and confidence intervals. Additionally, likelihood may be generalized to more complicated model structures [20].

Suppose x_1, x_2, \dots, x_n are i.i.d. observations with joint probability density function $f(x_1, x_2, \dots, x_n | \theta) = f(x_1 | \theta) \cdot f(x_2 | \theta) \dots f(x_n | \theta)$ is called the likelihood function, where $\theta = (\mu, \sigma, \xi)$ is a vector of unknown parameters. It is often more useful to work with the logarithm of the likelihood function, called the log-likelihood function:

$$L(\theta) = \text{Ln}(f(x_1, x_2, \dots, x_n | \theta)) = \sum_{i=1}^n \text{Ln}(f(x_i | \theta)).$$

The ML procedure can be used to estimate the GEV parameter θ with the likelihood function;

$$L(\mu, \sigma, \xi) = \frac{1}{\sigma^n} \prod_{i=1}^n \left[\left[1 + \xi \left(\frac{x_i - \mu}{\sigma} \right) \right]^{-\left(\frac{1}{\xi} + 1\right)} \exp \left[- \left[1 + \xi \left(\frac{x_i - \mu}{\sigma} \right) \right]^{\frac{-1}{\xi}} \right] \right] \quad (2.1)$$

when z (1.2) is violated, the likelihood is zero and the log-likelihood equals ∞ . GEV log-likelihood function can be written as

$$\text{Ln}(L) = -n \log \sigma - \left(\frac{1}{\xi} + 1 \right) \sum_{i=1}^n \log \left(1 + \xi \left(\frac{x_i - \mu}{\sigma} \right) \right) - \sum_{i=1}^n \left(1 + \xi \left(\frac{x_i - \mu}{\sigma} \right) \right)^{\frac{-1}{\xi}} \quad (2.2)$$

Then, by definition, MLE estimator $\hat{\theta} = (\hat{\mu}, \hat{\sigma}, \hat{\xi})$ for the unknown parameter θ , is obtained by bringing the first derivative to zero according to the $\text{Ln}L$ parameter. As used by Hosking et al. [21] and Martins and Stedinger [22] and Raynal-Villasenor [23] the MLE estimations for GEV are as follows:

$$\hat{\theta} = \text{argmax}_{\theta \in \Theta} L(\theta, X)$$

If we place this in Equation 1.2;

$$\begin{aligned} \frac{\partial \text{Ln}L}{\partial \mu} &= \frac{1}{\sigma} \sum_{i=1}^n \frac{\left(1 + \xi - z_i^{-1/\xi} \right)}{z_i} = 0 \\ \frac{\partial \text{Ln}L}{\partial \sigma} &= \frac{1}{\sigma} \left[-n + \sum_{i=1}^n \frac{\left(1 + \xi - z_i^{-1/\xi} \right)}{z_i} \left(\frac{x - \mu}{\sigma} \right) \right] = 0 \\ \frac{\partial \text{Ln}L}{\partial \xi} &= -\frac{1}{\xi^2} \sum_{i=1}^n \left[\ln(y_i) \left(1 + \xi - z_i^{-1/\xi} \right) - \frac{\left(1 + \xi - z_i^{-1/\xi} \right)}{z_i} \xi \left(\frac{x - \mu}{\sigma} \right) \right] = 0 \end{aligned} \quad (2.3)$$

Maximizing Eq. (2.3) according to the parameter $\hat{\theta}$ leads to the maximum likelihood estimate for the GEV distribution. Though this matrix can be analytically calculated, it is easier to use numerical differentiation techniques to complete secondary derivatives and inversion to assess standard numerical routines [2]. The Newton-Raphson algorithm is a powerful technique for solving equations numerically. It solves the likelihood equations $\partial L / \partial \theta$ by iteration. For detailed information see [21, 24, 25].

Taking θ_0 as the initial estimation value for the θ parameter vector, a Taylor series up to second order opens and if it corresponds to 0, the root of θ is obtained.

$$\theta = \theta_0 - \left[\frac{\partial^2 L(\theta)}{\partial \theta \partial \theta'} \right]^{-1} f'(\theta_0) \quad (2.4)$$

If the matrix of the second-degree partial derivative of the $H(\theta^m)$ function is taken as the Hessian matrix and if the vector of the first-degree partial derivative of the $\nabla L(\theta^m)$ function is taken as the gradient vector, the estimation value for the parameter vector of the $m + 1$ iteration of this root (2.4) is obtained as [26].

$$\theta^{m+1} = \theta^m - [H(\theta^m)]^{-1} \nabla L(\theta^m) \quad (2.5)$$

As the MLE method has asymptotic properties, it is a frequently chosen statistical method. MLE can handle cases like missing data, non-stationarity, temporal dependence and covariate effects. MLE may show better performance compared to other methods for small samples; however, the general problem with MLE is its lack of robustness [25].

2. Bayesian Inference. The aim of Bayesian approaches is to determine how the previously obtained data, used as prior knowledge, and the obtained posterior knowledge update the available information [27,28]. In the complex models of Bayesian techniques based on Bayes theorem, if θ is a high-dimensional vector of parameters, calculating the share of (Equation 2.6) may cause a problem even if complicated numerical integrations are used. Simulation-based techniques developed due to these difficulties such as Markov chain Monte Carlo (MCMC) have helped the use of Bayes techniques to become more widespread [2]. The advantage of MCMC is that it does not require asymptotic normality in samples and as a result provides reliable results for small samples [28]. MCMC includes all simulation techniques ensuring parameter estimations by pulling the sample to the simulation path from conditional distributions instead of by using complicated integration techniques. Basically, MCMC uses Markov chain and Monte Carlo iterations [29,30].

Bayes' theorem states that,

$$f(\theta|x) = \frac{f(\theta).f(x|\theta)}{\int_{\Theta} f(\theta).f(x|\theta)d\theta} \propto f(\theta).L(\theta; x) \quad (2.6)$$

This distribution (2.6) does not entail a closed form, because of this, it cannot be used in the rest of the inference.

The joint prior density function can be written as $f(\mu, \sigma, \xi) = f(\mu)f(\sigma)f(\xi)$ [2]. In situations where there is no information about these three parameters, the noninformative prior of improper prior $f(\mu, \sigma, \xi) \propto 1/\sigma$ may be used, as recommended in the study by Stephenson [31]. When using the MCMC method, the GEV scale parameter is commonly reorganized and

$\varphi = \log \sigma$ is employed to preserve the positivity of this parameter [2,32]. In this study, $f(\mu, \sigma, \xi) \propto 1$ was accepted.

In this situation, using likelihood function in Eq. (2.1), the joint posterior distribution of the parameters can be obtained as follows;

$$f(\mu, \sigma, \xi|x) \propto f(\mu, \sigma, \xi)L(\mu, \sigma, \xi|x)$$

$$f(\mu, \sigma, \xi|x) \propto \frac{1}{\sigma^n} \prod_i^n \left[z^{-\left(\frac{1}{\xi}+1\right)} \exp \left[-\left(z\right)^{-\frac{1}{\xi}} \right] \right], \mu, \sigma > 0$$

Similarly, when μ, ξ and x are given, the conditional posterior distribution of σ with given μ and x is;

$$f(\sigma|\mu, \xi, x) \propto \frac{1}{\sigma^n} + \sum_{i=1}^n \left[(1-z)^{-\left(\frac{1}{\xi}+1\right)} - \exp \left[1-z \right]^{\frac{-1}{\xi}} \right], \mu, \xi, \sigma > 0$$

the conditional posterior distribution of μ given σ, ξ and x is obtained as below;

$$f(\mu|\sigma, \xi, x) \propto \sum_{i=1}^n \left[(1-z)^{-\left(\frac{1}{\xi}+1\right)} - \exp \left[1-z \right]^{\frac{-1}{\xi}} \right], \mu, \xi, \sigma > 0$$

Similarly, the conditional posterior distribution of ξ with given μ, σ and x is;

$$f(\xi|\mu, \sigma, x) \propto \sum_{i=1}^n \left[(1-z)^{-\left(\frac{1}{\xi}+1\right)} - \exp\left[1-z\right]^{\frac{-1}{\xi}} \right], \mu, \xi, \sigma > 0$$

For the remainder of the analysis, MCMC is used to obtain a random sample from this distribution. The aim of the MCMC simulation method is to create a random walk in $\theta_t = (\mu_t, \sigma_t, \xi_t)$ parameter space and converge to the final targeted distribution. The Markov chain is a stochastic process and $\theta_{t+1} = (\mu_{t+1}, \sigma_{t+1}, \xi_{t+1})$ value is linked to the previous value in the chain $\theta_t = (\mu_t, \sigma_t, \xi_t)$; however, it forms a stochastic process independent of the others and produces data. If this chain works long enough, it reaches the final distribution of interest [27].

Coles [2] collected reasons why Bayesian analysis needs to be used for extreme value data under two headings. The first is that due to the low number of data it allows the possibility of including other data sources via previous distributions. Secondly the posterior distribution provides better outcomes than ML analysis. However, Coles and Powell [33] emphasized that in cases where prior information is large, inquiries should be made about whether extreme behavior is formulated or not. They mention that when the Bayesian approach to inference is used there may be a contradiction. There are opposing opinions about determining prior knowledge. Especially when personal views about prior knowledge are considered, [34] and others Savage, 1972; Barnet, 1973; Wright and Ayton, 1994 are encountered [27]. However, during the continuation of studies by Coles and Powell [33] they state the benefits of using spatial prior knowledge in studies with very few data, that the inclusion of a previous distribution form in spatial knowledge stabilizes estimations without causing prejudice and are more variable than ML estimators. Ashour and El-Adl [35] used simple numerical techniques to obtain a range of simulated data. Studies comparing the Bayes estimator with the ML estimators emphasized that the Bayes estimator was more productive than the ML estimators. Kumar et al. [11] applied the quasi Newton-Raphson algorithm ML estimates and Bayesian estimations with the MCMC simulation method, respectively, and found uniform priors and gamma priors results were very close to each other in ML and Bayes estimation results for Gumbel. The study stated that the MCMC method was a substitute method for parameter estimations in the Gumbel model and was more responsive compared to the MLE method. Martins and Stedinger [22] used Monte Carlo simulations in studies and compared the GML, ML, MOM and LM quartile estimators for a GEV distribution. They determined that in small samples, MLE may cause unreasonable and low performance results for GEV distributions while these types of problems were resolved by using Bayesian prior distributions. The study by Gholami [18] concluded that Bayes results were better than ML. Studies De Paola et al. by [19] considered MLE and Bayes methods and stated that the μ parameter estimated with the Bayesian method was more sensitive. Coles et al. [36] stated that Bayes analysis did not provide a completely different interpretation of data; however, it presented a more appropriate and direct route to managing and expressing uncertainties.

The prior and posterior distributions used in the simulation section of this study are listed as follows, respectively.

Prior1:

Priors: $\mu \sim N(\mu_0, \sigma_0)$, $\sigma \sim Ga(\alpha_0, \lambda_0)$, $\xi \sim Ga(\alpha_1, \lambda_1)$

Posterior:

$$\exp \left[\sum_i^n -(z)^{\frac{-1}{\xi}} - \frac{1}{2\sigma_0} (\mu - \mu_0)^2 - \lambda_0 \sigma - \lambda_1 \xi \right] \cdot \sum_i^n (z)^{-\left(\frac{1}{\xi}+1\right)} \cdot [\sigma^{\alpha_0-n-1}] \cdot [\xi^{\alpha_1-1}]$$

Prior 2:

Priors: $\mu \sim GEV(\mu_0, \sigma_0, \xi_0)$, $\sigma \sim Ga(\alpha_0, \lambda_0)$, $\xi \sim Ga(\alpha_1, \lambda_1)$

Posterior:

$$\exp \left[\sum_i^n - (z)^{-\frac{1}{\xi}} - \left(1 + \xi_0 \left(\frac{\mu - \mu_0}{\sigma_0} \right) \right)^{-\frac{1}{\xi}} - \lambda_0 \sigma - \lambda_1 \xi \right] \cdot \sum_i^n \left[(z)^{-\left(\frac{1}{\xi}+1\right)} \left(1 + \xi_0 \left(\frac{\mu - \mu_0}{\sigma_0} \right) \right)^{-\left(\frac{1}{\xi}+1\right)} \right] \cdot [\sigma^{\alpha_0-n-1}] \cdot [\xi^{\alpha_1-1}]$$

Prior 3:

Priors: $\mu \sim G(\mu_0, \sigma_0)$, $\sigma \sim Ga(\alpha_0, \lambda_0)$, $\xi \sim Ga(\alpha_1, \lambda_1)$

Posterior:

$$\exp \left[\sum_i^n - (z)^{-\frac{1}{\xi}} - \frac{\mu - \mu_0}{\sigma_0} - \exp \left(-\frac{\mu - \mu_0}{\sigma_0} \right) - \lambda_0 \sigma - \lambda_1 \xi \right] \cdot \sum_i^n (z)^{-\left(\frac{1}{\xi}+1\right)} \cdot [\sigma^{\alpha_0-n-1}] \cdot [\xi^{\alpha_1-1}]$$

Simulation studies. With the aim of comparing the performance of ML and Bayesian methods, μ , σ and ξ for the GEV (10, 1, 1) were produced from datasets containing 10, 30, 50 and 100 numbers respectively. Openbugs and extremes package in the R program was used for comparisons.

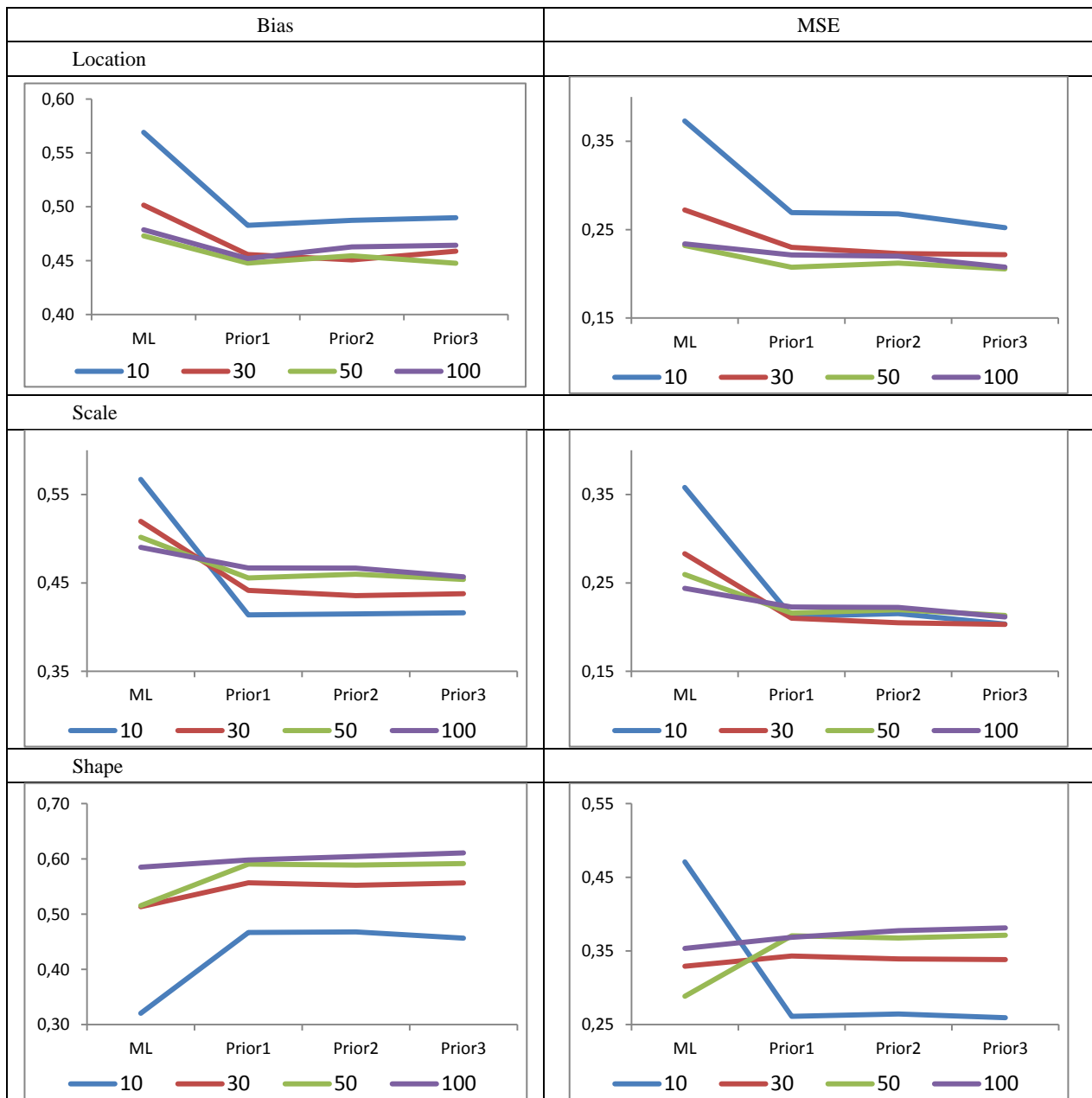
The bias informs how close the expected value of the estimator is to the actual value of the parameter, but not how far from the actual value. MSE is used to assess how close an estimator is to the actual value [37].

There were four applications of ML, Prior 1 (μ Normal, σ, ξ gamma), Prior 2 (μ Gumbel, σ, ξ gamma) and Prior 3 (μ GEV, σ, ξ gamma) and 100 simulation studies were performed for each dataset. In order, Location $\sim N(10,1)$, Location \sim Gumbel (10,1), and Location \sim GEV (10,1,1) priors were taken for location, while for scale and shape Scale \sim Gamma (1,1) and Shape \sim Gamma (1,1) priors were used. The bias and MSE results for the simulations are given in table and figure.

Bias and MSE results

| | | Bias | | | | MSE | | | |
|----------|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| n | | ML | Prior1 | Prior2 | Prior3 | ML | Prior1 | Prior2 | Prior3 |
| Location | 10 | 0.5691 | 0.4899 | 0.4873 | 0.4827 | 0.3729 | 0.2692 | 0.2679 | 0.2522 |
| | 30 | 0.5015 | 0.4588 | 0.4507 | 0.4557 | 0.2722 | 0.2299 | 0.2229 | 0.2216 |
| | 50 | 0.4730 | 0.4476 | 0.4545 | 0.4477 | 0.2319 | 0.2074 | 0.2122 | 0.2056 |
| | 100 | 0.4786 | 0.4643 | 0.4627 | 0.4519 | 0.2339 | 0.2214 | 0.2199 | 0.2076 |
| Scale | 10 | 0.5671 | 0.4139 | 0.4149 | 0.4163 | 0.3580 | 0.2122 | 0.2153 | 0.2036 |
| | 30 | 0.5197 | 0.4415 | 0.4356 | 0.4378 | 0.2830 | 0.2102 | 0.2049 | 0.2031 |
| | 50 | 0.5016 | 0.4557 | 0.4599 | 0.4539 | 0.2596 | 0.2159 | 0.2196 | 0.2132 |
| | 100 | 0.4903 | 0.4669 | 0.4668 | 0.4569 | 0.2439 | 0.2227 | 0.2223 | 0.2115 |
| Shape | 10 | 0.3206 | 0.4668 | 0.4678 | 0.4565 | 0.4708 | 0.2613 | 0.2645 | 0.2594 |
| | 30 | 0.5134 | 0.5567 | 0.5521 | 0.5565 | 0.3293 | 0.3432 | 0.3392 | 0.3382 |
| | 50 | 0.5154 | 0.5905 | 0.5889 | 0.5914 | 0.2885 | 0.3705 | 0.3675 | 0.3713 |
| | 100 | 0.5849 | 0.5980 | 0.6042 | 0.6109 | 0.3536 | 0.3684 | 0.3776 | 0.3813 |

When the simulation results are investigated, for the n=10 dataset, ML was seen to have high bias and MSE values (apart from bias results belonging to shape). The MLE simulation results belonging to shape were between -0.4 and 1.9. This causes the bias results for ML to fall. Again, in the same way the MSE values belonging to shape had higher bias values for Prior1, Prior2 and Prior3 compared to ML causing the MSE values to be larger than ML.



Simulation results

With both methods (ML and Bayesian), they appeared to provide better results as sample numbers increased. As can be seen from studies with different priors, as the sample number increased Bayesian results became more consistent and additionally provided better results than ML in situations with $n=10$ (table, figure).

Conclusion. Currently it is still unknown when and with what severity earthquakes will occur at a certain point. When the historical process is examined, a large earthquake occurs in Van province nearly every 30-35 years. In this study, it was seen that earthquake data was appropriately modeled by GEV distribution. GEV used in situations showing extreme behavior with the ML and Bayesian approaches were used and the obtained results were compared. An attempt was made to predict earthquakes that will occur in future years. Simulation studies show that as the number of data increase, the ML and Bayesian results show similarities. Bayesian analysis outputs provided more complete inference than MLE. The simulation results applied to different datasets show us that the Bayesian approach is reliable, in addition to being an alternative statistical analysis. Simulation studies show that as the number of data increase the

Bayesian method provides better results than ML. In this study, four different applications were completed.

As stated by Coles and Tawn [39], it is necessary to take care with selection of prior information in the structure of asymptotic models for extreme values. Distributions from similar distribution families ensure we obtain close and consistent results. In simulation studies, Prior2 and Prior3 come from the same distribution family. When the obtained results are investigated, it appears we obtained similar results from them.

When earthquake data is investigated, the four simulation results are close to each other. For Bayesian approaches, the lowest DIC value belongs to Prior3. The results confirm there will be a large Mx earthquake again within the next 30 years.

As stated in the conclusion of the study by Pisarenko et al. [40], extreme value theory provides a good statistical approach to calculate the magnitudes that will occur in future time intervals. However, whether this is accurate or not should always be carefully researched.

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**ЖЭЖ (ЖАЛПЫЛАНҒАН ТӨТЕНШЕ ЖАҒДАЙ/МЭН) ТАРАЛУЫ МЕН
ВАНДАҒЫ ЖЕР СІЛКІНІСІ ДЕРЕКТЕРІНІҢ ПАРАМЕТРЛЕРІН БАҒАЛАУ**

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РАСПРЕДЕЛЕНИЕ ОЭЗ И ОЦЕНКА ПАРАМЕТРОВ ДЛЯ ДАННЫХ О ЗЕМЛЕТРЯСЕНИИ В ВАНЕ

Аннотация. Вероятностная теория экстремальных значений – это интересная и увлекательная теория с большим разнообразием применений. В теории вероятностей и статистике это распределение используется для моделирования экстремальных (максимальных или минимальных) наблюдений. Распределение обобщенных экстремальных значений (ОЭЗ) часто применяется для прогнозирования природных явлений, таких как наводнения, загрязнение воздуха, экстремальные уровни моря, гидрология, метеорология, климатология, страхование, финансы, геология и сейсмология. В этом исследовании общая информация об оценке максимального правдоподобия и байесовском выводе была исследована с использованием методов оценки параметров. Применение исследования было завершено с использованием данных о землетрясениях из провинциального центра Ван в Турции с 1995 по 2017 год. В этих данных использовались методы оценки максимального правдоподобия и байесовской оценки в попытке предсказать силу землетрясений, которые могут произойти в будущем.

Ключевые слова: обобщенная экстремальная величина, ОЭЗ, оценка землетрясения.

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INDUCTION METOD FOR HEATING OIL IN LOW PRODUCTION WELLS

Abstract. The article discusses the induction method of heating oil in low production wells. To do this, it was suggested to use induction heater and frequency converter. Shown that at current frequencies of 1 - 1.5 kHz, an induction heater and inverter frequency converter can be installed at the bottom of oil wells. The inverter will be made on a JGBT transistor modules that can switch voltages up to a thousand volts, currents of hundreds of amperes and tens of kilowatts of power.

The goal of the research is to heat the oil to the required temperature, with the most efficient use of the consumed electricity, without the use of an open flame (furnace, burner), without thermal electric heaters (TENs), and without the use of heat exchangers, the efficiency of which does not exceed 60-80%. This is possible using the induction heating method.

Induction heating is used to heat technological equipment (oil pipelines, pipelines, tanks, etc.), heat liquid media, and dry coatings of materials (for example, wood). The most important parameter of induction heating settings is frequency.

For each process, there is an optimal frequency range that provides the best technological and economic indicators. For induction heating, frequencies from 50 Hz to 5 MHz are used. The advantages of induction heating.

The principle of operation of induction heaters is simple. If a metal work piece or parts are placed in an alternating magnetic field, then, according to the law of electromagnetic induction, an electromotive force is induced in it, under the influence of which an alternating electric eddy current will flow.

This current will heat the body of this work piece or part to the required temperature.

The general concept of the article is that with the help of an induction heater it is possible to heat oil in oil wells, and thus, increase oil production in low flow wells, that is, increase the profitability of oil production.

Key words: the induction method, at current frequencies, JGBT transistor modules, voltages, the required temperature, of this work piece.

Introduction. According to the Committee of the State Duma of Russia on energy, transport and communications, more than 70 % of the reserves of oil companies are in the range of low rates, that is, on the verge of profitability [1]. The share of hard-to-recover reserves reached 55-60 % and continues to increase. If 15 years ago 55 % of wells produced up to 25 tons of oil per day, today only about 10 tons are produced. Water cut is increasing (the amount of water pumped into the oil reservoir to increase pressure). The same situation is in Kazakhstan.

To increase oil production, it is necessary to heat the oil. This is a multifaceted and serious problem for many oil companies. Different heat carriers are used for heating: steam, hot water, hot gases and oil products, electric energy.

The greatest application is water vapor, which has the highest heat content and heat transfer, is simply transportable and does not pose a fire hazard. They use saturated steam with a pressure of 0.3-0.4 MPa, providing oil heating to 80-100 °C.

To heat the oil, electric heating devices are used, which differ in compactness, ease of maintenance and benefit when cheap electricity is available.

The goal of the research is to heat the oil to the required temperature, with the most efficient use of the consumed electricity, without the use of an open flame (furnace, burner), without thermal electric heaters (TENS), and without the use of heat exchangers, the efficiency of which does not exceed 60-80 %. This is possible using the induction heating method. Induction heating is used to heat technological equipment (oil pipelines, pipelines, tanks, etc.), heat liquid media, and dry coatings of materials (for example, wood). The most important parameter of induction heating settings is frequency [2].

For each process, there is an optimal frequency range that provides the best technological and economic indicators. For induction heating, frequencies from 50 Hz to 5 MHz are used.

The advantages of induction heating.

Electric energy is transferred directly to the heated body and allows direct heating of materials, with an increase in the heating rate.

1. The transfer of electrical energy directly to the heated body occurs in a non-contact manner. This is convenient in conditions of regulating the heating temperature and for automating the heating process.

2. Due to the phenomenon of the surface effect, maximum power is released on the surface layer of the heated product. Therefore, induction heating provides fast heating of the product and is more economical than other methods of heating oil.

3. Induction heating in most cases makes it possible to reduce the overall dimensions of the heated material at high current frequencies [3].

Description of the essence of development and testing methods. This method of heating oil in oil wells is used in Latin America. As a review and analysis of the literature, as well as technical documentation shows, the unit cost of existing foreign designs of heaters is very high.

In this regard, the introduction of foreign-made heaters in Kazakhstan is unprofitable, since the payback period reaches about ten years. Therefore, you should develop your own induction heaters based on your own developments, which will be cost-effective.

Given that at a low cost of electricity compared to the cost of electricity abroad, as well as a decrease in the unit cost of the entire installation, the development and implementation of induction heaters is an urgent problem. The article proposes an induction heater and a frequency converter on JGBT transistor modules. Moreover, the design is simpler and more technologically advanced for manufacturing, and they can be manufactured, assembled and tested at enterprises in Kazakhstan [4].

In addition, the developed technology and design methods allow you to create an individual induction heater for a specific type of oil heating process.

Modern induction heaters are classified according to the range of operating frequencies, which determine the scope of induction installations.

The principle of operation of induction heaters is simple. If a metal workpiece or parts are placed in an alternating magnetic field, then, according to the law of electromagnetic induction, an electromotive force is induced in it, under the influence of which an alternating electric eddy current will flow.

This current will heat the body of this workpiece or part to the required temperature. The general concept of the article is that with the help of an induction heater it is possible to heat oil in oil wells, and thus, increase oil production in low flow wells, that is, increase the profitability of oil production.

To do this, it will be necessary to develop various designs of the induction heater and frequency converter on JGBT transistor modules. The induction heater will be located at the bottom of the oil well and must be leakproof as well as corrosion resistant. As a rule, a frequency converter consists of a rectifier and an inverter. The rectifier will be connected to a three-phase AC voltage source and will be located on the surface of the earth, and the inverter at the bottom of the oil well with an induction heater.

This simplifies the method of supplying electricity to the bottom of the oil well, since the electricity from the rectifier is supplied by DC voltage. Calculations showed that the overall dimensions of the JGBT transistors and transistor modules can be placed at the bottom of the oil well with oil pipes with a diameter of 150-200 mm.

The design of the induction heater, which will be located at the bottom of the oil well, is a metal pipe. The main purpose of the induction heater is to create an electromagnetic field of any configuration in order to create eddy currents in the heater core. In general, an induction heater is an energy converter that converts electricity to heat [2].

Test results and discussion. If an induction heater is considered as an electric machine converter with a braked rotor, then it will convert electric energy into thermal energy [3].

In this case, the heater will have basic main dimensions: the outer diameter D1 and the inner diameter D2, the estimated length L, the base power P_{σ} , frequency f. The sizes D1, D2 and L are related to power, frequency f and electromagnetic loads \rightarrow following expression [5]

$$\frac{D^2 L \cdot f}{P_{\sigma}} = \frac{6,1 \cdot 10^{11}}{k_B k_{\sigma} A \cdot B}, \quad (1)$$

where: A- is the linear load of the heater, B- is the induction in the core of the heater, $k_B = 1.1$ is the coefficient of the shape of the voltage curve, $k_{\sigma} = 0.95$ is the winding coefficient.

The base power of an induction heater is

$$P_{\sigma} = P_n \frac{k_E}{\eta \cos \varphi} \quad (2)$$

where P_n - is the rated power of the induction heater, kW; k_E - the ratio of the EMF of the heater winding to the nominal voltage, which can be approximately determined from = 0.93 - 0.98. [6]. The values of efficiency $\eta = 0.88$ and power factor $\cos \varphi = 0.85$ can be taken according to.

Then the rated current is

$$I_{1n} = \frac{P_n}{U_1 \cdot \eta \cdot \cos \varphi} = \frac{25000}{514 \cdot 0,88 \cdot 0,85} = 65 A \quad (3)$$

where $U_1 = 514$ V is the rated voltage of the induction heater.

The preliminary selection of electromagnetic loads A, Bb, must be carried out very carefully, since they determine not only the calculated length of the heater, but also, to a large extent, the characteristics of the heater. When choosing specific values of A and Bb from practice, they are guided by the following data: A = 300 A / cm and Bb = 8,000 Gs = 0.8 Tc.

Then from the expression (1) for a given value of the outer diameter

D1 = 150 mm can determine the length of the heater

$$L = \frac{6,1 \cdot 10^{11} \cdot P_{\sigma}}{k_B k_{\sigma} A \cdot B \cdot D^2 \cdot f}, \quad (4)$$

For a given rated power $P_n = 25$ kW and frequencies $f = 2000$ Hz, also with the above values of efficiency $\eta = 0.88$, power factor $\cos \varphi = 0.85$ and $k_E = 0.95$, the base power will be equal to

$$P_{\sigma} = P_n \frac{k_E}{\eta \cos \varphi} = 25 \frac{0,95}{0,88 \cdot 0,85} = 31,78 kW.$$

In this case, the length of the heater will be equal to

$$L = \frac{6,1 \cdot 10^{11} \cdot 31,78}{1,1 \cdot 0,95 \cdot 300 \cdot 8000 \cdot 15^2 \cdot 2000} = 17,17 sm.$$

Preliminary calculations show that an induction heater with a rated power of $P_n = 25$ kW, an outer diameter of D1 = 150 mm, a length of L = 171.7 mm at a frequency of $f = 2000$ Hz can be freely placed at the bottom of the oil well. Naturally, at other frequencies these sizes will be different.

Table 1 presents the dependence of the length L of the induction heater on the frequency f for a given outer diameter D1 = 150 mm.

Table 1

| | | | | | |
|----------------------------------|-------|-------|-------|-------|-------|
| Current Frequency (f), Hz | 50 | 500 | 1000 | 1500 | 2000 |
| Length of induction heater L, cm | 686,8 | 68,68 | 34,34 | 22,89 | 17,17 |

When designing an induction heater, it is necessary to take into account the quality of heating, i.e. creating the desired temperature distribution in the heater body and achieving the highest efficiency value, as well as take into account special technological and other requirements in terms of geometric dimensions, materials used, etc.

A variety of heating systems, a limited range of weight and size parameters and the specificity of the oil heating process lead to the fact that the design of the induction heater is very diverse. [6].

Designing a workable induction heater with minimum weight and size parameters that increases the efficiency and power factor is not an easy task.

The duration of induction heating of the heater is associated with a number of factors. From the point of view of productivity and installation efficiency, the heating time should be as short as possible.

However, with very fast heating, a significant temperature difference is obtained between the surface and the center of the heater billet.

The calculation of the induction heater consists in choosing the current frequency, determining the heating time, calculating the dimensions (diameter and length) of the heater, determining the required power of the frequency converter and the capacitance of the capacitor.

The initial data are the material and sizes of the heater, as well as the heating time.

The mass of the induction heater is determined as follows

$$G = \rho_{mem} \cdot \pi \cdot (R_1^2 - R_2^2) \cdot L, \quad (5)$$

where $\rho_{mem} = 7880 \text{ kg / m}^3$ - is the specific gravity of the metal, R1 and R2 are the outer and inner radii of the heater, in m; L is the length of the heater, in m.

With the above parameters, the mass of the heater will be equal to

$$G = 7880 \cdot 3,14 \cdot (0,15^2 - 0,075^2) \cdot 0,1717 = 71,69 \text{ kg}$$

At a given heating temperature, in degrees C, the required rated power for heating the induction heater is determined by the following expression, according to [7].

$$P_H = \frac{c_0^{1200} t_{назр} \cdot G}{\tau_{назр}}, \text{ kW} \quad (6)$$

where c_0^{1200} - the average heat capacity of steel is 0.704 kJ / kg. hail.

From the last expressions, it is possible to determine the heating $\tau_{назр}$ time in seconds at a given heating temperature $\tau_{назр}$

$$\tau_{назр} = \frac{c_0^{1200} t_{назр} \cdot G}{P_H}. \quad (7)$$

Taking into account the above data and at a given heating temperature $t_{назр} = 3000 \text{ C}$, the heating time $\tau_{назр}$ will be equal to

$$\tau_{назр} = \frac{0,704 \cdot 300 \cdot 71,69}{25,0} = 605,6 \text{ c} = 10,1 \text{ min}$$

It turns out the actual heating time of the induction heater is 10.1 minutes.

Table 2 presents the dependence of the heating time of the induction heater on frequency.

Table 2

| | | | | | |
|-------------------------------------|-------|-------|------|------|------|
| Induction heater heating time, min. | 403,8 | 40,38 | 20,2 | 13,5 | 10,1 |
| Current Frequency (f), Hz | 50 | 500 | 1000 | 1500 | 2000 |

When induction heating of metal billets, the frequency is selected based on the maximum efficiency [6]. In this case, the current frequency must be selected based on the optimal weight and dimensions of the induction heater and the heating time. As can be seen from tables 1 and 2, the industrial frequency of 50 Hz is not suitable, since the induction heater will have a length of 6.87 meters and a heating time of 403.8 minutes or 6.73 hours.

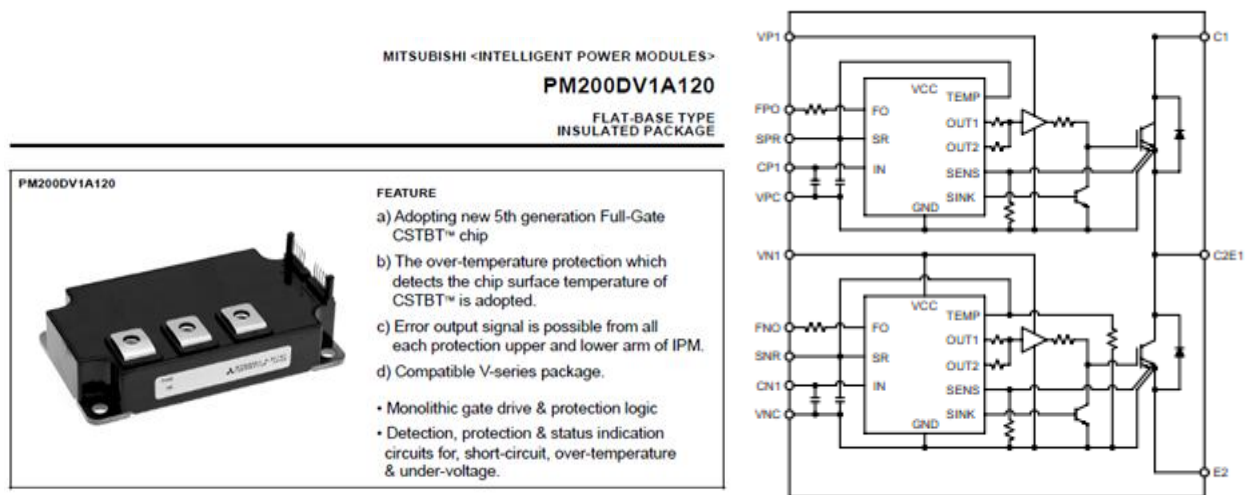
The optimal frequency is 1000-1500 Hz, while the length of the induction heater is 34.34-22.89 cm and the heating time is 20.2-13.5 minutes. Such a frequency is acceptable for switching transistors.

Transistor frequency converters of induction units consist of a rectifier and an inverter [7]. The technology for creating a rectifier on diodes and thyristors is known and well developed. Of interest is an inverter that will be implemented on transistor JGBT modules.

In most cases, the frequency converter runs on four transistors. In this case, it can be performed on two transistors. This idea was patented in the intellectual property committee of the Republic of Kazakhstan [3]. Two transistors can be successfully placed at the bottom of the oil well. It should be noted that the main losses of electricity occur in transistors and with a decrease in half, respectively, increases the efficiency of the frequency converter.

MITSUBISHI's VIPM Series Intelligent Power Modules (IPMs), which are a new stage in the development of power switches based on IGBT modules, are now a functionally complete product in a compact, insulated enclosure [8].

Figure shows the IGBT transistor module from MITSUBISHI, in table 3 - operational characteristics. As can be seen from table 3, these transistors are designed for high voltages, currents and powers. A frequency converter made on these transistor modules allows heating oil in oil wells.



IGBT module of the MITSUBISHI PM200DV1A120 transistor with an integrated control driver and a wiring diagram

Table 3

| Name | Parameters | | | Scheme |
|-------------|--------------|----------|-----------|--------|
| | $V_{ces}(V)$ | $I_C(A)$ | $P_0(kW)$ | |
| PM200DVA120 | 1200 | 200 | 37 | D |
| PM300DVA120 | 1200 | 300 | 55 | D |
| PM400DVA060 | 600 | 400 | 45 | D |
| PM600DVA060 | 600 | 600 | 55 | D |
| PM75CVA120 | 1200 | 75 | 15 | C |
| PM100CVA060 | 600 | 100 | 11 | C |
| PM100CVA120 | 1200 | 100 | 22 | C |

Designations: V_{ces} – supply voltage, I_C – load current, P_0 – recommended power delivered to the load.

The overall dimensions of the transistor module are completely located at the bottom of the oil well. At the same time, the supply voltage is 514 V, the load current is 65 A and the load power of 25 kW is quite acceptable for the transistor module with a margin.

An inverter made on transistor JGBT modules is controlled by control drivers [7]. The term “driver” refers to a microcircuit or module on a printed circuit board that controls a semiconductor power module or a discrete semiconductor device (MOSFET, IGBT, bipolar transistor, thyristor, etc.) that perform protective and service functions. The main task solved by the control circuit is to match the levels of pulses generated by the controller (microprocessor) with the control signals of the power key inputs, which require some power to turn on and off.

There is experience in the development and manufacture of an inverter with microprocessor control for converting direct current solar energy into alternating voltage energy [8]. In [9], the results of a developed and manufactured experimental model of a frequency converter with microprocessor control for induction heating of metal are presented.

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ТӨМЕН ӨНДІРУ ҰНҒЫМАЛАРЫНДА МҰНАЙДЫ ҚЫЗДЫРУДЫҢ ИНДУКЦИЯЛЫҚ ӘДІСІ

Аннотация. Мақалада төмен өндірістік ұнғымаларда мұнайды қыздырудың индукциялық әдісі қарастырылады. Ол үшін индукциялық қыздырғышты және жиілік түрлендіргішін пайдалану ұсынады. Көрсетілген токтың 1-1,5 кГц жиіліктерінде индукциялық жылытқыш және мұнай ұнғымаларының түбінде инвертор жиілігін түрлендіргіш орнатылуы мүмкін. Инвертор JGBT транзисторында кернеуді мың вольтке дейін ауыстыра алатын модульдер, жүздеген ампер мен ондаған киловатт қуат жасалады.

Мұнайды жылыту үшін ықшамдылық, техникалық қызмет көрсету қарапайымдылығы және арзан электр қуаты болған кезде пайдасы бойынша ерекшеленетін электр жылыту құрылғылары қолданылады.

Жүргізілген зерттеулердің мақсаты – мұнайды қажетті температураға дейін, жұмсалатын электр энергиясын барынша тиімді пайдалана отырып, ашық отты (пештерді, жанарғыларды) қолданбай, жылу электр қыздырғыш аспаптарысыз (Тэндерді) және ПӘК 60-80 %-дан аспайтын жылу алмастырғыш құрылғыларды пайдаланбай қыздыру. Бұл индукциялық қыздыру әдісін қолдану арқылы жүзеге асуы мүмкін.

Индукциялық қыздыру технологиялық жабдықты (мұнай құбырлары, құбырлар, резервуарлар және т.б.), жылу сұйық ортасын және материалдардың құрғақ жабындарын (мысалы, ағаш) жылыту үшін қолданылады. Индукциялық қыздырудың маңызды параметрі – жиілік. Әрбір процесс үшін ең жақсы технологиялық және экономикалық көрсеткіштерді қамтамасыз ететін оңтайлы жиілік диапазоны бар. Индукциялық қыздыру үшін 50 Гц-тен 5 МГц-ге дейінгі жиілік қолданылады.

Мұнай өндірісін арттыру үшін майды жылыту керек. Бұл – көптеген мұнай компаниялары үшін жан-жақты және маңызды проблема. Жылыту үшін әртүрлі жылу тасымалдағыштар қолданылады: бу, ыстық су, ыстық газдар мен мұнай өнімдері, электр энергиясы. Ең көп қолдануға болатыны – су буы, ол ең көп жылу мөлшері мен жылу өткізгіштікке ие, жай ғана тасымалданады және өрт қаупін тудырмайды. Олар 0,3-0,4 МПа қысыммен қаныққан буды пайдаланады, мұнайды 80-100 °С-қа дейін қыздырады.

Мақалада JGBT транзисторлық модульдеріндегі индукциялық жылытқыш және жиілік түрлендіргіші ұсынылған. Сонымен қатар дизайн қарапайым және технологиялық тұрғыдан жетілдірілген. Оларды Қазақстанның кәсіпорындарында дайындауға, жинауға және сынақтан өткізуге болады. Сонымен қатар әзірленген технология мен дизайн әдістері майды қыздыру процесінің белгілі бір түріне жеке индукциялық жылытқыш құруға мүмкіндік береді.

Мақаланың жалпы тұжырымдамасы: индукциялық жылытқыштың көмегімен мұнай ұнғымаларында майды жылытуға болады, сөйтіп төмен ағынды ұнғымаларда мұнай өндірісін көбейтуге болады, яғни мұнай өндірудің рентабельділігін арттырады.

Металды индукционды қыздыру үшін арзан тұратын пайдалы әсер коэффициенті жоғары габариті және салмағы аз жиілік түрлендіргіштер қолданылады. Олар жиілік түрлендіргіштердің диапазонын реттеуге, күштік транзисторлардың минималды санын таңдауды және орнатылған минималды қуаттарды қамтамасыз

етеді. Жиілік түрлендіргіш пен индуктордың тәжірибелік үлгісі дайындалған. Индукционды металды қыздыру үшін жиілік түрлендіргіштің эксперименталдық зерттеулері жүргізілген.

Түйін сөздер: осы жиіліктегі индукция әдісі, транзистордың JGBT модульдері, кернеулер, қажетті жұмыс температурасы.

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ИНДУКЦИОННЫЙ СПОСОБ НАГРЕВА НЕФТИ В НИЗКОДЕБИТНЫХ СКВАЖИНАХ

Аннотация. В статье рассматривается индукционный способ нагрева нефти в низкодебитных скважинах. Для этого предлагают использовать индукционный нагреватель и преобразователь частоты. Показано, что при частотах тока 1 – 1,5 кГц индукционный нагреватель и инвертор - преобразователь частоты могут быть установлены на дне нефтескважин. Инвертор будет выполнен на JGBT транзисторных модулях, которые могут коммутировать напряжения до тысячи вольт, токи сотни ампер и десятки киловатт мощности.

Для подогрева нефти используют электронагревательные устройства, которые различаются компактностью, удобством в обслуживании и выгодой при наличии дешевой электроэнергии.

Цель проводимых исследований – нагрев нефти до необходимой температуры, с максимально эффективным использованием затрачиваемой электроэнергии, без применения открытого огня (печи, горелки), без тепловых электронагревательных приборов (ТЭНов) и без использования теплообменных устройств, КПД которых не превышает 60-80%. Это возможно при использовании индукционного способа нагрева

Индукционный нагрев применяют для обогрева технологического оборудования (нефтепровода, трубопровода, емкости и т. д.), нагрева жидких сред, сушки покрытий материалов (например, древесины). Важнейший параметр установок индукционного нагрева – частота. Для каждого процесса существует оптимальный диапазон частот, обеспечивающий наилучшие технологические и экономические показатели. Для индукционного нагрева используют частоты от 50Гц до 5МГц.

Для увеличения добычи нефти необходимо осуществить подогрев нефти. Это многогранная и серьезная проблема для многих нефтедобывающих компаний. Для обогрева используют разные теплоносители: водяной пар, жаркую воду, жаркие газы и нефтепродукты, электроэнергию. Наибольшее применение имеет водяной пар, обладающий высочайшим теплосодержанием и теплоотдачей, просто транспортируемый и не представляющий пожарной угрозы. Употребляют насыщенный пар давлением 0,3-0,4 МПа, обеспечивая нагрев нефтепродукта до 80-100 °С.

Такой способ нагрева нефти в нефтескважинах применяется в странах Латинской Америки. Как показывает обзор и анализ литературы, а также технические документации, удельная стоимость существующих зарубежных конструкций нагревателей очень высока. В связи с этим, внедрение нагревателей в Казахстане иностранного производства невыгодно, так как срок окупаемости достигает около десяти лет. Поэтому следует разрабатывать свои индукционные нагреватели на основе собственных разработок, которые будут экономически выгодны. Учитывая, что при низкой стоимости электроэнергии по сравнению со стоимостью электроэнергии за рубежом, а также снижение удельной стоимости всей установки, разработка и внедрение индукционных нагревателей является актуальной проблемой.

При разработке технической документации для изготовления лабораторного образца преобразователя частоты и выборе транзисторных JGBT модулей основное внимание было уделено топологии силовых шин модуля и способам подключения электрических цепей и отвода тепла. Даже при использовании самых современных чипов конструкция мощных ключевых модулей имеет чрезвычайно большое значение для обеспечения надежности и эффективности. Распределенные характеристики проводимости и значения паразитных индуктивностей шин связи и выводов должны иметь минимальное значение для уменьшения потерь и снижения уровня переходных перенапряжений.

Кроме того, подбирая экспериментальный путем значение конденсатора C , можно не только улучшить качество выходного напряжения, но и добиться последовательного резонанса. При резонансе активная мощность инвертора будет передаваться индуктору, т.е. заготовке для нагрева.

Ключевые слова: индукционный метод, на частотах тока, транзисторные модули IGBT, напряжения, требуемая температура этой детали

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DIAGNOSIS OF THE CORROSION STATE OF HYDRAULIC STRUCTURES IN THE CASPIAN SEA IN ORDER TO PREVENT ENVIRONMENTAL DAMAGE

Abstract. In order to determine the corrosive state of offshore hydraulic structures subject to strong wave impacts, and to prevent environmental damage, the monitoring was carried out at “Oil Rocks” during 5 years.

Surveys showed that on piles of overpass structures that have been in operation for 12-20 years, the corrosion rate is on average 0.22 mm / year. At the same time, at individual facilities, it ranges from 0.15 to 0.28 mm / year. The average loss of pile wall thickness is 32%, while at individual sites they range from 17 to 51%.

The technology for the manufacture of structures of the surface complex should provide for high-quality factory deposition of corrosion-resistant coatings that provide at least 30 years of service without restoration.

If the protective coating of the supports of hydraulic structures is destroyed during operation, it is proposed to use compositions based on cheap raw materials.

Key words: hydraulic structures; corrosion; aggressiveness of the environment, the zone of periodic wetting.

Introduction. Long-term operation of oilfield equipment and hydraulic structures often leads to increased corrosion destruction of underground and ground equipment, which is fraught with the occurrence of accidents, fire hazard and uncontrolled oil spills, which cause not only direct material losses, but also disturbance of the ecological balance.

It is known that for the protection of oil and gas equipment and hydraulic facilities from corrosion equipment made from resistant steel is used, polymer coatings, galvanic anodes, bactericide-inhibitors and etc. are applied. Because of the simplicity of implementation, the most promising and widely used inhibitors for the protection of downhole equipment [1-15].

It is only possible to provide the safe corrosion protection of hydraulic facilities when applying high protective insulation scheme and electrochemical protection together.

Corrosive destruction of a hydraulic structure in marine conditions has an electrochemical nature and is caused by the flow of electric current between the anode and cathode sections of the metal [16].

Offshore oil hydraulic structures (OOHS), exposed to strong wave impacts, are operated in difficult corrosive conditions, and their operational reliability depends on the timely conduct of restoration and overhauls. The corrosion rate of steel in the marine atmosphere is determined by hydrometeorological factors, distances from the water mirror, operating conditions, and structural features of the structure [17,18].

Four specific zones of corrosion damage were established on steel hydraulic structures of oil fields in the Caspian Sea - atmospheric, periodic wetting, underwater and soil zones, which differ in the nature and rate of corrosion [19,20].

It is possible to protect environment with gathering and analyzing the diagnosis data for accidents occurred in the period of hydraulic facilities and oil and gas equipment exploitation, and conducting different measures according to their limitation.

In order to prevent corrosion damage, and, consequently, disturbance of ecological balance, on-site corrosion tests were carried out on Oil Rocks for diagnosing the corrosion state of OOHS in the atmospheric and periodic wetting zones during 5 years.

Mass measurements of the wall thickness of structural elements were carried out to assess the corrosion state of the operating OOHS with an ultrasonic thickness gauge. Moreover, more than 2000

measurements were made only on the supports of the structures, and more than 10 km of flyover structures and 15 thousand m² of flyover platforms were examined.

For various OOHS objects, the arithmetic mean value of the remaining pile wall thickness was derived in the maximum corrosion section, usually located at a level of 1-2.7 meters above sea level.

The average corrosion rate K_{ave} was calculated by below shown formula:

$$K_{ave} = \frac{\delta_0 - \delta_1}{\tau} \text{ mm / year}$$

where: δ_0 is the initial wall thickness of the piles, accepted equal to 11.0 mm; δ_1 is the remaining wall thickness of the piles, mm; τ – operation life, years;

The change in the wall thickness of the piles in percent was determined by the formula

$$C = \frac{\delta_0 - \delta_1}{\delta_0} \cdot 100\%$$

The results of measurements of the wall thickness of piles are given in table.

Characteristics of the corrosion state of the supports overpass structures of "Oil Rocks" OGEI*

| Operation life, years | Quantity of examined piles, pcs. | Wall thickness of examined piles, mm | | Average rate of corrosion, mm/year | Average loss of wall thickness of piles, % |
|-----------------------|----------------------------------|--------------------------------------|---------|------------------------------------|--|
| | | average | minimum | | |
| 12 | 22 | 9,1 | 8,1 | 0,16 | 17 |
| 13 | 18 | 9,1 | 5,8 | 0,15 | 17 |
| 14 | 35 | 7,5 | 5,6 | 0,25 | 32 |
| 15 | 17 | 7,6 | 6,9 | 0,21 | 31 |
| 16 | 19 | 7,1 | 6,3 | 0,24 | 35 |
| 17 | 24 | 7,1 | 5,3 | 0,21 | 35 |
| 18 | 25 | 7,2 | 5,0 | 0,21 | 35 |
| 19 | 10 | 7,3 | 5,7 | 0,25 | 34 |
| 20 | 10 | 5,4 | 4,4 | 0,28 | 51 |
| Total: | 180 | 7,5 | – | 0,22 | 32 |

*OGEI – Oil Gas Extracting Institution.

As seen from the table 1, the corrosion rate is on average 0.22 mm/year on piles of overpass structures, operating for 12-20 years. At the same time, at individual facilities, it ranges from 0.15 to 0.28 mm/year. The average loss of pile wall thickness is 32%, while at individual sites they range from 17 to 51%.

The data presented characterize the initial stage of the corrosion process. During long-term (12-20 years) operation, these values are somewhat reduced due accumulation of corrosion products on the surface by corrosion inhibition.

Inspection of piles after many years of operation without corrosion protection shows that corrosion products unevenly cover their surface. It was found that the distribution of corrosion products depends not only on the hydrometeorological conditions of the water area of the object's location, but also on the depth of the sea, the topography, wind rose, and the location of the supports under the overlying structures, i.e. on the degree of solar exposure to the surface. For example, with a sea depth of 11 meters and solar radiation on the south and west sides, the support on the north side is covered with layered corrosion products from sea level to 4.5 m, and on the south side only 2.3 m.

Observations show that in the zone of periodic wetting, corrosion on piles proceeds at a high speed, despite the formation of thick (more than 10 mm) layered corrosion products.

So, after 18-20 years of operation of unprotected structures, through corrosion lesions on tubular elements with an initial wall thickness of 11.0 mm are detected.

Unprotected structures during operation are surface structures of stationary platforms, so it was important to determine the degree of corrosion wear in a long-term section, i.e. to study the distribution of corrosion rates in height from sea level.

For this purpose, a separate base located at the Oil Rocks field at a depth of 11 meters was carefully examined.

From the point of view of the strength of the tubular support, it is important to determine the corrosion rate along the entire perimeter and height in the area of maximum corrosion.

If we summarize the corrosion wear and derive the arithmetic mean of the corrosion rate along the entire perimeter, then you can get a conditional idea of corrosion wear in general, the cross section of the tubular support.

The change in the average corrosion rate along the height of the support is shown in figure 1.

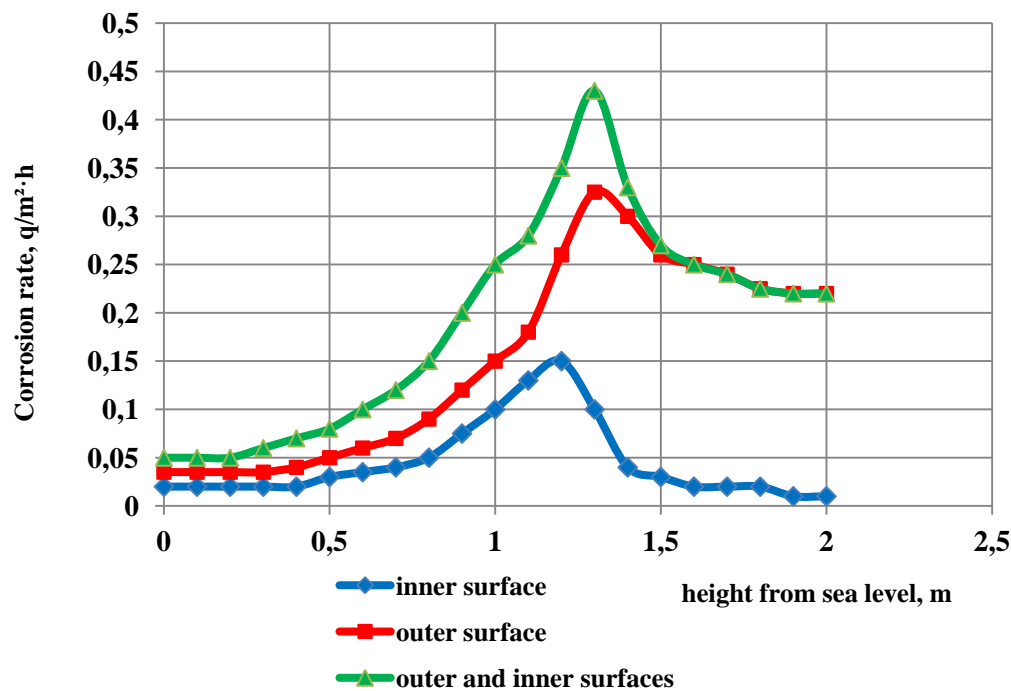


Figure 1 – Dependence of the corrosion rate along the entire perimeter of the foot of a stationary base on the height above sea level

As can be seen from the figure, the most corrosive area is located in the zone of periodic wetting with sea water.

Corrosion of steel in this zone develops under the film of electrolyte and corrosion products in the form of small frequent cavities and is activated by the depolarizing effect of hydrated oxides of ferric iron.

For the examined stationary platform, the thinning of the wall occurs at a speed of 0.23-0.43 mm/year in a section located at an altitude of 1-1.3 meters above sea level.

Dismantling the outer leg post of the stationary base, made after 20 years of operation without corrosion protection, and subsequent profiling of the surface showed that the highest average corrosion rate is 0.33 mm/year at a height of 1.3 m.

For the legs of stationary platforms, a characteristic is the fluctuation in the level of sea water in the annulus, as a result of which there is also corrosion on the inner surface of the foot of the base. Moreover, the maximum value of the average corrosion rate is 0.1 mm/year. Studies have shown that corrosion of the pipe wall from the inside and outside proceeds at a speed of more than 0.43 mm/year. Thus, taking into account local corrosion, individual through sores on pipes with a wall thickness of 11.0 mm can occur after 16-17 years of operation.

In order to assess the condition of multi-kilometer extent of OOHS erected in the Caspian, it is also necessary to determine the corrosion wear on real structures during periodic painting under operational conditions.

OOHS built in various water areas, differing in hydrometeorological conditions, have different operation life, a degree of corrosion protection and options for the embodiment of elements at separate facilities. All of the above mentioned determine the uneven corrosion wear of the building elements.

According to the results of mass surveys of the corrosion state of piles of operating structures, it is possible to assess the corrosion wear and determine the interval of its maximum and minimum values.

Figure 2 presents curves showing how the thickness of the wall of piles in the zone of periodic wetting changes over time in the absence of protection and when periodic protection is applied with the paint. Curve b shows corrosive wear at facilities located in the most severe conditions, with irregular corrosion protection.

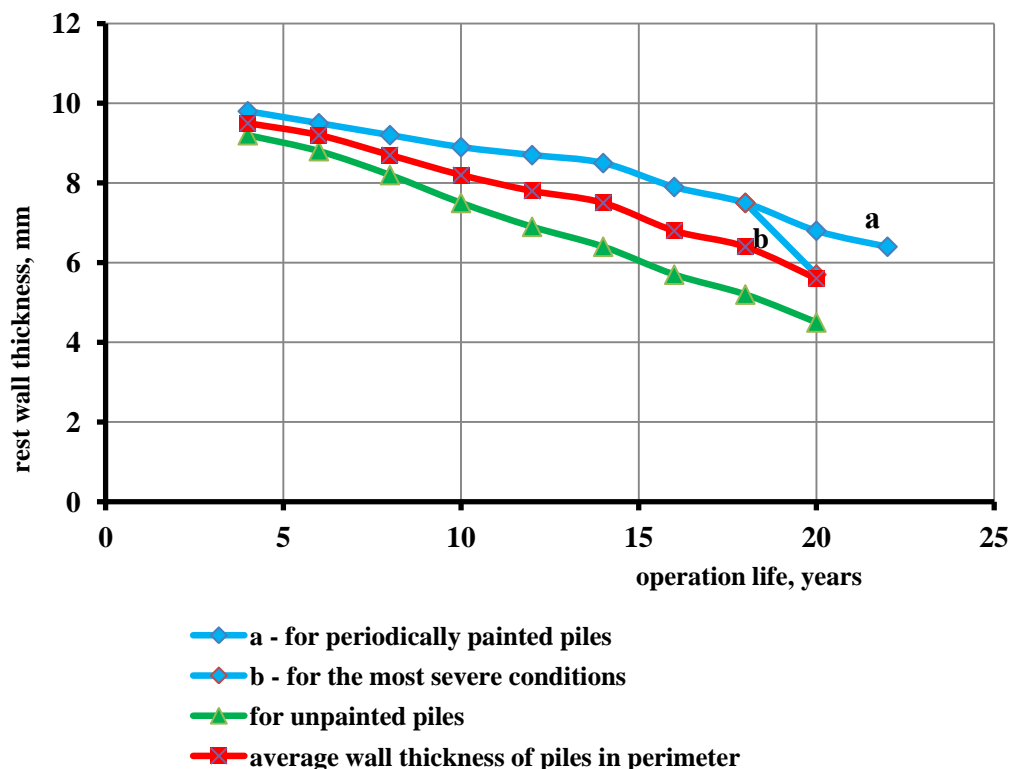


Figure 2 – Dependence of the average value of the remaining wall thickness of piles in the zone of maximum corrosion on the operating time

As can be seen from figure 2, after 16-20 years of operation of the supports, it becomes necessary to restore them in the zone of periodic wetting, while focusing on the increase in overhaul volumes.

The data obtained show that when staining piles operating in difficult conditions, natural corrosion wear is reduced by 40-50%, however, the necessary protection is not provided. It should be noted that the service life of the applied coatings on piles is relatively short and amounts to 2-2.5 years, and the possibility of coating due to frequent sea disturbances is limited to only 92 days a year.

A significant reduction in metal losses due to corrosion in the periodic wetting zone and an increase in the life of fixed assets can be achieved by protecting the support complex of structures with metal and thick polymer coatings applied in the factory.

If the coating is applied after the platform is installed at sea, the cost of the work may be 50-60% higher than carrying out these operations in the factory, and the quality is much lower.

In marine conditions, any damage to the paintwork or other coating is fraught with serious consequences. Therefore, it must be eliminated immediately. After the platform is installed at the point and the well drilling is completed, all anticorrosion coatings are updated in preparation for the next phase of operation. Subsequently, paint coatings are applied every 5-8 years.

In the practice of designing and building new OOHS, it is important to take into account the accumulated material by the nature of the corrosion and mechanical damage observed during operation.

Already, individual solutions should be reviewed both in the design and in the technology of manufacturing structures, work towards increasing operational reliability, significantly increasing the service life of structural elements located in the periodic wetting zone.

So, for example, significant loss of operability of underwater communications in water areas with a hard wave effect indicates that in such conditions it is necessary to use supports from separate blocks manufactured on the shore.

When designing, it is necessary to exclude, if possible, getting into the zone of periodic wetting of connecting parts and welds. The technology for the manufacture of structures of the surface complex of structures should provide for high-quality factory deposition of corrosion-resistant coatings that provide at least 30 years of service without restoration of the structure.

The practice of operating OOHS has shown that the anticorrosive protection of the supports carried out during operation is ineffective, therefore only a positive solution to the tasks posed will reduce the amount of expensive repair work carried out on the support of towers, significantly increase the overhaul period, and thereby increase the economic efficiency of the operation of structures in general.

If it is necessary to conduct anti-corrosion measures in the conditions of operating supports of hydraulic structures in the zone of periodic wetting, it is very advisable to use lubricating compositions. For this purpose, a lubricant composition based on locally produced products was developed. BNB 70/30 grade bitumen, technical salomas, heavy high-temperature resin, "KAB" brand bactericidal inhibitor were used in developing this grease, and natural bitumen containing sand and clay were used as a filler [21].

Field tests of lubricant were carried out at 34 overpass platform of OGEI named after N.Narimanov. Field tests have shown that the lubricant has anticorrosive and sealing properties, good hiding power, high adhesion to the metal surface, stability, and provides effective protection of hydraulic structures supports against corrosion in the periodic wetting zone.

To protect hydraulic structures in the atmospheric zone, a primer - rust converter and bitumen-polymer mastic (BPM) based on non-deficient local raw materials was developed and tested.

The new rust converter is based on phosphoric acid, bottoms of polypropylene glycol, isopropyl alcohol and surfactants. Upon receipt of the new BPM, organic solvents, BNV-70/30 bitumen, SKS rubber, water glass, polymer-propylene resin and natural bitumen containing sand and clay were used as filler. To enhance the anti-corrosion properties, corrosion inhibitors based on fatty acids, asidole, and light gas oil were introduced into the mastic, which also positively affect the hiding power and mechanical strength of the mastic.

Thus, the use of the developed compositions based on inexpensive products to protect the supports of hydraulic structures from corrosion damage during their operation allows preempting environmental damage and is economically feasible.

Conclusions. 1. Surveys have shown that on piles of overpass structures that have been in operation for 12-20 years, the corrosion rate is on average 0.22 mm/year.

2. The thinning of the wall of the stationary platform in the zone of periodic wetting at an altitude of 1.3 meters above sea level occurs at a speed of 0.33 mm/year. The average loss of pile wall thickness is 32%.

3. To protect the supports of hydraulic structures from corrosion in the atmospheric zone and in the period of periodic wetting during the destruction of the factory protective coating, it is proposed to use compositions based on cheap local raw materials.

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ЭКОЛОГИЯЛЫҚ ЗАЛАЛДЫҢ АЛДЫН АЛУ ҮШІН
КАСПИЙ ТЕҢІЗІНДЕГІ ГИДРОТЕХНИКАЛЫҚ ҚҰРЫЛЫСТЫҢ
КОРРОЗИЯЛЫҚ ЖАҒДАЙЫН ДИАГНОСТИКАЛАУ

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**ДИАГНОСТИКА КОРРОЗИОННОГО СОСТОЯНИЯ
ГИДРОТЕХНИЧЕСКИХ СООРУЖЕНИЙ НА КАСПИЙСКОМ МОРЕ
ДЛЯ ПРЕДОТВРАЩЕНИЯ ЭКОЛОГИЧЕСКОГО УРОНА**

Длительная эксплуатация нефтепромыслового оборудования и гидротехнических сооружений часто приводит к усилению коррозионного разрушения подземного и наземного оборудования. Это чревато возникновением аварий, пожароопасных ситуаций и неконтролируемым разливом нефти, что становится причиной не только прямых материальных потерь, но и нарушения экологического равновесия.

Для оценки коррозионного состояния эксплуатируемых морских нефтепромысловых гидротехнических сооружений (МНГС) проводились массовые измерения толщины стенки элементов конструкций ультразвуковым толщиномером. Обследования показали, что на сваях эстакадных сооружений, эксплуатирующихся в течение 12-20 лет, скорость коррозии в среднем составляет 0,22 мм/год. При этом на отдельных объектах она колеблется от 0,15 до 0,28 мм/год. Средние потери толщины стенки свай составляют 32 %, а на отдельных объектах - от 17 до 51%.

Обследование свай после многолетней эксплуатации без антикоррозионной защиты показывает, что продукты коррозии неравномерно покрывают их поверхность. При этом обнаружено, что распределение продуктов коррозии зависит не только от гидрометеорологических условий акватории расположения объекта, но и от глубины моря, рельефа дна, розы ветров, расположения опор под перекрывающими конструкциями, т.е. от степени солнечного облучения поверхности. Например, при глубине моря 11 метров и солнечном облучении с южной и западной стороны опора с северной стороны покрыта слоистыми продуктами коррозии от уровня моря до 4,5 м, а с южной стороны – только до 2,3 м.

Так, на незащищаемых сооружениях уже через 18-20 лет эксплуатации обнаруживаются сквозные коррозионные поражения на трубчатых элементах с первоначальной толщиной стенки, равной 11,0 мм.

Для обследованной стационарной платформы утончение стенки происходит со скоростью 0,23-0,43 мм/год в сечении, расположенном на высоте 1 -1,3 метра над уровнем моря.

Демонтаж наружной стойки ноги стационарного основания, произведенный после 20 лет эксплуатации его без антикоррозионной защиты, и последующее профилирование поверхности показало, что наибольшее значение средней скорости коррозии составляет 0,33 мм/год на высоте 1,3 м.

Для ног стационарных платформ характерным является колебание уровня морской воды в межтрубном пространстве, вследствие чего отмечается также коррозия на внутренней поверхности ноги основания. При этом максимальное значение средней скорости коррозии составляет 0,1 мм/год. Исследования показали, что коррозия стенки трубы с внутренней и внешней стороны протекает со скоростью более 0,43 мм/год. Таким образом, с учетом местной коррозии отдельные сквозные язвы на трубах с толщиной стенки 11,0 мм могут возникать уже через 16-17 лет эксплуатации.

Значительного сокращения потерь металла на коррозию в зоне периодического смачивания и увеличения срока службы основных фондов можно достичь, защитив опорный комплекс сооружений металлическими и толстослойными полимерными покрытиями, наносимыми в заводских условиях.

При необходимости проведения антикоррозионных мероприятий, осуществляемых в условиях эксплуатации опор гидротехнических сооружений в зоне периодического смачивания, весьма целесообразным является использование смазочных композиций. С этой целью была разработана смазочная композиция на основе продуктов местного производства. При разработке данной смазки использовались битум марки БНБ 70/30, саломас технический, тяжёлая пиролизная смола, бактерицид-ингибитор марки «КАБ» и в качестве наполнителя – природные битумы, содержащие песок и глину.

Промысловые испытания смазочного материала были проведены на эстакадной площадке № 34 НГДУ им. Н.Нариманова. Промысловые испытания показали, что смазочный материал обладает антикоррозионными и уплотняющими свойствами, хорошей укрывистостью, высокой адгезией к поверхности металла, стабильностью, обеспечивает эффективную защиту опор гидротехнических сооружений от коррозии в зоне периодического смачивания.

Для защиты гидротехнических сооружений в атмосферной зоне были разработаны и испытаны грунтотка – преобразователь ржавчины и битумно-полимерная мастика (БПМ) на базе недефицитного местного сырья.

Новый преобразователь ржавчины разработан на основе ортофосфорной кислоты, кубового остатка ПОЛИпропиленгликоля, изопропилового спирта и ПАВ. При получении новой БПМ были использованы органические растворители, битум БНВ-70/30, каучук СКС, жидкое стекло, смола полимерная-пропиленовая и в качестве наполнителя природные битумы, содержащие песок и глину. Для усиления антикоррозионных свойств в состав мастики были введены ингибиторы коррозии на основе жирных кислот, асидола и легкого газойля, которые положительно влияют также и на укрывистость и механическую прочность мастики.

Ключевые слова: гидротехнические сооружения; коррозия; агрессивность среды, зона периодического смачивания.

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DEVELOPMENT OF REPAIR KITS FOR KNOTS OF TRANSPORT EQUIPMENT AND TECHNOLOGICAL EQUIPMENT

Abstract. Sliding and rolling bearings are applied in transportation and production equipment, these bearings operate under high loads in reciprocating/rotary mode. They are used in railroad, road, and agricultural transport for suspensions, dampers, steering, shaft drives, in garment equipment, mining, oil and gas production and processing, as well as some other industries. However, their operation lifetime is insufficient and recovery of such couplings by conventional methods comprised of replacement with repair kits of similar design does not solve this problem.

As assumed in this article, the operation lifetime of couplings operating under heavy loading in reciprocating/rotary mode can be increased by improved recovery of their operability using repair kits based on new operation principles of tribocouplings, that is, sliding bearings with movable spring bearing boxes.

The design of repair kit design of rubber bushing in the form of sliding bearing with movable conical spring boxes has been theoretically substantiated. Mathematical models of size variations of movable conical spring box of sliding bearing of damper rubber bushing have been developed.

Theoretical importance of the work is comprised of the expanded proven concepts of recovery of damper rubber bushings using repair kits with movable spring boxes. Practical significance is that the developed repair kits of damper rubber bushing are characterized by operation lifetime higher by 1.5...2 times in comparison with regular kits.

The obtained results can be applied for development of new engineering solutions, for improvement of recovery of transportation and production equipment with couplings operating under high loads in reciprocating/rotary mode.

Key words: repair kit, spring boxes, vehicle suspension, dampers.

Introduction. Transportation and production equipment operates with sliding and rolling bearings under high loads in reciprocating/rotary mode. Such bearings are used in railroad, road and agricultural transport in suspensions, dampers, steering, shaft drives, in garment equipment, mining, oil and gas production and processing, as well as some other industries. Manufacturing companies of the equipment are requested to increase operation lifetime retaining reliability of parts, units, assemblies and systems. However, at the design and manufacturing stages, these problems are solved insufficiently, and during operation it is required to carry out functional tuning in order to improve operation quality [1]. Functional tuning, besides all, assumes application of repair kits in units and assemblies in order to recover their working state and even for improvement of their operation lifetime.

Numerous works are devoted to provision of operability of transportation equipment in the course of operation lifetime: Avdon'kin, Apsin, Grebennikov, Grigor'ev, Gurvich, Denisov, Dyumin, Zvyagin,

Kanarchuk, Kramarenko, Kuznetsov, Novikov, Savel'ev, Sheinin, N. Gkikas, J. Little, D. Cormick, S. Bennett, I.A. Norman, and others [2,10,11,13,14].

Analysis of operation reliability of passenger cars evidences that suspension elements are not characterized by equal lifetime during overall operation period [3]. Dampers are the most expensive suspension elements. The frequency of their failures is about 17%, specific labor consumption required for recovery is about 12%. Operation lifetime of dampers depends on operation conditions of cars and does not exceed 70 thous. km. The most popular and typical couplings operating under high loads in reciprocating/rotary mode are rubber bushings of car dampers. Rubber bushings fail due to wear and fatigue breakages. Conventional recovery of such couplings by replacement with repair kits of similar design is not efficient because operation lifetime is not increased. Therefore, it is important to search for new engineering approaches aiming at improvement of lifetime of couplings of transportation and production equipment operating under high loads in reciprocating/rotary mode, as well as at improvement of their operability recovery using repair kits.

This work substantiates theoretically the design of repair kit of rubber bushing containing tribocoupling based on new operational principle: sliding bearing with movable conical spring boxes.

Methods. Operation lifetime of tribocouplings, in particular: sliding bearings operating under high loads in reciprocating/rotary mode, can be improved by using concepts of Prof. Zhukovsky about motion without friction leading to its decrease in working body [4].

The first concept was comprised of friction compensation by auxiliary counter-motion of intermediate support driven by external energy source. The second concept differs by application of supplemental lateral motion (instead of counter-motion) of platform, its speed should exceed significantly the sliding speed of a body over platform. The second concept can be implemented by various designs, including those without external energy source, for instance, due to remaining disequilibrium of rotating body. Implementation of these concepts using forced rotation or vibration of intermediate support confirmed possibility to decrease friction in working body. These concepts were embodied in gyroscopes on the basis of specialized reverse rotary support: ball bearings with two rows of balls and intermediate rings which rotated in opposite directions by means of toothed gearing. In internal combustion engines with undermounted camshafts and motion transfer to valves via plungers and rods, the cam wear is insignificant, which can be attributed to the second concept by Zhukovsky: existence of auxiliary lateral motion (plunger rotation) and conversion of sliding friction to rolling friction achieved by cam displacement relatively to plunger rotation axis.

The repair kit with cylindrical spring box was developed for crossarms of various vehicles [5].

However, cylindrical spring box is characterized by certain disadvantages: difficulties in manufacturing and assembling due to necessity to apply selective method.

Theoretical substantiation of conical spring box for damper rubber bushing in comparison with cylindrical box. In conical spring box the required coupling conditions are provided automatically by the box design. The conical box in sliding bearing for reciprocating/rotary motion is characterized by peculiar positioning. In rest state the conical spring box at half of its length (on the side of lower diameter) is positioned rightly reaching zero in the middle of the box on shaft and having the same positioning on the bushing on the side of higher diameter of the spring box. Such positions provide guaranteed allowance on both working surfaces, thus meeting the requirements of bearing operability: plastic deformation on working surfaces [6].

The mathematical model of conical spring box of sliding bearing of damper rubber bushing is based on the mathematical model for cylindrical spring box.

The conical spring box differs from the cylindrical one, hence, the following assumptions have been made for predictions:

- absolute linear deformation of spring box f_x equals to 1 mm due to negligible deformation of spring box in rubber bushing;
- the length of spring box in loaded state H_x equals to H_0 because the spring is unloaded;
- the pitch angle of coils of spring box in unloaded (free) state is $\alpha = 1.83^\circ$
- the initial pitch angle of screw beam axis of unloaded spring box is $\alpha = \alpha_0$.

The sliding bearing for reciprocating/rotary motion is proposed [5,6] with partial implementation of the Zhukovsky's concepts about motion without friction (by rotation of intermediate support) without application of external energy source.

Tribocoupling (figure 1) is comprised of the shaft 1, the external ring 2 and the spiral box 3 in the form of coiled spring positioned between them. The spiral box is movable, conical with the cone angle from 1° to 5° , herewith, the spring wire diameter d equals to one half of the gap between the shaft diameter D and the diameter of box opening $D+2d$. Herewith, it is installed with allowance at edges as well as with allowance at internal and external surfaces for constant ratchet effect [7,12].

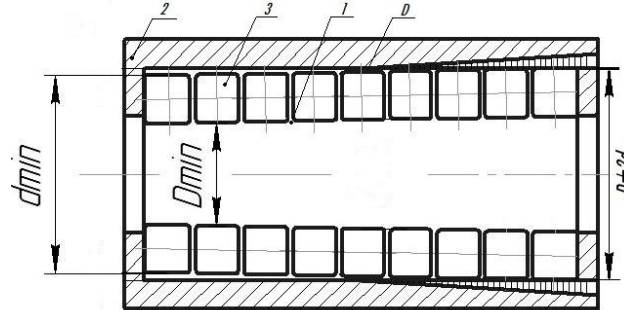


Figure 1 – Sliding bearing for reciprocating/rotary motion

The identifying feature of the bearing design is that it is equipped with movable box in the form of conical coiled spring (intermediate element) which in oscillating mode is forced only in one direction, thus providing uniform wear and lubrication distribution due to decrease in adhesive constituent of friction and occurrence of ratchet effect [9].

Tribological principles are executed in the bearing: activation of working surface by plastic deformation and suppression of oxidation.

Activation of working surfaces by plastic oxidation is provided by installation of elastic spring box between external and internal bushings so that to achieve certain allowance on working surfaces of the box. Herewith, during operation (rotation to one direction) the allowance increases on one working surface and decreases on the other working surface up to formation of gap and sliding. When rotating to another direction, the gap is replaced with allowance and vice versa.

Suppression (restriction) of oxidation on working surfaces of bearings is supported by design, because sealing glands are used preventing access of oxygen and other oxidants to working surfaces, or by addition of inhibitors to lubricants.

The developed bearing is the main element of innovative repair kit of damper rubber bushing (figure 2).

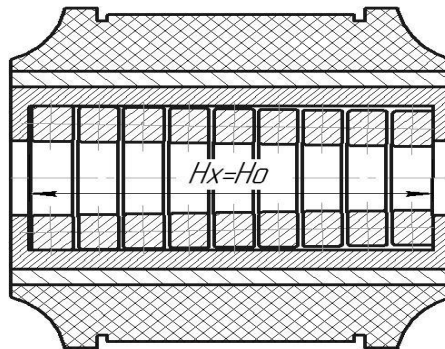


Figure 2 – Schematic view of damper rubber bushing with movable conical box

Mathematical model of size variation of conical movable spring box of sliding bearing of damper rubber bushing was developed [7].

The developed mathematical model can be applied to theoretical predictions of rubber bushing bearing included in the damper repair kit.

Results and discussion. Theoretical assumptions for development of sliding bearing with spring boxes are proved by laboratory studies of experimental repair kit of damper rubber bushing of passenger car performed with high precious instruments, as well as in working environment [8]. Practical

significance is that the developed repair kits of damper rubber bushing are characterized by operation lifetime higher by 1.5...2 times in comparison with regular kits operating in reciprocating/rotary mode.

Conclusion. The obtained results can be applied for development of new engineering solutions aimed at efficient operability maintenance of transport and agricultural equipment based on recovery improvement of couplings operating under high loads in reciprocating/rotary modes (for instance, steering, drive shafts, vehicle suspension) using repair kits.

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КӨЛІК ТЕХНИКАСЫНЫҢ ТҮЙІНІ МЕН ТЕХНОЛОГИЯЛЫҚ ЖАБДЫҚТАРҒА АРНАЛҒАН ЖӨНДЕУ ЖИЫНТЫҒЫН ДАМУ

Аннотация. Көлік техникасы мен технологиялық жабдықтардың конструкцияларында қайтарымды-айналмалы режимде жоғары жүктеме кезінде жұмыс жасайтын шайқалмалы және жылжымалы подшипниктер қолданылады. Олар теміржол, автомобиль және ауылшаруашылық көліктерінде, аспалы қондырғыларда, амортизаторларда, рульдік басқаруда, кардан берілістерде, тігін, тау-кен, мұнай және газ өңдеу жабдықтарында және басқа да салаларда қолданылады. Алайда олардың ұзақ уақыт қызмет етуі көп жағдайда жеткіліксіз, және осындай интерфейстерді дәстүрлі әдістермен қалпына келтіру, ұқсас жөндеу жинақтарымен алмастыру бұл мәселені шеше алмайды.

Авторлардың ойынша, қайтарымды-айналмалы режимде үлкен жүктеме кезінде жұмыс істейтін түйіндемелердің ұзақ уақытқа төзімділігін арттырудың жолы – трибожұптасу жұмысының жаңа принциптеріне құрастырылған жөндеу жиынтықтарын, атап айтқанда, жылжымалы серіппелі жапсырмасы бар сырғу мойынтіректерін пайдалану арқылы олардың жұмысқа қабілеттілігін қалпына келтіру технологиясын жетілдіру.

Жылжымалы конустық серіппелі кірістері бар жылжымалы подшипник түріндегі жөндеу блогының дизайны теориялық тұрғыдан негізделген. Амортизатор сайлентблогының жылжымалы конустық серіппелі мөлшерін өзгерту процесінің математикалық модельдері жасалды.

Зерттеудің теориялық маңыздылығы келесілермен дәлелденеді: жылжымалы серіппелі кірістері бар жөндеу жинақтары көмегімен амортизаторлардың сайлентблогын қалпына келтіру әдістері туралы идеяны кеңейтетін теориялық ережелер дәлелденді. Тәжірибенің мәні амортизатордың сайлентблогының жетілдірілген жөндеу жиынтығы стандарттан 1,5 ... 2 есе көп ресурсқа ие екендігінде жатыр.

Ұсынылған ғылыми зерттеулердің нәтижелері ауыр жүк астында жұмыс жасайтын және кері – айналмалы қозғалыстар жасайтын көліктік жабдықтары мен технологиялық жабдықтардың түйіндерін қалпына келтіру әдістерін жетілдірудің жаңа техникалық және технологиялық шешімдерін жасау үшін қолданылады.

Түйін сөздер: жөндеу жиынтығы, серіппелі салма, автомобиль көтергіші, амортизаторлар.

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РАЗРАБОТКА РЕМОНТНЫХ КОМПЛЕКТОВ ДЛЯ УЗЛОВ ТРАНСПОРТНОЙ ТЕХНИКИ И ТЕХНОЛОГИЧЕСКОГО ОБОРУДОВАНИЯ

Аннотация. В конструкциях транспортной техники и технологического оборудования применяются подшипники скольжения и качения, работающие при больших нагрузках в возвратно-вращательном режиме. Они используются в железнодорожном, автомобильном и сельскохозяйственном транспорте в узлах подвески, амортизаторах, рулевом управлении, карданных передачах, в оборудовании швейного, горнодобывающего, нефтегазодобывающего и перерабатывающего и некоторых других производствах.

Вместе с тем их долговечность, зачастую, недостаточна, а восстановление таких сопряжений традиционными методами путем замены на ремонтные комплекты, аналогичные по конструкции, не позволяет решить эту проблему.

Авторами выдвинута идея, что резервом повышения долговечности сопряжений, работающих при больших нагрузках в возвратно-вращательном режиме, является совершенствование технологии восстановления их работоспособности путем использования ремонтных комплектов, сконструированными на новых принципах работы трибосопряжений, а именно – подшипников скольжения с подвижными пружинными вкладышами.

Теоретически обоснована конструкция ремонтного комплекта сайлентблока в виде подшипника скольжения с подвижными коническими пружинными вкладышами. Разработаны математические модели процесса изменения размера подвижного конического пружинного вкладыша подшипника скольжения сайлентблока амортизатора.

Теоретическая значимость исследования обоснована тем, что: доказаны теоретические положения, расширяющие представление о методах восстановления сайлентблоков амортизаторов применением ремонтных комплектов с подвижными пружинными вкладышами. Значение для практики заключается в том, что разработанные ремонтные комплекты сайлентблока амортизатора имеют ресурс в 1,5...2 раза больший по сравнению со стандартным.

Представленные результаты научного исследования могут быть использованы для разработки новых технических и технологических решений для совершенствования методов восстановления узлов транспортной техники и технологического оборудования, где имеются сопряжения, работающие при больших нагрузках и совершающие возвратно-вращательные движения.

Ключевые слова: ремонтный комплект, пружинные вкладыши, подвеска автомобиля, амортизаторы.

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INTERNATIONAL TRADE COMPETITIVENESS OF KAZAKHSTANI SMALL AND MEDIUM ENTERPRISES (SMEs)

Abstract. Small and medium sized business as an institutional sector of the economy for many years have been dominated by the number and volume of production in the leading countries of the world. Enterprises with a small number of workers provide the flexibility and sustainability of the economic system of the region, brings it closer to the needs of specific consumers and, at the same time, perform an important social role, providing jobs and providing sources of income for a significant number of populations. Although throughout the entire period of the market economy in Kazakhstan, problems of the development of small and medium sized businesses received a lot of attention; including measures such as economic reform, implementation of strategic programs; its social-economic status is still suboptimal. Nevertheless, recent efforts of the state to create a regulatory framework for the support of small and medium sized businesses have not solved the problems of creating a favorable climate for this sector of the economy. The development of small and medium sized businesses, in turn, affects the competitiveness of national market participants at the international level. One of the main tasks in the development of this sphere is the entry of the Kazakhstani market to the international level, increasing its competitiveness. Thus increasing the share of exports of domestic goods to the country's gross domestic product, as well as the country's full-fledged transition to a market economy. In this research work, an analysis of doing business in Kazakhstan, prospects for the development of medium and small sized businesses, as well as the level and prospects of competitiveness of domestic entrepreneurs at the international level will be carried out.

Key words: International competitiveness, small and medium sized enterprises, market economy, entrepreneurship types.

Introduction. It is the 28th anniversary of independence of the Republic of Kazakhstan in 2019. Since the proclamation of independence, the country showed itself as the powerful economic state in a region. The main economic indicators showed impressive progress. According to OECD data, from 2000 to 2014, Kazakhstani GDP growth averaged 7.7% per year in real terms, which contributed to the creation of over 2 million work places [1]. However, the difficult international situation has led to a general economic slowdown. GDP growth decreased from 4.1% in 2014 to 1.1% in 2016 [2] and nowadays it increased to 4.1% in 2018. In response to these challenges, government planned to accelerate the implementation of structural reforms aimed at promoting diversified economic development, increasing the productivity and efficiency of the state apparatus. Under these conditions, it was necessary to enhance the role of the private sector, in particular, by creating an appropriate incentive mechanism based on a clear, transparent and predictable business and investment climate. Therefore, following the international experience, the main attention was given to the development of small and medium sized enterprises in the country. During the entire period of the market economy in Kazakhstan, problems of the enhance of small and medium sized businesses received a lot of changes; including measures such as economic reform, implementation of strategic programs; its social-economic status is still suboptimal [3]. According to Doctor of Juridical Sciences S. Moroz, the problem is not even in the quantitative parameters of the functioning of this sphere, which are dynamically improving, but, above all, in creating certain conditions for the development of small and medium sized business, the management structure of domestic business, and its effective

cooperation with large enterprises in the regions [4]. Moreover, small and medium sized enterprises are more flexible and sustainable; and do respond for demands of population in a specific region.

The methodological basis for the study consists of general scientific methods and special methods. Among the general scientific methods, we chose following theoretical and practical methods: dialectical, logical, systems analysis and synthesis, data and statistical analyzing, induction and deduction. Moreover, in this scientific work were used special method as statistical method for the study of the economic environment and studying official data.

The problems of national business development and the importance of their subjects' competitiveness on the international trade arena are given sufficient attention by scientists and practitioners. Among them it is necessary to distinguish such as: Porter M., Gorfinkel V., Kononkova I., Kaminsky I., Dorsati H. Madani, Sarsenov I., Nurpeisov B., Osipov J., Frumen S., Salzhanov I., Kochanovsky M. and others. But, despite a sufficient amount of research on these issues, a study of the current state is required, as well as the competitiveness of small and medium sized businesses in the international trade arena.

The main part. The term "business" in current days is quite a familiar and understandable word, although this concept first appeared at the end of the 20th century. We will analyze this term by stages of its development. But as we know there is another similar for "business" definition - entrepreneurship, and in some cases it is the same. The concept of "entrepreneurship" originated in the XVIII - XIX centuries.

Table 1 – Definition of business

| No | Author | Definition of "business" or "entrepreneurship" |
|----|--|--|
| 1 | Jean-Baptiste Say | ... an economic activity carried out through constant combination of factors, aimed at the efficient use of all resources and obtaining the highest results [5] |
| 2 | Alan Hosking | ... an activity carried out by private individuals, enterprises or organizations to extract natural goods, the production or acquisition and sale of goods or the provision of services in exchange for other goods, services or money for the mutual benefit of interested persons or organizations [6] |
| 3 | R. Hizrich | ... an entrepreneurship as the process of creating something new that has value, and an entrepreneur is a person who spends on it all the necessary time and forces, assumes all financial, psychological and social risk, receiving money and satisfaction in accomplishment as a reward [7] |
| 4 | V. Konoplitky, A. Filin | ... any organized legal activity, the main purpose of which is to make a profit. Regulated by national legislation and international agreements [8] |
| 5 | Entrepreneurial Code of the Republic of Kazakhstan | ... an independent, initiative activities of citizens, oralmans and legal entities aimed at obtaining net income through the use of property, production, sale of goods, performance of work, provision of services, based on the right of private property (private entrepreneurship) or on the right of economic management or operational management of a state enterprise (state entrepreneurship) [9] |

On the basis of the definitions above, it can be noted that the meaning of the term “business” changes under the influence of the development of market relations [10]. Despite the fact that there is no universal definition for the term of business and its three "quantitative" types, most countries of the world do distinguish them by two main criteria, which we can see in the table below:

Table 2 – SME criteria in the world [9,11,12,13,14,15]

| Country | Micro enterprise | | Small enterprise | | Medium enterprise | |
|---------------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|
| | Employees' number | Annual income | Employees' number | Annual income | Employees' number | Annual income |
| Kazakhstan | | | <100 | 300 000 MRP | <250 | 3 mln MRP |
| Russia | <15 | 120 mln RUB | <100 | 800 mln RUB | <250 | 2 bln RUB |
| Ukraine | <10 | 2 mln EUR | <50 | 10 mln EUR | <250 | 50 mln EUR |
| Belarus | <15 | | <100 | | <250 | |
| Sweden | | | <50 | 50 mln SEK | – | – |
| European Commission | <10 | 2 mln EUR | <11-50 | 10 mln EUR | <250 | 50 mln EUR |
| OECD | <9 | | 0-49 | | 50-250 | |

The formation of small and medium sized businesses in the Republic of Kazakhstan from the first days of economic reforms became to one of the priorities of the state's economic policy. Now, after almost thirty years of sovereign Kazakhstan, the development of the economy and the enhance of small and medium sized businesses were divided into seven stages, each of which has its own distinctive features.

Table 3 – Establishment of Kazakhstani business [16]

| Stage | Short name of the period | Period | Main features |
|-------|--|------------|--|
| I | Price liberalization | 1991-1992 | Emergence of small enterprises; focus on sales of products, repair and maintenance of production facilities; the 1st program for the business development. |
| II | Tight monetary and restructuring fiscal policy | 1993-1995 | Abolition of tax incentives; negative consequences of policy of small enterprises |
| III | Boom of small-scale privatization | 1996-1997 | Slight macroeconomic stabilization; decentralization of the business management |
| IV | Qualitative development of the economy | 1998-2000 | Increase of GDP; stabilization of financial and credit spheres |
| V | The crisis time | 2000-2008 | The World crisis effect on the fragile economy of the country, confession of vulnerability of national market |
| VI | Floating exchange rate | 2009-2014 | Slow decrease of GDP; weakening of national currency; floating exchange rate in February 2014 |
| VII | The new direction of the economy | 2015-today | New external influences; changing of economic policies and transformation to the manufacturing economy |

In accordance with A. Seyit, the competitive environment in the Republic of Kazakhstan is in the formative stage, therefore the management of this process is one of the urgent problems of the development of our country [17]. In comparison, we can see from today's developed Western countries, whose small firms make up 70-90% of the total number of enterprises. For instance, the United States - where 53% of the total population is employed in small businesses, Japan - from its 71.7% and the EU countries, where about half of the working population work in similar enterprises [18]. Only these figures indicate the enormous importance of small businesses for the economies of these countries. The effectiveness of these firms is supported by the fact that they introduce 17 times more innovations and developments at a cost of \$ 1 than large enterprises, which gives only 10% of new technologies, and the remaining 90% introduce small enterprises and independent inventors [19]. Therefore we can say that small and medium sized enterprises are engines of the country's competitiveness on the national and international arena. Since then many scholars have been trying to find the key factors of being competitive on the trade market. For now, there are three main useful analysis of the competitiveness level of countries' enterprises in the global arena: PEST analysis, Nine factors analysis, Diamond analysis.

Traditionally, the PEST analysis concerns the study of the macro environment only, which includes a sufficiently large number of factors, therefore, of their total number, it is customary to consider only four key areas that have the most significant impact on the organization's activities: political (P), economic (E), social (or socio-cultural) (S), technological (T) [20]. Here we say, to start own business in Kazakhstan, all the conditions for this were created in the country: political stability, support from the state, tax privileges, highly qualified personnel, a simplified system of work with state and law enforcement agencies, non-competitive society, and a multinational community. According to another one - Nine factors analysis, the category of "competitiveness", describing the state of the company, depends on a complex of following factors: Level 1: enterprise competitiveness; Level 2: rivalry: 1) product, 2) enterprise prosperity, 3) personnel; Level 3: competitiveness of goods (works, services): 1) price; 2) quality; enterprise competitiveness: 1) marketing, 2) finance, 3) development (flexibility); staff competitiveness: 1) qualification. We can come to the conclusion that, in order to increase the competitiveness of a domestic entrepreneur, although in the domestic market of the country, it is necessary to take into account all factors, and sometimes make concessions (put prices lower). Since, at the moment, the domestic

consumer has a much more diverse product on the market, and may well opt for a better product at a lower price. Moreover, now the consumer also has the opportunity to purchase goods via the Internet, that is, to purchase goods without leaving home.

Michael Porter's Diamond Model shows that any company is able to compete in the international arena if there is interrelated advantages in a certain area of industry of a country as: Firm Strategy, Structure and Rivalry; Factor Conditions; Demand Conditions; and Related and Supporting Industries [21]. In the table below we do show those enterprises which do satisfy Porter's Diamond's factors.

Table 4 – Diamond conditions for Kazakhstani SME

| No | Porter's Diamond conditions of being competitive | Kazakhstani companies owns Porter's Diamond conditions | How it works |
|----|--|---|---|
| 1 | Firm strategy, structure, rivalry | "Red Dragon", "April" LLP, "Kar-Tel" LLP, "Temir Bank" JSC | Inventing a new strategy, as open branches for specific goods; invention of USB modems; reduce number of employees and so on. |
| 2 | Factor condition | "Damu", "Atameken", "Bank Center Credit" PLC | Support of business; consultation of young entrepreneurs; giving bank credits. |
| 3 | Demand condition | "Locomotive-building Plant" JSC, "Tulpar-Talgo" LLP, "KSP Steel" LLP, "Pavlodar Pipe Rolling Plant" LLP, "Asia AVTO" JSC | Meet the current needs of consumers, study the current market and look at the situation in the region |
| 4 | Related and supporting industries | "Plant named after SM Kirov" JSC, "Blok" LLP, "Izolit" LLP, "PZTM" JSC, "Munaymash" JSC, "Zapchast" JSC, "Car building Plant" LLP, "Prommashkomplekt" LLP | Cooperation with other enterprises in order to satisfy consumers' demand and to be more competitive |

Moreover, there are a number of other problematic issues affecting the competitiveness of small and medium sized businesses in Kazakhstan, such as the unstable dynamics of growth in the number of enterprises and their employees; sphere and regional structure are irrational; attempts to manage an enterprise are often episodic and unscientific in nature; not all industries have developed a monetary system to protect the entrepreneur and his property from encroachment [4]; not a proper business management, decision-making, and personnel policy [22]; tax incentives for small and medium sized businesses it's a burden in running business and keep it on the surface [23]. Besides, macroeconomic factors could also affect on business, such as geographical location, macroeconomic stability, investment climate, exchange rate, inflation, institutions: the process of globalization, the world economic crisis, the fall of oil prices, the trade war between China and USA, the sanctions against Russian Federation [24]. In the modernization of the economy, financial institutions and the entire monetary system play an important role, respectively, issues related to the development and reform of the credit system of the Republic of Kazakhstan are becoming increasingly important [25].

To sum up this research, we believe that important aspects of the development of the institution of support for entrepreneurship should be:

- continuous support and protection of business by the state, which may even take on a planned and administrative character;
- training highly qualified personnel for the state apparatus and the business sector;
- legislative consolidation of the interaction between small and medium sized businesses and large businesses, for example, the share of state orders should be clearly fixed in the law for the sector of small and medium sized businesses, the inclusion of small and medium sized enterprises in the system of cooperating with large enterprises [26];
- easing the tax regime and simplifying tax administration procedures for small and medium sized businesses;
- liberalization of procedures for entering foreign markets;
- development of credit and financial institutions, for example, by creating credit cooperatives of entrepreneurs [27];
- direct government lending to small and medium sized businesses, bypassing second-tier banks;
- providing guarantees for small and medium sized businesses using government securities;
- development of alternative mechanisms for financing business activities [28];

- stimulating the creation of a network of integration associations of interconnected enterprises (clusters) [29];
- assistance in ensuring access of small and medium sized businesses to the results of research and development;
- strengthening the revenues of regional budgets by increasing the portion of the income tax transferred to local budgets for the profit of small and medium sized businesses engaged in entrepreneurial activities in the region [30].

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ҚАЗАҚСТАНДЫҚ ШАҒЫН ЖӘНЕ ОРТА КӘСІПОРЫНДАРДЫҢ (ШОК) ХАЛЫҚАРАЛЫҚ НАРЫҚТЫҚ БӘСЕКЕГЕ ҚАБІЛЕТТІЛІГІ

Аннотация. Көптеген жылдар бойы экономиканың дербес институционалдық секторы шағын және орта кәсіпорындар әлемнің жетекші елдеріндегі көлемі мен сапасы бойынша өнім нарығындағы доминанттар болып келді. Қызметкерлердің саны шағын кәсіпорындар, өз кезегінде, аумақтың экономикасын одан әрі қалыптастыру және ауысымды етіп жасайды, пайдаланушылардың ниеттеріне одан әрі жақын, сонымен қатар маңызды әлеуметтік рөл атқарып – халықты жұмыспен қамтып, осы халыққа жалақы төлейді. Қазақстан Республикасында шағын және орта бизнесті қалыптастыру экономикалық реформалардың алғашқы күнінен бастап, мемлекеттің экономикалық саясатының басым бағыттарының бірі болды. Қазір, Егемендік алғаннан отыз жылдан кейінгі Қазақстанда экономиканың дамуы мен шағын және орта бизнестің дамуы жеті кезеңге бөлінді, олардың әрқайсысының өзіндік ерекшеліктері бар. Бұл кезеңде Қазақстан нарықтық экономикаға көшкен, шағын және орта бизнесті дамыту проблемаларына экономикалық реформалар, стратегиялық бағдарламаларды енгізу, оның әлеуметтік-экономикалық мәртебесін көтеру сияқты шараларды қоса алғанда, ерекше назар аударды.

Қазақстан Республикасындағы бәсекелестік орта қалыптастыру сатысында, сондықтан бұл процесті басқару біздің еліміздің дамуының өзекті мәселелерінің бірі болып саналады. Салыстыру үшін, біз шағын фирмалар кәсіпорындардың жалпы санының 70-90 %-ын құрайтын бүгінгі дамыған батыс елдерін қарастыра аламыз. Тек осы сандар ғана, елдердің экономикасы үшін шағын бизнестің үлкен маңызын көрсетеді. Бұл фирмалардың тиімділігі ірі кәсіпорындарға қарағанда құны 1 доллар болатын инновациялар мен әзірлемелерді 17 есе көп енгізетінімен расталады, бұл жаңа технологиялардың тек 10 %-ын ғана береді, ал қалған 90 %-ын шағын кәсіпорындар мен тәуелсіз өнертапқыштарды қамтиды. Отандық кәсіпкердің бәсекеге қабілеттілігін арттыру үшін елдің ішкі нарығында да барлық факторларды ескеру, ал кейде басқаға беру (бағаны төмендету) қажет деген қорытындыға келуге болады. Қазіргі уақытта отандық тұтынушының нарықта әлдеқайда алуан түрлі тауары бар болғандықтан және неғұрлым төмен бағамен үздік тауардың пайдасына таңдау жасай алады. Бұдан басқа, енді тұтынушылардың тауарларды интернет, яғни тауарларды үйден шықпай-ақ сатып алуға мүмкіндігі бар.

Бұдан басқа, Қазақстанда шағын және орта бизнестің бәсекеге қабілеттілігіне әсер ететін кәсіпорындар мен олардың қызметкерлері санының өсуінің тұрақсыз серпіні сияқты бірқатар проблемалық мәселелер бар; салалық және өңірлік құрылым иррационалды; кәсіпорынды басқару әрекеттері жиі эпизодтық және ғылыми емес сипатқа ие; барлық салаларда кәсіпкер мен оның мүлкін қол сұғушылықтан қорғау үшін ақша-кредит жүйесі дамымаған; бизнесті тиісінше басқару, шешімдер қабылдау және кадр саясаты жолға қойылмаған; шағын және орта бизнес үшін салық жеңілдіктері бизнес жүргізуіне тиімсіз. Сондай-ақ бизнеске географиялық жағдай, макроэкономикалық тұрақтылық, инвестициялық ахуал, валюта бағамы, инфляция, институттар: жаһандану процесі, әлемдік экономикалық дағдарыс, мұнай бағасының төмендеуі, Қытай мен АҚШ арасындағы сауда соғысы сияқты макроэкономикалық факторлар әсер етуі мүмкін. Экономиканы жаңғыртуда қаржы институттары және барлық ақша-кредит жүйесі маңызды рөл атқарады, тиісінше, Қазақстан Республикасының кредиттік жүйесін дамыту мен реформалауға байланысты мәселелер барынша үлкен мәнге ие болады.

Алайда шағын және орта кәсіпкерлікті дамыту үшін қолайлы экономикалық ахуалды қамтамасыз етуге қатысты барлық қабылданған шараларға қарамастан, бірқатар шешілмеген мәселелер әлі де қалып отыр. Шағын және орта бизнестің дамуы ұлттық нарық қатысушыларының халықаралық аренадағы бәсекеге қабілеттілігіне әсер етеді. Осы саладағы негізгі міндеттердің бірі – қазақстандық тауарды халықаралық нарыққа кіргізу және оның бәсекеге қабілеттілігін арттыру. Осы ғылыми зерттеу жұмысында Қазақстанда бизнесті жүргізуді талдау, шағын және орта бизнесті одан әрі дамыту, халықаралық сауда нарығындағы отандық тауардың бәсекеге қабілеттілігі қарастырылады.

Түйін сөздер: халықаралық бәсекеге қабілеттілік, кіші және орта кәсіпорындар, нарықтық экономика, кәсіпорын түрлері.

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МЕЖДУНАРОДНАЯ ТОРГОВАЯ КОНКУРЕНТОСПОСОБНОСТЬ КАЗАХСТАНСКИХ МАЛЫХ И СРЕДНИХ ПРЕДПРИЯТИЙ (МСП)

Аннотация. На протяжении многих лет малые и средние предприятия как самостоятельный институциональный сектор экономики являлись доминантами на рынке продукции по объемам и по качеству в лидирующих странах мира. Предприятия с меньшим количеством работников являются наиболее стабильными и гибкими в экономической системе региона, приближают их к наиболее необходимым требованиям потребителей, играют важную роль в общественной жизни, а также обеспечивают население работой, обеспечивают доходами это население. Формирование малого и среднего бизнеса в Республике Казахстан с первых дней экономических реформ стало одним из приоритетных направлений экономической политики государства. Сейчас, после почти тридцатилетнего суверенного Казахстана, развитие экономики и развитие малого и среднего бизнеса были разделены на семь этапов, каждый из которых имеет свои отличительные особенности. На протяжении периода времени как Казахстан перешел на рыночную экономику, проблемам развития малого и среднего бизнеса уделяется особое внимание, включая меры, как: экономические реформы, введение стратегических программ, поднятие его социально-экономического статуса.

Конкурентная среда в Республике Казахстан находится в стадии формирования, поэтому управление этим процессом является одной из актуальных проблем развития нашей страны. Для сравнения мы можем видеть из сегодняшних развитых западных стран, чьи малые фирмы составляют 70-90% от общего числа предприятий. Только эти цифры свидетельствуют об огромном значении малого бизнеса для экономики этих стран. Эффективность этих фирм подтверждается тем, что они внедряют в 17 раз больше инноваций и разработок стоимостью в 1 доллар, чем крупные предприятия, что дает лишь 10% новых технологий, а остальные 90% включают в себя малые предприятия и независимых изобретателей. Можно прийти к выводу, что для повышения конкурентоспособности отечественного предпринимателя, хотя и на внутреннем рынке страны, необходимо учитывать все факторы, а иногда и идти на уступки (снижать цены). Так как на данный момент отечественный потребитель имеет на рынке гораздо более разнообразный товар, и вполне может сделать выбор в пользу лучшего товара по более низкой цене. Более того, теперь потребитель также имеет возможность приобретать товары через интернет, то есть приобретать товары, не выходя из дома.

Кроме того, существует ряд других проблемных вопросов, влияющих на конкурентоспособность малого и среднего бизнеса в Казахстане, таких как нестабильная динамика роста числа предприятий и их работников; отраслевая и региональная структура иррациональны; попытки управления предприятием носят зачастую эпизодический и ненаучный характер; не во всех отраслях развита денежно-кредитная система для защиты предпринимателя и его имущества от посягательств; не налажено надлежащее управление бизнесом, принятие решений и кадровая политика; налоговые льготы для малого и среднего бизнеса это бремя в ведении бизнеса. Также на бизнес могут влиять и макроэкономические факторы, такие как географическое положение, макроэкономическая стабильность, инвестиционный климат, валютный курс, инфляция, институты: процесс глобализации, мировой экономический кризис, падение цен на нефть, торговая война между Китаем и США. В модернизации экономики важную роль играют финансовые институты и вся денежно-кредитная система, соответственно, все большее значение приобретают вопросы, связанные с развитием и реформированием кредитной системы Республики Казахстан.

Однако, несмотря на все предпринятые меры, проблемы касательно обеспечения благоприятного экономического климата для развития малого и среднего предпринимательства, ряд нерешенных вопросов еще остается. Развитие же малого и среднего бизнеса влияет на конкурентоспособность участников национального рынка на международной арене. Одними из основных задач в данной сфере являются: вхождение казахстанского товара на международный рынок, увеличить его конкурентоспособность. В данной исследовательской работе рассматривается анализ ведения бизнеса в Казахстане, дальнейшее развитие малого и среднего бизнеса, конкурентоспособность отечественного товара на международном торговом рынке.

Ключевые слова: международная конкурентоспособность, малые и средние предприятия, рыночная экономика, виды предпринимательства.

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ECONOMIC AND MATHEMATICAL MODEL FOR FORECASTING DIRECTIONS OF DEVELOPMENT OF HUNTING ENTERPRISES

Abstract. The article summarizes arguments and counterarguments within the scientific discussion on the development of the hunting enterprises. The aim of the article is to construct an economic and mathematical model for determining the number of wild hunting animals, in which the production and economic activity of the enterprises of the hunting economy will be able to operate on the basis of self-sustainability and self-financing. The actuality of solving of this scientific problem is in the necessity of reformation of the hunting economy in Ukraine, which provides formation of the national conception of its organization and development, which would base on the effective economic, ecological and social instruments; and which, at the same time, would take into account national management traditions. In order to construct an economic and mathematical model for predicting the directions of development of the hunting enterprises, the research was conducted in the following logical sequence: analyzed by what components are formed the total costs and total revenues from hunting economy; the boundary between the unprofitable and break-even level of hunting activity; according to the objective function, the theoretical principles of the economic and mathematical model were formulated, which allow to define the break-even quantity of hunting animals; four directions of development of the hunting enterprises are considered.

The methodical basis of the study were the methods of analysis, synthesis, economic and mathematical modeling, statistical method; the period of research – 2016-2017 years. The hunting facility of the Lviv region (Ukraine) was chosen as the object of the research as it gave us the opportunity to carry out additional calculations taking into account more optimistic directions of hunting economy development.

The research empirically confirms and theoretically proves that the hunting economy can function on the principles of self-sustainability and self-financing without going beyond the established and legally established norms.

Key words: economic and mathematical model, enterprises, hunting economy, wild hunting animals, break-even number of wild animals, capacity of hunting grounds.

Introduction. Ukraine is one of the largest countries in Europe and is characterized by extremely favourable territorial conditions, various environmental and climatic conditions, fertile lands, rich plant and animal world, and so on. Despite this situation, Ukraine is not without its problems. This is proved by the fact that the percentage of woodiness in the country is one of the lowest in Europe (15.9%) [1,2]. Another problem is the rather high anthropogenic pressure on the environment and the contamination of large areas of the country with radioactive substances, which leads to a decrease in the biodiversity of the animal and plant world. In particular, for the last few decades, the following animals and plants have been classified as rare or endangered: brown bear, lynx, otter, buzzard, eagle, yellow tortillas, and others [3].

The industrial and economic activity directed at the use, protection and reproduction of wildlife resources, which is engaged in specialized state forest, hunting and forestry farms, hunting associations and enterprises of other forms of ownership, is important in the structure of the national economy.

The objective necessity of reforming the hunting economy in Ukraine involves the formation of a national concept of its organization and development, based on effective economic, environmental and social instruments taking into account national traditions of management. One of the main reasons for the ecological and economic inefficiency of hunting-and-economic activities in Ukraine is the rather low number of wild hunting animals, which is why the cost of hunting is almost twice the amount of income. Analysis of the experience of hunting in the developed countries of the world proves that the production and economic activity of enterprises of the hunting economy can be profitable and operate on the principles of a market economy in accordance with the principles of sustainable ecologically balanced development.

The process of reforming the hunting economy is expensive and should be implemented gradually. The process of implementing an effective ecological and economic direction of the development of the hunting economy, which is aimed at achieving the optimal number of hunting animals in hunting grounds, acquires the longest time of establishment. Thus, the problem of economic stimulation of efficient reproduction and using of hunting resources is one of the key problems in modern science and it needs immediate resolution.

The organizational aspects of reforming and development of hunting economy in Ukraine are highlighted in the scientific works of such scientists as Bondarenko [4], Vovchenko [5], Delehan [6], Cherniavskiy [7], Dynka [6], Koval [9], Muraviov [10], Novikov [11], Protsiv [12], Siniakivych [13], Tunytsia [14], Khoietskiy [15], Sheihas [16] greatly contributed to solving the issues of the economic evaluation of the resources of the hunting economy, the ecological and economic stimulation of the using and protection of forest and fauna resources, as well as the state regulation of hunting and hunting in their scientific works.

The economic and mathematical modeling of the using of nature and its optimization as a scientific problem is considered in the works of many domestic and foreign scientists. However, despite the accumulated experience and the results obtained, the problem of economic and mathematical modeling and forecasting of the directions of development of hunting enterprises in the current conditions of reforming the economy of Ukraine deserves further study and becomes of special urgency.

The aim of the article: to construct an economic and mathematical model for determining the number of wild hunting animals, in which the production and economic activity of the enterprises of the hunting economy will be able to operate on the basis of self-sustainability and self-financing.

Methods. The theoretical basis of this research are the fundamental provisions of tourism science, economics of hunting, tourism and nature management, ecological economics, the theory of sustainable development, normative and legal support of activities in the field of hunting tourism. The methodical basis of the study were the methods of analysis, synthesis, economic and mathematical modeling, statistical method; the period of research – 2016-2017 years. The hunting facility of the Lviv region (Ukraine) was chosen as the object of the research as it gave us the opportunity to carry out additional calculations taking into account more optimistic directions of hunting economy development.

Results. The organized hunting and economic activities in Ukraine are conducted on the area of 38 340.6 thousand hectares, including the area covered by hunting regulation of 37 722.7 thousand hectares [17]. The largest part of the structure of Ukrainian hunting grounds is occupied by field lands – 28 334.2 thousand hectares (73.9%), and forest and wetlands – 7 857.5 thousand hectares (20.5%), 1 774.6 thousand hectares (4.6%) respectively [17]. In general, there are 1 113 legal entities on the territory of Ukraine engaged in organized hunting, 783 000 hunters were registered and 6 300 hunters and regular hunters were involved [2].

The payback of hunting economy of Ukraine constitutes about 46.9%. Total expenses on hunting are 284 018.2 thousand UAH with revenues 133 203.0 thousand UAH [17]. The average cost of hunting in Ukraine is 7 408 UAH per 1 thousand hectares, including the cost of protection and reproduction of hunting animals 3 266 UAH on 1 thousand hectares of hunting grounds [17].

The main condition for increasing the economic efficiency of the production and economic activities of hunting enterprises is not the reduction of the total costs of hunting, but rather the reduction of the number of game animals to their break-even level. For the last decade, Ukraine has seen a decrease in the number of ungulates, which are the basis for effective hunting farms. The density of wild animals in

hunting grounds is much lower than scientifically based indicators of their optimal capacity. This tendency makes it possible to argue about the ineffectiveness of the using of potential opportunities for hunting grounds that are not even capable of simply reproducing wildlife and the neediness to move to a new hunting economy based on the principles of a market economy.

In order to construct an economic and mathematical model, it is necessary to analyze what constituents generates the total costs and total revenues from the management of the hunting economy.

Total revenues from hunting economy are formed at the expense of [18]:

- implementation of licenses in accordance with the limit for hunting animals and additional licenses that are implemented in case of non-use of this limit;
- realization of shooting cards for fur animals and game birds;
- sales of hunting products (meat, skins, fat and trophies of wild hunting animals);
- provision of services to hunters in the hunting process (hunting services, trapping services, the use of enterprise transport (car or carriage), the development of carcasses of hunting animals, housing, clothing, weapons, documents, etc.);
- sponsorship.

The amount of revenues does not include entry fees and membership fees paid by hunters. In accordance with the constituent documents of public hunting organizations, funds received from entrance fees and membership fees are directed towards the reproduction of wild hunting animals.

Total costs for hunting are formed at the expense of wage costs of workers employed in hunting, the cost of guarding, reproduction and recording of wild hunting animals, the ordering of hunting grounds and other expenses related to the management of the hunting economy.

Other costs related to the management of the hunting economy include [18]:

- costs for the maintenance of hunting houses and hunting bases, office premises and production facilities, namely, the cost of their heating, lighting, maintenance;
- costs for the transport maintenance, hunting roads and their corresponding depreciation deductions;
- costs for the maintenance of hunting dogs, slaughter and hunting birds, horses, etc.;
- costs for the purchase and repair of hunting weapons, low-value inventory, stationery, etc.;
- other costs for business events.

The basis of forecasting the directions of development of hunting enterprises is laid the economic and mathematical model of break-even. Target function, which characterizes the level of break-even hunting activity, is described below:

$$F(X(Q), Y(Q)) = f_2(Y(Q)) - f_1(X(Q)) \rightarrow \min, [0; -\infty] \quad (1)$$

$$f_1(X(Q)) = \sum_{i=1}^n X_i(Q), \quad n = 3, \quad (2)$$

$$f_2(Y(Q)) = \sum_{j=1}^m Y_j(Q), \quad m = 3, \quad (3)$$

where $f_1(X(Q))$ – is a function that describes the total revenues from hunting; $f_2(Y(Q))$ – a function that describes the total cost of hunting; n – the number of components that form the total revenues from hunting, m – the number of components that form the total costs of hunting.

The boundary between the unprofitable and break-even level of hunting activity will be such number of wild hunting animals, in which, in accordance with the established standards of extraction (shooting), the difference between total costs and total revenues will be equal to zero. In addition, there is a probability that the break-even number of wild hunting animals may exceed the maximum capacity of hunting grounds. In this case, hunting is economically and environmentally inappropriate as the proceeds from extraction of an additional animal will be significantly lower than the costs associated with an increase in their number, in which the hunting enterprise will receive the costs for compensation of environmental and economic losses caused by hunting animals to forest, and water facilities.

In accordance with the objective function, the authors have formulated the theoretical principles of the economic and mathematical model, which can be expressed using the system of equations:

$$\begin{cases}
 L(Q) = \sum_{u=1}^d PL_u \cdot Q_u \cdot \frac{q_u}{100} \cdot S \cdot K_u & (4) \\
 P(Q) = \sum_{u=1}^d \sum_{e=1}^b PP_{ue} \cdot N_{ue} \cdot Q_u \cdot \frac{q_u}{100} \cdot S & (5) \\
 R(Q) = \sum_{u=1}^d PS_u \cdot Q_u \cdot \frac{q_u}{100} \cdot S + \sum_{v=1}^l PS_v \cdot T_v & (6) \\
 Z(Q) = \left(\frac{0,1 \cdot L(Q)}{\sum_{u=1}^d PL_u \cdot Q_u \cdot \frac{q_u}{100} \cdot K_u} \cdot \left(1 + \frac{r}{100}\right) \right) \cdot OJ + OM & (7) \\
 W(Q) = 2,0 \cdot \sum_{u=1}^z \sum_{k=1}^z H_{uk} \cdot T_{uk} \cdot PF_k \cdot Q_u \cdot S & (8) \\
 O(Q) = 0,2 \cdot (Z(Q) + W(Q)) & (9)
 \end{cases}$$

where $L(Q)$ – revenues from the sale of licenses (shooting cards) for the extraction of game animals, UAH; $P(Q)$ – income from the sale of hunting products, UAH; $R(Q)$ – revenues from rendering services to hunters, UAH; $Z(Q)$ – costs on the employees' wages, UAH; $W(Q)$ – costs for protection, reproduction, registration of hunting animals and the ordering of hunting grounds, UAH; $O(Q)$ – other costs related to the management of the hunting economy, UAH; PL_u – the cost for a license (shooting card) for obtaining the u -type of a hunting animal, UAH/animal; Q_u – optimal density of hunting animals of the u -species for 1000 hectares of hunting grounds, animals; q_u – allowable rate of using (shooting) of hunting animals of the u -species with a minimum (maximum) permissible density, %; S – area of hunting grounds, thousands hectares; K_u – coefficient, taking into account the number of additional licenses (shooting cards), which are realized in case of non-use of the permissible norm of obtaining u -type hunting animal; d – the number of species of hunting animals; PP_{ue} – sales value of e -products from u -type hunting animal, UAH/kg, unit; N_{ue} – normative output of e -products from one hunting animal of the u -species, kg, unit/animal; b – number of types of hunting products; PS_u – the cost of providing a service for the development of one carcass u -type hunting animal, UAH/animal; PS_v – cost of providing v -th service to hunters, UAH/person-day, horse-day, machine-change; T_v – the general period of providing v -th service to hunters, man-days, horse-days, machine-change; l – the number of types of services provided to hunters; r – percentage of forest hunting grounds in the total area, %; OJ – annual wage fund for one hunter engaged in hunting, UAH; OM – annual wage fund of a hunter engaged in hunting, UAH; H_{uk} – daily norm of k -th type of forage per one individual for the u -species of a hunting animal, tons, kg, pc/day; T_{uk} – the average period of feeding the u species of hunting animal k -th type of feed, days; PF_k – cost of the k -th type of feed for the feeding of hunting animals, UAH/ on, kg, pieces; z – the number of feed types required for feeding hunting animals.

Thus, we take into account certain specific conditions for the reproduction and usage of hunting fauna resources restrictions for the target function of the model appear as follows in this form:

$$Q_{\min} \leq Q_{br} \leq Q_{\max} \quad (10)$$

$$q(Q_{\min}) \leq q(Q_{br}) \leq q(Q_{\max}) \quad (11)$$

where $q(Q_{br})$ – the norm of usage (shooting) of the quarry at their break-even number, %; $q(Q_{\min})$ – the permissible limits of using (shooting) hunting animals at the minimum allowable number, %; $q(Q_{\max})$ – the norm of usage (shooting) of hunting animals at their maximum permissible number, %.

The authors have tested the constructed economic and mathematical model on the example of the activity of the hunting enterprises based in the Lviv region (Ukraine). In order to determine the break-even number of hunting animals, the authors have considered four directions of development of hunting economy, in particular:

1. determination of the break-even number of the hunting animals, based on the actual indicators of the production and economic activities of the hunting enterprises;

2. determination of the break-even number of the hunting animals at their minimum allowable density and the minimum permissible norm of use (shooting);

3. determination of the break-even number of the hunting animals at their maximum permissible density and the minimum allowable rate of use (shooting);

4. determination of the break-even number of the hunting animals at their maximum permissible density and the maximum permissible norm of use (shooting).

Summary calculations in the context of the particular areas of the hunting economy are presented in table 1.

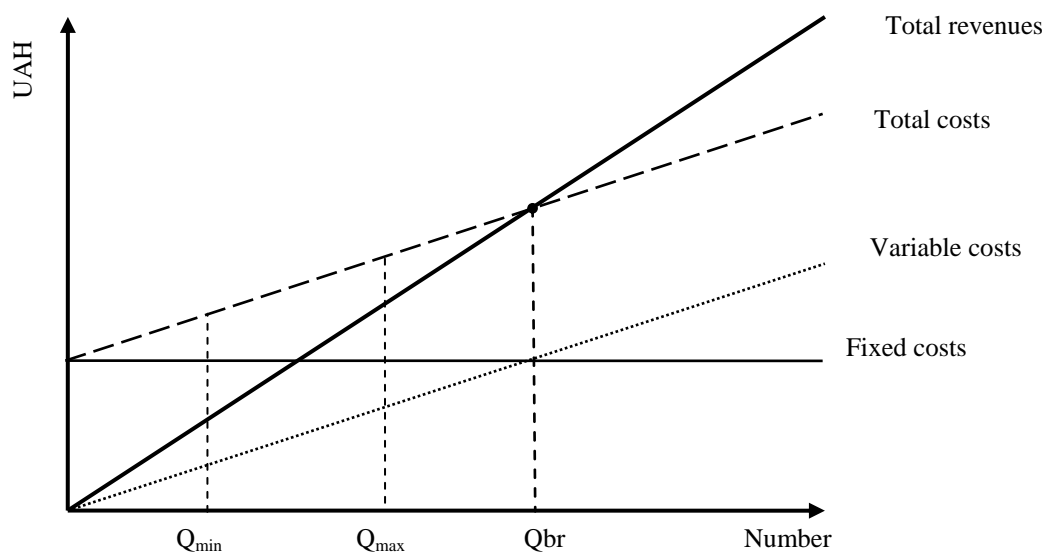
The analysis of the production and economic activities of the hunting enterprises in the Lviv region has showed that none of them meets the established norms of the minimum number of wild hunting animals, at which they are allowed to be produced (shooting, catching) [19].

The calculations, presented in table, confirm that the achievement of the break-even level of the hunting activity, with using actual financial indicators of reproduction and using of the hunting fauna resources, is only possible if the number of wild hunting animals significantly exceeds the maximum possible capacity of the hunting grounds (figure).

Thus, the current situation in the hunting grounds in the Lviv region (Ukraine) gives us an opportunity to carry out additional calculations taking into account more optimistic directions of hunting economy development. These directions are based on the assumption that the number of the main species of wild hunting animals in the hunting grounds in the Lviv region (Ukraine) corresponds to the established norms and are in the range between the minimum (at which they are allowed to be extracted) and their maximum allowable capacity.

Summary results obtained by determining the break-even number of the hunting animals in the Lviv region (Ukraine)

| Indexes | Direction 1 | | | | Direction 2 | | | |
|--|------------------|---------|---------|--------|---------------|---------|----------|-------|
| | Deer | Roe | Boar | Hare | Deer | Roe | Boar | Hare |
| Total costs, UAH | 17 252 900 | | | | 58 688 499.2 | | | |
| Costs per 1000 hectares of the hunting grounds, UAH | 10 470.3 | | | | 35 616.3 | | | |
| Variable costs, UAH / animal | 730.8 | 221.1 | 252.4 | 7.4 | 927.5 | 532.2 | 1286.0 | 44.3 |
| Total income, UAH | 6 088 400 | | | | 36 798 506.5 | | | |
| Income from one produced animal, UAH / animal | – | – | – | – | 16623.9 | 5539.70 | 10424.2 | 71.5 |
| Revenue per animal, UAH | 996.5 | 200.9 | 268.0 | 4.1 | 1676.7 | 555.2 | 2088.1 | 10.7 |
| Q _{br} | 5500 | 40493 | 13194 | 128782 | 10126 | 49777 | 8148 | 90461 |
| Indexes | Direction 3 | | | | Direction 4 | | | |
| | Deer | Roe | Boar | Hare | Deer | Roe | Boar | Hare |
| Total costs, UAH | 100 082 360.2 | | | | 100 082 360.2 | | | |
| Costs per 1000 hectares of the hunting grounds, UAH | 60 736.96 | | | | 60 736.96 | | | |
| Variable costs, UAH / animal | 969.9 | 577.7 | 1326.9 | 47.6 | 969.9 | 577.7 | 1326.9 | 47.6 |
| Total income, UAH | 75 681 872.0 | | | | 103 299 920.0 | | | |
| Income from one produced animal, UAH / animal | 16598.06 | 5528.31 | 10415.6 | 71.5 | 16596.29 | 5527.04 | 10407.55 | 71.5 |
| Revenue per animal, UAH | 1661.8 | 552.9 | 2079.5 | 10.7 | 2130.6 | 736.2 | 3127.5 | 17.9 |
| Q _{br} | 13281 | 49777 | 10198 | 90461 | 9133 | 42330 | 7183 | 90461 |
| Normative indicators of the number of the hunting animals: | Q _{min} | | | | 8021 | 19907 | 5726 | 31833 |
| | Q _{max} | | | | 16101 | 49777 | 9827 | 90461 |



The number of the main hunting animals species, which is calculated based on the actual indicators of production and economic activities of the hunting enterprises

In order to determine the break-even number of the wild hunting animals in these areas, the authors have calculated the total revenues and total costs on hunting in accordance with the established norms of the output of hunting products and provided services, which are offered to hunters in the hunting process, the expenses on the animals' feed and the real prices of the products, services and feeds that have been formed to date in Ukraine. In addition, in order to determine the minimum and maximum permissible numbers of the wild hunting animals, the norms of their usage (shooting), the authors have used the indicators that are theoretically substantiated and approved [19].

The calculations presented in Table 1 show that, in order to achieve the level of break-even level of the hunting economy, with a minimum allowable number of wild hunting animals, it is necessary to keep roe and hare whose number is slightly higher than the maximum capacity of hunting grounds. The number of deer and wild boars, however, doesn't reach the minimum capacity of hunting grounds. This can be explained by the fact that costs on the usage (shooting) of deer and boars significantly exceed the variable costs of their reproduction, protection and accounting. It also should be noted that the revenues from the extraction of hares don't cover the variable costs of their maintenance. Taking into account everything mentioned above, it can be concluded that the breeding population of roe and hare is their maximum number, which allows full using of the capacity of hunting grounds. In addition, a part of the fixed and variable costs associated with the reproduction, protection and accounting of roe and hare can be attributed to the costs associated with the reproduction, protection and accounting of deer and wild boars, in case of increase in the number under which it will be possible to cover these costs.

Discussion. After considering four directions of the development of hunting enterprises, the authors claim that the fourth direction is the most favorable for the Lviv region; this direction is aimed to increase the number of hunting animals to their maximum permissible density in the hunting grounds in case of the maximum permissible norm of their use. The calculation of the break-even number of the wild hunting animals on the basis of actual financial indicators of the production and economic activity of the hunting enterprises in the Lviv region has confirmed the complete inefficiency of hunting, but this doesn't mean that this and all other areas, that can be used for preliminary analysis of ecological and economic projects and environmental programs, aimed to increase the population of the main species of the wild hunting animals.

Besides that, it has been established that not all hunting enterprises can be profitable, in particular, such enterprises which include the area of hunting grounds which is less than 10 000 hectares, which is associated with significant costs for wages payment to the employees in the hunting industry. To increase their economic efficiency, the authors propose to increase the area of hunting grounds due to hunting grounds of other enterprises.

Conclusions. The calculations which were made to determine the break-even number of the main species of the wild hunting animals, have shown that the hunting economy can operate on the basis of self-sustainment and self-financing without going beyond legally established norms. The obtained results are not final because there is a possibility of adjusting the number of hunting animals within the minimum and maximum capacity of hunting grounds.

The prospects for the further investigations are in the formation of a system of environmental policy instruments in the field of reproduction and using of hunting fauna resources, which will increase the efficiency of hunting management and make managerial decisions on the development of hunting economy, both at the state and regional levels.

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АҢШЫЛЫҚ ШАРУАШЫЛЫҒЫНЫҢ ДАМУ БАҒЫТТАРЫН БОЛЖАУДЫҢ ЭКОНОМИКАЛЫҚ-МАТЕМАТИКАЛЫҚ ҮЛГІСІ

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ЭКОНОМИКО-МАТЕМАТИЧЕСКАЯ МОДЕЛЬ ДЛЯ ПРОГНОЗИРОВАНИЯ НАПРАВЛЕНИЙ РАЗВИТИЯ ПРЕДПРИЯТИЙ ОХОТНИЧЬЕГО ХОЗЯЙСТВА

Аннотация. Статья обобщает аргументы и контраргументы в научной дискуссии по вопросам развития предприятий охотничьего хозяйства. Целью статьи является построение экономико-математической модели для определения численности диких охотничьих животных, при которой производственно-хозяйственная деятельность предприятий охотничьего хозяйства будет функционировать на принципах самокупаемости и самофинансирования. Актуальность решения данной научной проблемы заключается в том, что появилась объективная необходимость реформирования охотничьего хозяйства в Украине, которая предусматривает формирование национальной концепции его организации и развития, что должна ориентироваться на эффективные экономические, экологические и социальные инструменты с учетом национальных традиций менеджмента. Для построения экономико-математической модели прогнозирования направлений развития предприятия охотничьего хозяйства исследование проведено в следующей логической последовательности: проанализировано, за счет каких составляющих формируются общие расходы и общие поступления от ведения охотничьего хозяйства; установлена граница между убыточным и безубыточным уровнем охотничье-хозяйственной деятельности; в соответствии с целевой функцией сформулированы теоретические основы экономико-математической модели, которые позволяют определить безубыточную численность охотничьих животных; рассмотрены четыре направления развития охотничьего хозяйства.

Методическим инструментарием проведенного исследования стали методы анализа, синтеза, экономико-математического моделирования и статистический метод, периодом исследования избраны 2016-2017 годы. Объектом исследования избрано охотничье хозяйство Львовской области (Украина), поскольку именно оно дало нам возможность для проведения дополнительных расчетов с учетом более оптимистических направлений развития охотничьего хозяйства.

Исследование эмпирически подтверждает и теоретически доказывает, что охотничье хозяйство может функционировать на основе самокупаемости и самофинансирования, не выходя за пределы установленных и законодательно закрепленных нормативов.

Ключевые слова: экономическая математическая модель, предприятия, охотничье хозяйство, дикие охотничьи животные, безубыточность численность диких животных, емкость охотничьих угодий.

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WARNING OF VIETNAM'S FOREIGN DEBT CRISIS

Abstract. Every country needs domestic and foreign investment capitals. Each capital source has its advantages and disadvantages associated with different policies, mechanisms and management that are associated with the characteristics of each country's economy and culture. Developing countries like Vietnam, foreign loans for economic development are very important, creating a driving force to promote domestic investment and improve the efficiency of public investment in general if this capital is managed effectively and monitored. The rapid increase in the size and proportion of foreign loans in our country is concerned by many organizations and individuals with mixed opinions that: Foreign debts are under control, not worrying but meaningful. The idea is that it is necessary to warn the foreign debt crisis.

The main purpose of the study is to analyze the current situation of Vietnam's foreign debt in the period of 1986-2018 to see the management and situation of foreign loans of our country today, build a debt crisis warning model based on Vietnam's macro data to calculate the probability of a crisis so that it can adjust Vietnam's debt management and debt management strategy, and as well as supplement foreign debt assessment and management tools.

The article uses a research method which is a quantitative research method through the construction of a binary Probit model to determine the probability of a foreign debt crisis with two aggregate variables, namely Macroeconomic indicators and financial index variables.

Through analyzing the situation of foreign borrowing and repayment in Vietnam during 1986-2018, the study thereby points out the limitations and causes of ineffective use of foreign debt in Vietnam. Besides, the results of the warning model show that the external debt crisis can be predicted through two explanatory variables, namely macroeconomic index and financial index variables.

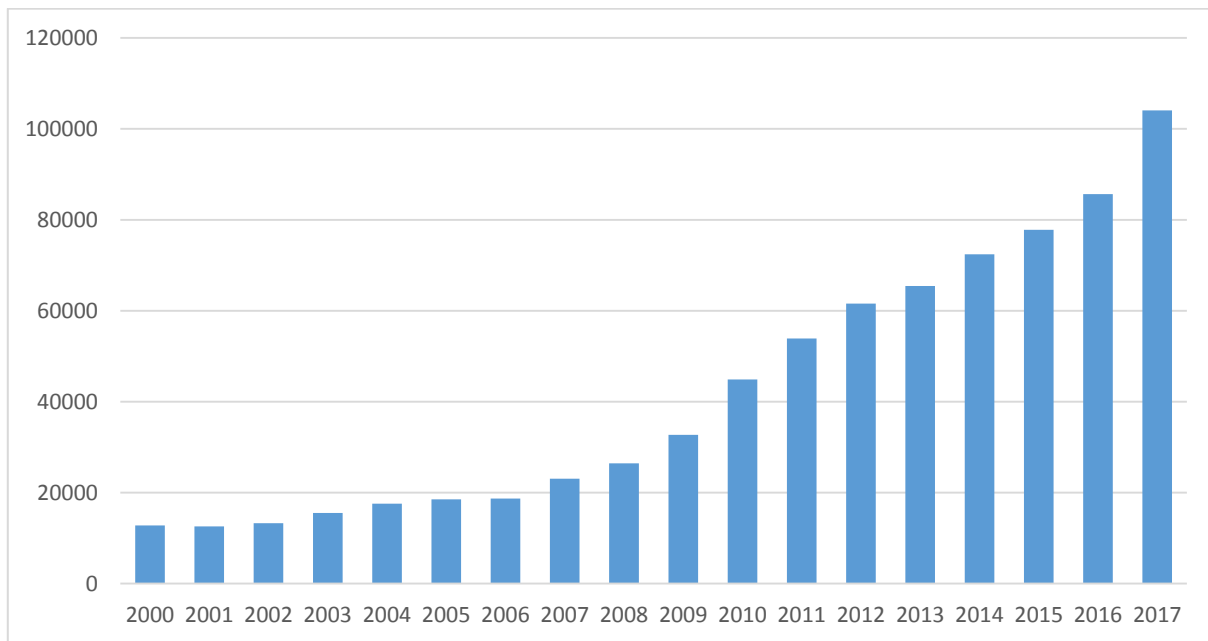
Keywords: Foreign debt, foreign debt crisis, Vietnam.

Introduction. In recent years, the world economy has suffered great consequences due to the impact of the global economic crisis. The economic crisis is a broad problem composed of many different aspects and the debt crisis is one of the many components that make up it. As a member of the global economy, Vietnam will be affected by economic crises, including debt crisis. Therefore, the debt crisis warning is becoming the concern of every country, both the borrower and the lender.

Therefore, the paper focuses on analyzing the situation of foreign debt in Vietnam in the period of 2000-2018, thereby giving a general picture of foreign debt, showing the limitations and causes. In addition, based on data provided by the World Bank and the IMF, the authors propose a model for warning of foreign debt crisis in Vietnam to make recommendations on the management of foreign debt as well as supplement public evaluation tool [1-3].

According to the Government's regulations on foreign borrowing and repayment management, public debt management law can be generalized: “National foreign debt is the balance of all current debt obligations (excluding obligations (contingent debt) on principal and interest repayment at a time of Vietnam's foreign loans. National external debt includes public sector external debt and private sector external debt”.

Scale of foreign debt:



Vietnam's total foreign debt 2000-2017. Unit: Billion USD. Source: World bank

It can be seen from the chart, foreign debt tends to increase sharply in the period after 2009, in 2017 reached over 104 billion USD. This is the period when Vietnam focused on investment in socio-economic development, in which the average mobilization of public debt accounted for about 44% of the total development investment capital of the whole society; The average annual growth rate is at 16.7% / year. Foreign debt in the total public debt also increased rapidly, sometimes accounting for over 60% of the total public debt. In addition, according to the Ministry of Finance's report, by the end of 2017, public debt is about 62.6% of GDP (public debt ceiling is 65% / GDP), Government debt is about 51.8% of GDP (Government debt ceiling is 54% of GDP). The nation's foreign debt (including debt, government guarantee and economic sectors borrowing in the form of self-borrowing) is equivalent to 45.2% of GDP (the ceiling of foreign debt is 50% of GDP). Although the ratio of foreign debt of the country / GDP has not exceeded the permitted level, it is likely to increase gradually and close to the ceiling; it is expected that this ratio will be 49.9% in 2019. The main reason for the increase in the nation's foreign debt is the rapid increase in the size of its foreign borrowing by self-repayment. In 2017, the growth rate of outstanding loans of medium and long-term loans was 22.56%, of short-term loans was 73% compared to 2016. Notably, the target of the country's foreign debt repayment in 2017 increased by 6.3% compared to 2016, at 36%, while the ceiling was 25%, mainly due to capital withdrawal and principal repayments. Short-term foreign loans of enterprises and credit institutions in 2017 increased sharply. In fact, the increase in short-term foreign borrowing of credit institutions is aimed at supporting short-term credit capital, regulating foreign currency liquidity in the system.

Over the past time, the economy has achieved positive results such as a positive growth rate (GDP of 2018 increased 7.08%, the highest increase since 2008, according to the President. Statistics) and control inflation at a low level (<4% in 2018), and to maintain such growth, the demand for investment capital is very large. But if relying only on accumulated capital, domestic mobilized capital is absolutely not enough, but foreign investment is required, especially ODA capital plays an important role in addition to investment capital. such as helping socio-economic development in many fields, reducing poverty, adjusting economic structure and creating a modern socio-economic infrastructure system. However, there are some limitations such as:

- The scale of foreign debt is getting bigger, the ratio of foreign debt to GDP is getting closer to the ceiling of foreign debt. In the public debt structure of Vietnam, foreign debt now accounts for about two-thirds, so when the increase in external debt, the total public debt increases. The ratio of short-term debt tended to increase rapidly, indicating that the pressure of debt repayment in the short-term of Vietnam also increased significantly, if not used effectively to bring profits and appropriate foreign currency revenue, it will create very heavy burden.

- Low disbursement rate of ODA fell from 23.1% in 2014 to 11.2% in 2018, much lower than the global average of the group of 6 banks that are the main donors of ODA to Vietnam, in which The global disbursement ratios of ADB and WB in 2018 were 21% and 20.2% respectively. The cause of the slow disbursement is due to complicated and overlapping regulations on procedures; the project's readiness is low, and the procedure's "difference" between Vietnam and the donors[4].

- Lending conditions of partners are getting stricter. Many partners have switched from lending to Vietnam to ODA with less incentives, since Vietnam became a middle-income country. Besides, the national debt reputation is affected by a number of macroeconomic instability and Vinashin events.

- Data on foreign debt is not reliable. Currently in Vietnam, foreign debt assessment is done through different debt indices but only assesses the level of debt at a given time, has not been evaluated in the long term. In addition, data on debt situation is limited and unreliable. The data that Vietnam publishes often have deviations from the figures of international organizations such as WB, IMF, Moody's, S&P, etc. This makes it difficult for policy making as well as making out. the appropriate recommendations[5-7].

- Foreign borrowing contains many risks such as exchange rate risk, interest rate risk, refinancing risk, liquidity risk, credit risk, etc. These risks may cause an increase in foreign debt or make it difficult to repay or use ineffective foreign loans leading to increased debt burden, negatively affecting the economy.

The reasons of above limitations are:

- The mechanism of foreign debt management is not effective

Firstly, the overlap in regulations on foreign debt management. This is reflected in the parallel existence of regulations on official development assistance (ODA) management and general public and foreign debt management.

Second, there has been no agreement on foreign debt management. The coordination among ministries, sectors, between the Central Government, localities and donors is not really smooth, especially in fields with the participation of many donors or multi-program projects. industry, multi-level and multi-goals. This shows that the mobilization, repayment and use channels are still not in agreement. This is an inadequate advantage for the effective implementation of foreign debt management functions.

Thirdly, the lack of specialized officials. The capacity and qualifications of staffs involved in project management are limited, especially in localities. Project management personnel are often unstable, in many cases working on a part-time basis. The project management training has not been conducted regularly, systematically and methodically. Currently, our country has not specialized training foreign debt management. Short-term training courses and workshops, mainly provided by ODA projects, are not sufficient to form a team of experts to ensure accurate information gathering, analysis and forecasting [8-10].

- The inefficiency of using foreign loans

The plan of using foreign loans does not match the loan term and project investment period, leading to the use of short-term loans to finance long-term projects. When the payment is due and the return on investment has not been achieved, if there is not enough repayment source, it may cause insolvency leading to debt crisis. In addition, the foreign loans of the Government of Vietnam are used to re-lend domestically.

- Inefficient public investment using foreign loans

At present, there are many public investment projects using foreign loans but due to the donor's conditions for these loans, it has led to inconsistencies in the management and assurance of investment efficiency. conflict of interest between parties. In addition, the integration of government programs and projects in the province with ODA programs and projects, sometimes overlapping, has close contents such as poverty reduction, rural transport, rural clean water, etc. which still limit the efficiency of capital.

- The system of connecting and updating information is not flexible

Information on foreign debt in Vietnam so far is still poor, incomplete and continuous, and the quality of information on unreliable debt. In addition, the non-disclosure of information among ministries and agencies has led to the phenomenon of silencing information that has bad consequences for debt management. In addition, the application of information technology in managing related data on foreign debts is weak because foreign debt management software currently in use at the Ministry of Finance and the State Bank has not been fully supported. Application in data storage and processing. In addition, the time for summarizing, analyzing and processing information before publicizing is quite long, slowing down the evaluation of the performance of projects and programs using foreign capital as well as the topic. export solutions to adjust.

- Warning and risk management are limited

Currently, Vietnam has not had an early warning model of debt risks for the economy. There are just only relies on the evaluation criteria according to the standards of the World Bank, IMF or Moody's, and S&P to assess the situation of foreign debt compared to the permitted safety threshold or against the targets in the foreign debt management strategy of government through periods. But the limitation of data makes these indicators not really reflect the true situation of foreign debt, leading to a relatively relative evaluation, sometimes deviating from the assessment of international financial institutions [11-13].

In the face of the enormous consequences that the external debt crisis caused to many countries in the world in the previous period, researchers and international organizations have made many studies on this issue and made contributions important for both theory and practice. These studies focus on three main research directions, specifically:

Researching the debt crisis early warning model

Some authors such as Fioramanti (2006), Manasse et al. (2003), Manasse&Roubini (2005), Jedidi (2013), Ciarlone&Trebeschi (2006), Fuertes &Kalotychou (2005), Fuertes&Kalotychou (2007) proposed for research models such as binary tree, Logit, Probit, neural network, etc. These models provide multi-dimensional views of early warning models based on the results of analyzing the effects of Economic indicators of each country.

Manasse et al. (2003) developed a model for early warning of debt crises. A country is defined as in a debt crisis if it is classified as in the Standard & Poor's default, or if it receives support from the IMF in excess of 100% of the quota. By analyzing the binary tree (CART), the authors determine the likelihood of a country's debt crisis based on the country's past data. The independent variables used are divided into 03 categories: Group of external debt variables (short-term external debt / reserves; Interest on external debt (% of GDP); Services of the external debt / reserves; Total external debt (% of GDP), group of macroeconomic variables (US treasury Bills; Real GDP Growth; FDI (% of GDP); Trade openness; Volatility of inflation) and other variables (Current Account Balance).

Ciarlone&Trebeschi (2006) built a debt crisis warning model with three states (quiet, pre-crisis and adjustment) based on the conceptualization of debt crisis. However, this model used a large number of variables (such as Interest on external debt / international reserves; Total External Debt / GDP; GDP Growth; short-term debt / total external debt; Total Private capital flows / GDP; Annual inflation; International reserves / total external debt, etc.) made the calculation more complex, which can cause model defects. In current Vietnam conditions, the data for variables are incomplete, which makes forecasting in this way difficult [14].

Jedidi (2013) built a table logit model with many macroeconomic and financial indicators, thereby developing an early warning system for 60 emerging and developing countries during 1973-2010. By identifying the relationship between the above indicators by implementing the main component analysis (PCA), the author built two general macroeconomic and financial indicators to predict the appearance of debt crisis. Macroeconomic indicators include variables such as Total gross central government debt / GDP; total gross external debt / GDP; FDI; gross saving; GDP growth; trade openness; imports / GDP; exports / GDP; general government expenditure (% of GDP). Financial indicators include variables such as M2 / total reserves, Foreign exchange reservers, stock of total assets; central bank assets / GDP; financial openness; domestic credit provided by banking sector / GDP. This model is simple because only the explanatory variables are used as the two aggregate indicators, but not mentioning the latency of these variables when affecting the economy. Besides, this is a warning model with data sets of many countries, so its scope is very wide, to apply to a specific country needs appropriate adjustment.

Although the models in these studies are different, the variables in the model are similar to GDP growth, total external debt, short-term debt, import-export, money base, foreign exchange reserves, etc. These terminals are meaningful and reflect the research purpose. Currently, the system of indicators to assess the status of foreign debt in Vietnam only allows to assess the level of debt in certain times, not evaluated in a period. Therefore, it is imperative to build a debt crisis warning model. Within the scope of this study, the authors focus on the third research direction that proposes an early warning model for Vietnam's external debt crisis[10].

Thus, each study focuses on a specific aspect of the external debt crisis with macroeconomic and institutional indicators. In the framework of this paper, the authors approach the debt crisis through the concept proposed by Ciarlone&Trebeschi (2006) as follows:

A debt crisis occurs when at least one of the following conditions occurs:

- A country has officially announced the suspension of payment of public or foreign debt or has entered into an agreement to restructure the debt or extend it with creditors.

- A country has not paid foreign creditors and / or principals to creditors an amount greater than 5% of the percentage of foreign debt paid out during the year.
- A country has accrued interest and / or principal of foreign debt an amount greater than 5% of the total outstanding foreign debt of the year.
- A country receives large support from the IMF when such support exceeds 100% of the limit.

Methods. The study of the authors uses Vietnam's data in the period of 1986-2017. The data sources used in this study are from WDI (World Bank Development Indicators), IFS (International Financial Statistics).

Dependent variable (DC)

In the period 1987 - 2018, Vietnam had no debt crisis. Therefore, from the definition of debt crisis, the authors processed the data, identified the years that satisfied the debt crisis definition and assigned the dependent variable with the corresponding value equal to 1, and in the remaining years which were not satisfied, the value is set to zero.

First of all, the world economic theory has shown that money crisis and debt crisis are closely related. Based on the model recommendations of Eichengreen et al. (1995), the authors used the forex market pressure index (EMP) to determine a value of 0 or 1 for the dependent variable.

The formula for calculating the EMP is:

$$EMP_t = \alpha \cdot \left[\frac{E_t - E_{t-1}}{E_{t-1}} \right] + \beta \cdot [r_t - r_{t-1}] + \gamma \cdot \left[\frac{R_t - R_{t-1}}{R_{t-1}} \right]$$

In which: E_t is the average exchange rate of year t ; r_t is real interest rate of year t ; R_t is total reserves of year t ; α, β, γ are inverse standard deviation of E, r, R comparatively.

Debt crisis is considered to occur when $EMP_t > \mu_{EMP} + 1.5\sigma_{EMP}$

In addition, according to the definition of debt crisis combined with the analysis of the current situation of foreign debt in Vietnam in the past, the authors choose the years with debt restructuring or debt extension to assign DC value = 1.

Based on Vietnam's statistical sources, the research team processed the data, then calculated the indicators that affect the likelihood of debt crisis synthesized from the research results of Jedidi (2013) and sorted into 02 groups of macroeconomic indicators and financial indicators[15].

Macroeconomic indicator variables (IMV)

To build macroeconomic indicators, the authors choose the following macro indicators:

Table 1 – The IMV variable construction criteria are assumed as follows

| Criteria | Symbol | Effects | Explanations |
|---|--------|---------|--|
| Total foreign debt/ GDP | X1 | +/- | An increase in foreign debt leads to an increased probability of a debt crisis. However, if the economic growth and export growth rate are high, ensuring that the foreign currency sources for debt repayment are unlikely to increase the possibility of a crisis. |
| Total savings/GNI | X2 | - | Increasing total national savings reduces the likelihood of a debt crisis. |
| Growth of GDP | X3 | - | The higher the GDP growth rate, the less likely the debt crisis is to occur. |
| Commercial openness | X4 | +/- | The impact is not clear: To a certain extent the openness stimulates exports, increases foreign exchange earnings, thereby reducing the pressure to repay debts in foreign currencies. On the other hand, high trade openness makes the economy vulnerable to external shocks. |
| Import /GDP | X5 | + | Increased imports cause more foreign currency to flow, which can cause a serious deficit of the trade balance, increasing foreign borrowing leading to the probability of an increasing debt crisis. |
| Export /GDP | X6 | - | This ratio increases, increasing foreign currency sources to pay debts, and the probability of crisis happening. |
| Inflation | X7 | + | The increase in inflation caused a reduction in domestic debt but an increase in foreign debt and thus the debt crisis impact. |
| <p><i>Source:</i> Jedidi (2013) and the author's synthesis. "+" Sign: Increasing the probability of a debt crisis; "-" Sign: Reducing probability of debt crisis.</p> | | | |

Formula: $IMV = \beta_1 X_1 - \beta_2 X_2 - \beta_3 X_3 - \beta_4 X_4 + \beta_5 X_5 - \beta_6 X_6 + \beta_7 X_7$
 In which: β_i , with $i = 1, \dots, 8$ is the inverse standard deviation of variable X_i .
 Finance indicator variables (IFV)
 To build finance indicator variables, the authors chose the following financial indicators:

Table 2 – IFV development criteria are assumed as follows

| Criteria | Symbol | Effects | Explanations |
|---|--------|---------|--|
| M2/ Foreign exchange reserves | Y1 | + | For countries with a dollarization level, this indicator aims to assess the central bank's ability to meet foreign exchange needs. This ratio is of importance in countries that are likely to lose domestic capital due to a weak banking system or a rigid fixed exchange rate management policy. The higher this ratio is, the probability of a debt crisis increases. |
| Foreign exchange reserves / GDP | Y2 | - | The growth of foreign exchange reserves ensures the source of repayments in foreign currencies, leading to a reduced probability of a crisis. |
| Total assets of State bank/ GDP (center bank assets/ GDP) | Y3 | + | Through the discount and open market operations, the assets of the central bank increased and the deposits of commercial banks at the central bank increased, increasing the monetary base, related to M2, and increasing the probability of debt crisis. |
| Financial openness | Y4 | +/- | Not clear: this variable measures the level of access to foreign capital. When the financial openness is good, the country can easily access external capital in borrowing to pay debts, reducing the possibility of debt crisis. However, if the financial openness is too liberal and the flow of foreign indirect investment capital is not well managed, the sudden withdrawal can make the debt crisis more serious, so it bears a plus sign. |
| Domestic credit is provided by the financial sector /GDP | Y5 | + | This ratio can be used as an indicator of the financial system's vulnerability. Central banks pump liquidity to banks during periods of the banking crisis to improve their financial situation. |
| GDP growth rate per capital | Y6 | +/- | This is essentially an ICOR. If the icor is low (effective), it will attract more foreign direct investment, which reduces the pressure on foreign borrowing, leading to a reduction in the debt crisis. If icor is high, FDI into Vietnam will decrease due to low efficiency of capital use, leading to an increase in the demand for foreign loans and an increase in debt crisis. |
| <p>Source: Jedidi (2013) and the author's synthesis. "+" Sign: Increasing the probability of a debt crisis; "-": Reducing probability of debt crisis.</p> | | | |

Formula: $IFV = \alpha_1 Y_1 - \alpha_2 Y_2 + \alpha_3 Y_3 - \alpha_4 Y_4 + \alpha_5 Y_5 - \alpha_6 Y_6$
 In which: α_i , with $i = 1, \dots, 6$ is the inverse of the standard deviation of Y_i .

Results. The model of warning of foreign debt crisis is built based on research results of international standard models. The variables used in the model all include a one-year delay to ensure there is a lag in its impact on the economy. Based on the research results of Jedidi (2013), the authors have built a warning model in both binary Logit and Binary Probit. However, when the authors used the Wald-Test test to test the suitability of the model, the results of the binary Probit model were better. Therefore, the authors used the binary Probit model for their research[16-18].

The binary Probit model has the form:

$$DC = 1 \text{ if } U > U^*$$

$$DC = 0 \text{ if } U < U^*$$

In which, U is the utility determined by the independent variables

$$U^* \text{ is a limit with the assumption: } U^* = U_t + u_t = \beta_0 + \beta_1 \times IMV_{t-1} + \beta_2 \times IFV_{t-1} + u_t.$$

u_t is a random error with $N(0, 1)$ distribution.

The formula for calculating the probability of $DC = 1$ is:

$$p_t = P(DC=1/IMV_{t-1}, IFV_{t-1}) = P(U_t^* < U_t)$$

$$= F(U_t) = \int_{-\infty}^{\beta_0 + \beta_1 \times IMV_{t-1} + \beta_2 \times IFV_{t-1}} \frac{1}{(2\pi)^{1/2}} \exp\left(-\frac{t^2}{2}\right) dt$$

In practice, the authors use the approximate formula as follows:

$$p_t = 1 - \phi_0(-\beta_0 - \beta_1IMV_{t-1} - \beta_2IFV_{t-1}) = 1 - \phi_0(u)$$

For $\phi_0(u)$ is taken from annex 2.

The authors used Eview software to run the model, taking the meaning level $\alpha = 0.05$.

Table 3 – Model results

| Dependent Variable: DC | | | | |
|--|-------------|-----------------------|-------------|-----------|
| Method: ML - Binary Probit (Quadratic hill climbing) | | | | |
| Sample(adjusted): 1987 2019 | | | | |
| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
| C | 5.679511 | 2.392015 | 2.374363 | 0.0176 |
| IMV(-1) | 0.600465 | 0.224263 | 2.677505 | 0.0074 |
| IFV(-1) | -0.449156 | 0.236100 | -1.902393 | 0.0571 |
| Mean dependent var | 0.181818 | S.D. dependent var | | 0.391675 |
| S.E. of regression | 0.289850 | Akaike info criterion | | 0.728051 |
| Sum squared resid | 2.520387 | Schwarz criterion | | 0.864097 |
| Log likelihood | -9.012839 | Hannan-Quinn criter. | | 0.773826 |
| Restr. log likelihood | -15.64660 | Avg. log likelihood | | -0.273116 |
| LR statistic (2 df) | 13.26752 | Probability(LR stat) | | 0.001315 |

From the results table, we have an estimate of the utility:

$$U_t = 5.679511 + 0.600465*IMV_{t-1} - 0.449156*IFV_{t-1}$$

Tests

The statistical significance of independent variable test:

To test the statistical significance of the independent variables, the authors used the Wald-Test test.

Pair of hypotheses need to be tested:

$$\begin{cases} H_0: \beta_1 = 0 \\ H_1: \beta_1 \neq 0 \end{cases} \quad \text{and} \quad \begin{cases} H_0: \beta_2 = 0 \\ H_1: \beta_2 \neq 0 \end{cases}$$

We have the following results:

Table 4 – Test results of statistical significance of coefficient β_1

| Wald Test: | | | |
|------------------|-------------|-------------|----------|
| Null Hypothesis: | $\beta_1=0$ | | |
| F-statistic | 7.169032 | Probability | 0.011911 |
| Chi-square | 7.169032 | Probability | 0.007417 |

Table 5 – Test results of statistical significance of coefficient β_2

| Wald Test: | | | |
|------------------|-------------|-------------|----------|
| Null Hypothesis: | $\beta_2=0$ | | |
| F-statistic | 3.619098 | Probability | 0.066758 |
| Chi-square | 3.619098 | Probability | 0.057120 |

Thus, the Prob values are <0.07 so the independent variables are statistically significant.

The suitability of the model test

For the Probit model, to test the suitability of the model, we use the test of the rational function ratio LR (Wooldridge, 2008). The rational function ratio is a statistic used to compare the suitability of the two models. The assumption of verification is:

$$H_0 : \beta_0 = \beta_1 = \beta_2 = 0$$

$$H_1 : \beta_0^2 + \beta_1^2 + \beta_2^2 > 0$$

From the table of results we see that the statistical ratio is reasonable $R = 13.26752$, P-value (R) = 0.001315 < 0.05, so H_0 is rejected, ie with 5% significance level, the coefficients of the model are not equal to 0, model matching[19].

Hosmer-Lemeshow (H- L) suitability test

The objective of H - L testing is to compare actual and estimated values, if the actual values and the estimated values are too different, the model is not suitable. This test uses the When square standard for testing. Pair of hypotheses to be tested:

H_0 : Model is suitable

H_1 : Model is not suitable.

Table 6 – Results of H-L testing

| Andrews and Hosmer-Lemeshow Goodness-of-Fit Tests | | | | | |
|---|--------|--|--|-----------------|--------|
| Grouping based upon predicted risk (randomize ties) | | | | | |
| H-L Statistic: | 6.2336 | | | Prob. Chi-Sq(8) | 0.6211 |

We see Prob = 0.6211 > 0.05, there is no basis to reject H_0 , the model is suitable with the data.

Discussions. The biggest contribution of the project is to propose a model for warning of foreign debt crisis in Vietnam based on international standards. This is the inheritance and creativity of the authors' group based on published research works. The results of the model show that the macroeconomic and financial indicators are closely related to each other and to the possibility of external debt crisis. The external debt crisis is not only caused by a cause and the impact and resonance of many factors in each country's economy. The model building has added a tool to warn foreign debt crisis, creating conditions to achieve the highest efficiency in the management and prevention of a debt crisis in Vietnam in the future[20-22].

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²Вьетнам мемлекеттік қазынашылығы

ВЬЕТНАМНЫҢ СЫРТҚЫ ҚАРЫЗ ДАҒДАРЫСЫ ТУРАЛЫ ЕСКЕРТУ

Аннотация. Әр елге ішкі және шетелдік инвестициялық капиталдар қажет. Әрбір капитал көзі әр елдің экономикасы мен мәдениетінің ерекшеліктерімен байланысты әртүрлі саясаттармен, механизмдермен және басқарумен байланысты өзіндік артықшылықтар мен кемшіліктерге ие. Вьетнам сияқты дамушы елдер, экономикалық дамуға арналған шетелдік қарыздар өте маңызды, бұл ішкі капиталды басқаруға қозғаушы күш және жалпы капиталды басқарған жағдайда, мемлекеттік инвестициялардың тиімділігін арттырады. Тиімді басқару және мониторинг. Біздің еліміздегі шетелдік қарыздардың мөлшері мен үлесінің тез артуына көптеген ұйымдар мен жеке адамдар тарапынан: «Шетелдік қарыздар бақылауда, алаңдатпайды, себепті», – деген пікірлер айтылады. Бұл жерде сыртқы борыш дағдарысы туралы ескерту керек деген ой бар.

Зерттеудің негізгі мақсаты – Вьетнамның 1986-2018 жылдардағы сыртқы қарызының ағымдағы жағдайын талдау, қазіргі кездегі еліміздің сыртқы қарыздарының басқарылуы мен жағдайын білу, Вьетнамның макро деректері негізінде қарыз дағдарысы туралы ескерту моделін құру дағдарыстың ықтималдығы, ол Вьетнамның қарызды басқару стратегиясын реттей алады, сонымен қатар сыртқы қарыздарды бағалау және басқару құралдарын толықтырады.

Мақалада екі агрегаттық айнымалысы бар сыртқы борыш дағдарысының ықтималдығын анықтау үшін екілік Пробит моделін құру арқылы сандық зерттеу әдісі болатын зерттеу әдісі қолданылады, атап айтқанда, макроэкономикалық көрсеткіштер мен қаржылық көрсеткіштер.

1986-2018 жж. Вьетнамдағы сыртқы қарыздар мен төлемдердің жағдайын талдау арқылы зерттеу Вьетнамдағы сыртқы қарызды тиімсіз пайдаланудың шектеулері мен себептерін көрсетеді. Сонымен қатар ескерту моделінің нәтижелері сыртқы борыш дағдарысын екі түсіндірме айнымалы арқылы болжауға болатынын көрсетеді, атап айтқанда, макроэкономикалық индекс және қаржы индексінің өзгермелі көрсеткіштері.

Қазіргі кезде Вьетнамда сыртқы қарыз дағдарысы жаңа тақырып болып қала береді. Авторлардың тақырыбы сыртқы қарыздардың жағдайын талдаумен ғана шектеліп қоймай, сонымен қатар Вьетнамдағы сыртқы борыш дағдарысы туралы макроэкономикалық көрсеткіштер мен қаржыға қатысты екі айнымалыға негізделген ескерту үлгісін жасады. Тиісті индикаторлардан басқа, индекстің осы екі ауыспалы құрамы сыртқы индикаторлардың сыртқы борыш дағдарысының туындау мүмкіндігіне әсерін арттырады. Сонымен қатар авторлар модельдік айнымалылардың әр елдің сыртқы қарыз дағдарысының туындау мүмкіндігіне әсер етуінің кідірісін де қарастырды. Бұл модельді неғұрлым қолайлы, дәл бағалауға және болжауға қабілетті етеді. Сондай-ақ мақала қарыздық дағдарыс пен ақша дағдарысы арасындағы тығыз байланысты талдауға ықпал етеді.

Бүгінгі халықаралық экономикалық интеграция жағдайында барлық елдер жоғары және тұрақты өсу мен дамуды көздейді. Бұған жету үшін барлық елдер дамудың инвестициялық көздеріне, оның ішінде ішкі және шетелдік капиталдарға сүйенуі керек. Ішкі капитал экономиканың ішкі ресурстарынан жұмылдырылады. Егер ішкі капитал жеткіліксіз болса, шетелдік капиталды әртүрлі тәсілдермен жұмылдыру қажет, мұнда қарыз алу танымал әдіс болып саналады. Шетелдік қарыздарға дамуға ресми көмек (ODA) түріндегі несиелер және нарықтық жағдайдағы коммерциялық несиелер жатады. Алайда сыртқы қарыздарды басқаруды жеңілдету, сондай-ақ тиімсіз пайдалану көптеген елдерді қарызға, борыш дағдарысына және экономикалық құлдырауға душар етті. Сондықтан сыртқы қарызды басқаруды күшейту – бүгінгі таңда әр елдің қаржы саясатындағы маңызды мақсаттарының бірі. Вьетнамда сыртқы қарыздарды басқару іс жүзінде тек 1993 жылдан басталды, сол кезден бері Вьетнамның сыртқы қарыздарды басқару жүйесі әлі аяқталу үстінде, сондықтан сыртқы қарыздарды бақылау және басқару өзекті болып отыр.

Түйін сөздер: сыртқы қарыз, сыртқы қарыз дағдарысы, Вьетнам.

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ПРЕДУПРЕЖДЕНИЕ КРИЗИСА ВНЕШНЕГО ДОЛГА ВЬЕТНАМА

Аннотация. Каждая страна нуждается в капитале внутренних и иностранных инвестиций. Каждый источник капитала имеет свои преимущества и недостатки, связанные с различными политиками, механизмами и управлением, которые связаны с характеристиками экономики и культуры каждой страны. В развивающихся странах, таких как Вьетнам, иностранные кредиты для экономического развития очень важны, создавая движущую силу для поощрения внутренних инвестиций и повышения эффективности государственных инвестиций в целом, если этот капитал управляется эффективно и мониторинг. Быстрое увеличение размера и доли иностранных займов в нашей стране вызывает обеспокоенность у многих организаций и частных лиц со смешанным мнением о том, что: внешние долги находятся под контролем, не тревожные, но значимые. Идея заключается в том, что необходимо предупреждать кризис внешнего долга.

Основная цель исследования – проанализировать текущую ситуацию с внешним долгом Вьетнама в период 1986-2018 гг., чтобы увидеть управление и ситуацию с внешними кредитами нашей страны сегодня, построить модель предупреждения долгового кризиса на основе макроданных Вьетнама для расчета вероятности кризиса, чтобы он мог скорректировать стратегию управления долгом и управления долгом во Вьетнаме, а также дополнить инструменты оценки и управления внешним долгом.

В статье используется метод исследования, который представляет собой метод количественного исследования посредством построения бинарной модели Probit для определения вероятности кризиса внешнего долга с двумя агрегированными переменными, а именно макроэкономическими показателями и переменными финансового индекса.

Анализируя ситуацию с иностранными заимствованиями и погашениями во Вьетнаме в течение 1986-2018 гг., исследование тем самым указывает на ограничения и причины неэффективного использования

внешнего долга во Вьетнаме. Кроме того, результаты модели предупреждений показывают, что кризис внешнего долга можно прогнозировать с помощью двух объясняющих переменных, а именно переменных макроэкономического индекса и финансового индекса.

В настоящее время во Вьетнаме кризис внешней задолженности остается новой темой. Авторская тема не только остановилась на анализе ситуации с внешними долгами, но и создала модель для предупреждения кризиса внешней задолженности во Вьетнаме, основанную на двух переменных: макроэкономических показателях и финансах. В дополнение к соответствующим показателям эти две индексные переменные также включают в себя увеличивающееся или уменьшающееся влияние этих показателей на возможность кризиса внешней задолженности. Кроме того, авторы также рассмотрели латентность модельных переменных, влияющих на вероятность кризиса внешней задолженности каждой страны. Это делает модель более подходящей, способной более точно оценивать и прогнозировать. Кроме того, статья также способствует анализу тесной взаимосвязи между долговым кризисом и валютным кризисом.

В контексте международной экономической интеграции сегодня все страны стремятся к быстрому и устойчивому росту и развитию. Для достижения этого все страны должны полагаться на источники инвестиций в области развития, в том числе отечественный и иностранный капитал. Внутренний капитал мобилизуется за счет внутренних ресурсов экономики. Если внутреннего капитала недостаточно, необходимо мобилизовать иностранный капитал различными способами, в которых заимствование является популярным методом. Иностранные займы включают займы в форме официальной помощи в целях развития (ОПР) на льготных условиях и коммерческие займы в рыночных условиях. Однако ослабление управления внешним долгом, а также неэффективное использование привело к тому, что многие страны оказались в состоянии задолженности, долгового кризиса и экономического спада. Поэтому укрепление управления внешним долгом является сегодня одной из важных целей финансовой политики каждой страны. Во Вьетнаме управление внешними долгами действительно началось только с 1993 года, в то время как система управления внешним долгом Вьетнама все еще находится в процессе завершения, поэтому мониторинг и управление внешним долгом также становятся все более актуальными.

Ключевые слова: внешний долг, кризис внешнего долга, Вьетнам.

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DIFFUSION OF INNOVATIONS, KNOWLEDGE SPILLOVERS AND ECONOMIC GROWTH OF THE REGIONS OF KAZAKHSTAN: MUTUAL IMPACT

Abstract. In the transition from the raw material orientation of the economy to industrial development, an increase in innovative activity is of great importance. Diffusion of innovation and the knowledge spillovers between regions can play an active role in this. To stimulate innovative activity, which plays a decisive role in the transition from the raw material orientation of the economy to industrial development, diffusion of innovations and the knowledge spillovers between regions are important. The flows of technological innovations, stimulating the processes of creating new products and technologies, contribute to increasing the rate of regional economic growth.

The purpose of the study is to quantify the impact of costs on R&D and technological innovation, their flows in space on the economic growth of the regions of Kazakhstan.

The authors verified the models of endogenous growth for Kazakhstan, built a social filter, and calculated two specifications of the econometric model with fixed effects. Model calculations confirmed the hypothesis about the positive impact of technological innovation costs on regional economic growth rates. At the same time, the regions need to pursue their own innovation policy in order to maintain absorption capacity, which is a prerequisite for an effective flow of knowledge.

The results of the study can be used by public authorities in the formation of the regional innovation policy of the Republic of Kazakhstan.

Key words: innovative development, diffusion of innovations, regional economic growth, R&D, econometric models

Introduction. The latest economic studies of the theory of evolutionary and endogenous growth indicate a decisive role of knowledge and technology in the development of economic systems. An analysis of the nature of the accumulation of knowledge allows not only to explain the existing gaps in productivity between individual countries and types of economic activity (as well as within them), but also to predict their further expansion in the context of an increase in the “difference of knowledge potentials”. Thus, the processes of knowledge creation and accumulation largely determine the future status of the national economic system in a rapidly changing global economy.

This problem is of particular relevance for Kazakhstan. The economy of Kazakhstan is largely dependent on the extraction and sale of minerals, and the share of high technology in the economy is low. At the same time, Kazakhstan has an innovative potential expressed in a high level of the educated population, a high proportion of highly qualified specialists, as well as a large number of resources for the implementation of industrial and innovative projects. However, the insufficient scale and low speed of distribution of innovations characterize the country's modern innovation policy.

Kazakhstan is a country with a relatively large territory and uneven development of regions. The rather high importance of the innovative component of modernization for the regions of Kazakhstan is determined by such factors as global competition, uncertain and sudden change in consumer preferences,

labor migration, and other factors inherent in the modern world economy. Regions are becoming active participants in the processes of competition, while the importance is given to the development of R&D and innovation, information technology, which is understandable.

The purpose of the study is to quantify the impact of diffusion of knowledge, innovations and technologies, their flows in space on the economic growth of the regions of Kazakhstan.

In post-Soviet countries, there are still very few approaches, in contrast to developed economies, to assess the impact of R&D on innovative development. In this regard, this study of the relationship of economic growth of the regions of Kazakhstan with innovation is relevant.

Literature review. Scientists-economists began to approach the study of the diffusion mechanisms of innovative processes, similar to the physical phenomenon of diffusion in various environments, in the middle of the last century. The concept of "diffusion" (corresponds to the Latin "Diffusio" - spill, spread, leakage) was studied in detail by Gabriel Tarde. In his book "The laws of imitation" G. Tarde describes the basic elements that ensure progress. The scientist, being interested in the laws of the distribution of innovations in society, called them the laws of imitation [1]. The concept of the "law of imitation" had a strong influence on the further development and improvement of diffusionism ideas. Later, E. Mansfield [2], C. Wissler [3], B. Ryan and N. Gross [4] confirmed this concept, the essence of which is that initially the idea is perceived by a small number of people, then their number increases, and subsequently - slows down due to the emergence of other ideas.

The spatial system necessarily develops along with diffusion processes. This is evidenced by numerous basic research [5,6,7]. However, despite the fact that each of the directions of research is based on the fundamental concepts of diffusionism, the main principles of different theories do not contradict each other. The Oslo Manual defines the term "diffusion" as the way in which innovations are distributed through market and non-market channels from their initial location to different consumers-countries, regions, industries, markets and enterprises (OCDE, 2005). The Oslo Manual emphasizes that without diffusion, innovation has no economic value [8].

Along with the classical problems of economic growth, the problems of empirical modeling of regional growth based on innovations have recently attracted the attention of many scientists [9, 10]. The theory of diffusion of innovations and knowledge spillovers is important in itself as a section of the general theory of the relationship between economic growth and innovation activity and as a section of modern economic theory. The theory of diffusion of innovations and knowledge spillovers aims to explain the speed and breadth of distribution of various product and process innovations in society [11]. Of particular interest is the study of A.I. Yablonsky, in which the author, describing mathematical models in the study of science, suggested the possibility of using S-shaped curves for modeling the processes of technological development [12]. This assumption became the basis for a series of studies on modeling innovative development. A. Grubler in conducting an experimental study focused on the fact that the diffusion process, expressed in the form of the share of output of a certain technological level, or the share of firms that have mastered the market of new products, is described by the logistics curve [13].

The study of the problems of innovative development and its relationship with significant regional growth is contained in the diffusion models of F. Agillon and P. Howitt [14]. P. Romer theoretically justified the influence of endogenous factors on economic growth [15]. His works contain generalizations of localization effects that positively affect innovation. An analysis of the impact of innovation in the form of R&D on the economic growth of countries and regions over the past decade has become widespread. The positive role of knowledge flows on the economic growth of regions and countries is recognized [16]. In general, the research results show a link between knowledge spillovers and economic growth for a group of countries (for example, the EU), as well as for regions within one country (US states, Spanish provinces, and subjects of the Russian Federation).

As for Kazakhstan, regions of Kazakhstan are characterized by strong uneven socio-economic development. But in accordance with the modern requirements, regions become active participants in the processes of competition, with the main emphasis placed on the field of R&D and innovation, information technology [17]. Issues of innovation development and its management are actively studied in Kazakhstan [18].

In this study, the authors relied on recent studies devoted to the study of the relationship between R&D results and regional growth, performed, in particular, by G.A. Untura and M.A. Kaneva [19]. Scientists emphasize the inverse relationship between the intensity of flows and exchanges of knowledge and distances, since the possibility of direct communication and flows of implicit knowledge decreases with distance.

Methodology. It is obvious that the real socio-economic conditions of the region are characterized by many specific parameters determined by the context of the territory. It is the specific regional context (the structure of human and social capital, institutional and socio-cultural environment, conditions for access to financing, infrastructure) that has a decisive impact on innovative development [20]. This is especially true for Kazakhstan, where regional features of innovation activities differ significantly.

The formulation of the basic model of this study corresponds to traditional models of catching up endogenous growth [21]. To calculate the model, the annual data Of the Committee on statistics of the MNE of the Republic of Kazakhstan of the time period from 2005 to 2018 were used. The geographical units of analysis and the object on the example of which this study is carried out are the regions of Kazakhstan.

The Arellano-bond method, according to the formulation of the model [22] allows to overcome the problem of endogeneity in the model. Adding spatial variables to the regression equation changes the picture to some extent. Thus, the use of the GMM (Generalized Method of Moments) model confirmed the statement about the convergence of regions, made earlier on the basis of the results of panel regression with fixed effects. It was shown that not only regions with lower GRP per capita in the past period grow faster, but also those regions that grew at a lower rate in the past periods.

This result is supported by most empirical studies. For example, this dependence, also based on the GMM model, was previously confirmed for Russian regions [23]. Kazakhstan, as is known, is similar in some respects to Russia in some respects: it has a rich resource base and the raw material nature of the economy. Model calculations confirmed the hypothesis about the positive impact of technological innovation costs on regional economic growth rates. Accordingly, the flows of technological innovations have intensified the processes of creating new products and technologies and contributed to increasing the economic growth rates of the regions of Kazakhstan.

Results. The solution to the problem is carried out step by step.

Stage 1. Calculation of the input data of the model

For the development of the object of study it is necessary to analyze the specifics of Kazakhstan. The authors calculated the input variables of the regression equations. When calculating the dependent variable - the growth rate of GRP per capita at comparable prices (growth), we used the national GDP deflators, presented in table 1. The formula for calculating growth is presented as follows:

$$growth_t = \frac{realGRPPc_t - realGRPPc_{t-1}}{realGRPPc_{t-1}} \quad (1)$$

Table 1 – National deflators of GDP of Kazakhstan (base year 2004)

| Year | Deflator by 2004 | Deflation index |
|------|------------------|-----------------|
| 2005 | 121.5 | 1.215 |
| 2006 | 140.333 | 1.403 |
| 2007 | 169.802 | 1.698 |
| 2008 | 177.783 | 1.778 |
| 2009 | 212.629 | 2.126 |
| 2010 | 252.815 | 2.528 |
| 2011 | 264.950 | 2.650 |
| 2012 | 290.121 | 2.901 |
| 2013 | 306.948 | 3.069 |
| 2014 | 312.780 | 3.128 |
| 2015 | 355.318 | 3.553 |
| 2016 | 377.703 | 3.777 |
| 2017 | 390.7 | 3.907 |
| 2018 | 415.5 | 4.155 |

Source: data of the Committee on Statistics of the Republic of Kazakhstan and the authors' calculations.

By formula (1), recalculations of the growth variable were performed. The variable *lnyt1* was added to the database - “the natural logarithm of GRP per capita with a lag of 1 year” (that is, a shift backward in time by one period). The calculation of knowledge spillovers formulas was carried out, the *spillgrppc* variable was added to the database - “GRP per capita flow”.

Stage 2. Calculation of the social filter of the endogenous growth model

The flow of knowledge is the process of dissemination of once mastered innovations in new conditions. In this regard, to predict the patterns occurring under the influence of certain factors, it is necessary to take into account the socio-economic conditions of the region into which knowledge flows. This is a direct analogue of the effects of the most important socio-economic conditions in the region on other regions. According to our definition, a social filter is a set of factors related to the demographic structure of a region and the level of development of human capital, which is crucial for innovative development [24].

Variables used to calculate the social filter (variable *sf1*) were added to the database. These are the variables: university graduates,% of the total employed population (*grad_l*); the unemployment rate in the region,% (*unemp*); the proportion of the population under 30 years employed in the region’s economy, % (*young*); the share of the population employed in agriculture in the region, of the total employed population,% (*agri_l_n*). Table 2 presents the components of the social filter *sf1* and their weight in the index.

Table 2 – Indicator coefficients for factor 1 (component score coefficient matrix) of the variable “social filter”

| Variable | Coefficients (shares in the social filter) |
|---|--|
| <i>grad_l</i> | 0,7246 |
| <i>Unemp</i> | 0,1305 |
| <i>Young</i> | -0,0088 |
| <i>agri_l_n</i> | -0,6766 |
| <i>Note:</i> The principal component method (<i>pca</i> command in Stata) was used to calculate the weights of the social filter components. | |

The social filter index was based on a factor analysis of the four indicators listed above, and the index itself corresponds to the first factor identified in the process of factor analysis, with an eigenvalue greater than 1 (1,481). The first factor accounted for 37% of the overall variation.

The variable overflows of the social filter *spillsf1* was also added to the database. Descriptive statistics of model variables are presented in table 3.

Table 3 – Descriptive statistics of variables used in the analysis

| Variable | Number of observations | Average | Standard deviation | Min | Max |
|-----------------------|------------------------|------------|--------------------|------------|-------------|
| <i>growth</i> | 192 | 5.237 | 13.050 | -26.880 | 40.430 |
| <i>lnyt1</i> | 192 | 13.155 | 0.703 | 11.790 | 14.785 |
| <i>rd_mk</i> | 192 | 0.135 | 0.141 | 0.007 | 0.709 |
| <i>rd_spill_mk</i> | 192 | 0.129 | 0.040 | 0.071 | 0.318 |
| <i>inno_tot</i> | 192 | 0.994 | 2.340 | 0.000 | 26.327 |
| <i>spill_inno_tot</i> | 192 | 0.980 | 0.810 | 0.126 | 4.928 |
| <i>sf1</i> | 192 | -13.957 | 11.140 | -36.151 | 6.938 |
| <i>spillsf1</i> | 192 | -14.240 | 3.344 | -22.222 | -6.399 |
| <i>spillgrppc</i> | 192 | 654920.400 | 145433.900 | 330502.900 | 1024939.000 |

As follows from the calculations, the regions of Kazakhstan are significantly differentiated by the rate of economic growth: the minimum value of the growth rate of GRP per capita was recorded for the Kyzylorda region in 2015, while the maximum value was reached in 2011 for the Pavlodar region. R&D costs ranged from 0.007% to 0.709% during the study period, but the costs of research and development were higher than the costs of R&D, reaching a maximum of 26.3% for Astana in 2013.

Stage 3. Verification of endogenous growth models

The authors calculated two models with fixed effects based on new data. Before calculating the model, a correlation matrix of all variables used in the analysis was constructed (table 4).

According to the correlation matrix, in both cases, high correlations between the variables were found. Firstly, this is the correlation between the flows of the social filter and the flows of GRP per capita (0.728). This correlation is the result of multiplying the original indicators by the same distance matrix when calculating the accessibility index. The correlation between the social filter and the natural logarithm of GRP per capita with a lag of one year is also high. Alternative social filter options (*sf2* - components *grad_l*, *rd_l*, *young*, *agri_l_n* and *sf3* - components *grad_l*, *rd_l*, *unemp*, *agri_l_n*) were calculated, but no significant reduction in correlation was achieved.

Table 4 – Correlation matrix of variables in endogenous growth model

| | growth | lnyt1 | rd_mk | rd_spill_mk | inno_tot | spill_inno_tot | sf1 | spillsf1 | Spill grppc |
|----------------|--------|--------|--------|-------------|----------|----------------|--------|----------|-------------|
| growth | 1 | | | | | | | | |
| lnyt1 | -0.164 | 1.000 | | | | | | | |
| rd_mk | -0.044 | 0.305 | 1.000 | | | | | | |
| rd_spill_mk | -0.007 | -0.476 | -0.132 | 1.000 | | | | | |
| inno_tot | 0.052 | -0.004 | -0.057 | -0.102 | 1.000 | | | | |
| spill_inno_tot | 0.021 | 0.088 | -0.079 | -0.337 | 0.099 | 1.000 | | | |
| sf1 | -0.104 | 0.816 | 0.541 | -0.443 | -0.011 | 0.136 | 1.000 | | |
| spillsf1 | -0.198 | 0.043 | -0.386 | -0.202 | 0.161 | 0.421 | -0.079 | 1.000 | |
| spillgrppc | 0.038 | 0.227 | -0.329 | -0.312 | 0.067 | 0.206 | 0.012 | 0.728 | 1.000 |

To account for the problem of endogeneity in the model, between the dependent variable and the set of independent variables in terms of the reversecausality problem, all independent variables were lagged.

The authors calculated two specifications of the model. The first specification included the costs of R&D and their flows, the second – the costs of technological innovations and their flows. Specifications are presented in table 5.

Table 5 – Panel regression with fixed effects, dependent variable growth rate of real GRP per capita for the regions of Kazakhstan

| Independent variables | Specification 1 The number of observations = 176 | Specification 2 The number of observations = 176 |
|---|---|---|
| The natural logarithm of GRP per capita with a lag of 2 years | -0.693 (4.958) | 15.460 (10.029) |
| R&D costs as% of GRP with a lag of 1 year | -10.397 (12.074) | |
| Cost of technological innovation as% of GRP with 1 year lag | | 2.290 (0.807) |
| Social filter with 1 year lag | -0.480 (0.276) | -0.602 (0.155) |
| R&D flows with a lag of 1 year | -321.277 (83.278) | |
| Flows of technological innovation with a lag of 1 year | | 13.493 (3.993) |
| The flow of socio-economic conditions with a lag of 1 year | 0.156 (0.338) | -0.605 (0.706) |
| Flow of GRP per capita | -0.000118 (0.00002) | -0.0000638 (0.00001) |
| Constant | 129.949 (64.261) | -186.215 (140.095) |
| Fisher test for the significance of coefficients to zero regression coefficients | F(6.79)=13,67 [0.0000] | F(6.15)=13.72 [0.0000] |
| R ² | 0.1411 | 0.1564 |
| <i>Note: robust standard errors of the regression coefficient are indicated in parentheses.</i> | | |

Analyses showed that, the second specification is more adequate, has a higher R2 (15.6%) and indicates a positive effect of investments in technological innovations on the rate of regional growth. The marginal effect of the *inno_tot* variable is 2.290. The negative and significant value of the social filter indicates that among the variables of the social filter, an increase in unemployment (resulting in *sfl* growth) reduces GRP per capita. The growth of per capita GRP is also caused the growth of people employed in agriculture, which means that in Kazakhstan, economic growth is still dependent on the agricultural sector.

The positive and significant coefficient in the variable flows of costs for technological innovations confirmed the assumption about the significance of the spatial structure and knowledge spillovers on the economic growth of regions. Thus, the costs of IT in neighboring regions stimulate an increase in the growth rate of GRP per capita in the region. At the same time, the regions need to pursue their own innovation policy in order to maintain absorption capacity, which is a prerequisite for an effective flow of knowledge.

Conclusion. Summarizing the results of the tested models, we can conclude that the hypothesis of the importance of knowledge flows on the economic growth of regions and their ability to overcome administrative boundaries and spread beyond one region, stimulating the growth of GRP per capita in the neighboring regions and nearby territories is partially fulfilled. This result allows us to conclude that knowledge is distributed between regions with similar rates of growth and development of technological platforms, and the efficiency of their flow depends on the absorption capacity of the regions

The results of the study can be used by public authorities in the formation of a regional innovation policy in the Republic of Kazakhstan, in particular: substantiation of strategic national priorities in the modernization of the regional economy; justification of the proposal on the STP public administration system; the formation of a basic innovation infrastructure, which includes universities, technology parks, innovation and technology centers, business incubators, centers of expertise, technology transfer, clustering, etc.

Further work in this scientific direction should be focused on the development of theoretical and methodological foundations for the study of regional innovation systems. The implementation of this study will reveal the patterns of innovative development and the specifics of innovative processes in different Kazakhstan regions. In the future, on this basis, it is possible to develop mechanisms for diffusion of innovations, which in turn will contribute to sustainable innovative development of Kazakhstan's regions.

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ҚАЗАҚСТАН Өңірлерінің инновациялар диффузиясы, білім ағыны және экономикалық өсуі: өзара әсері

Аннотация. Экономиканың шикізаттық бағытынан индустриалды дамуға көшуде шешуші рөл атқаратын инновациялық қызметті ынталандыруда инновациялардың таралуы және аймақтар арасындағы білім ағынының маңызы зор. Білімді жинақтау сипатын талдау жекелеген елдер мен экономикалық қызмет түрлері арасындағы (сондай-ақ олардың ішіндегі) өнімділіктегі бар олқылықтарды түсіндіріп қана қоймай, сонымен бірге «білім потенциалдарының айырмашылығын» артуы жағдайында олардың әрі қарай кеңеюін болжауға мүмкіндік береді. Әдетте білімді құру және жинақтау процестері тез өзгертін әлемдік экономикадағы ұлттық экономикалық жүйенің болашақ күйін анықтайды.

Жаңа өнімдер мен технологияларды құру процестерін ынталандыратын технологиялық инновациялар ағындары аймақтық экономикалық өсу қарқынының өсуіне ықпал етеді. Бұл мәселені шешу Қазақстан үшін өте маңызды. Қазақстан экономикасы негізінен пайдалы қазбаларды өндіруге және сатуға байланысты, ал экономикадағы жоғары технологиялардың үлесі төмен. Сонымен бірге республиканың білімді тұрғындарының жоғары деңгейінде, жоғары білікті мамандардың едәуір бөлігінде, сондай-ақ индустриалды-инновациялық жобаларды іске асыру үшін көптеген ресурстарында көрінетін инновациялық әлеуеті бар. Алайда инно-

вацияларды таратудың жеткіліксіз ауқымы мен төмен жылдамдығы елдің қазіргі заманғы инновациялық саясатын сипаттайды.

Зерттеудің мақсаты – шығындардың ҒЗТҚЖ мен технологиялық инновацияларға, олардың кеңістіктегі ағындарының Қазақстан аймақтарының экономикалық өсуіне әсерін бағалау.

Осы зерттеудің негізгі моделін тұжырымдау эндогенді өсудің дәстүрлі үлгілеріне сәйкес келеді. Үлгіні есептеу үшін Қазақстан Республикасы Ұлттық экономика министрлігі Статистика комитетінің 2005-2018 жылдардағы жылдық деректері пайдаланылды. Зерттеудің географиялық бірлігі және объектісі – Қазақстанның аймақтары.

Әлбетте, аймақтың нақты әлеуметтік-экономикалық жағдайлары аумақтың контексімен анықталатын көптеген нақты параметрлермен сипатталады. Бұл инновациялық дамуға шешуші әсер ететін фактор – нақты аймақтық контекст (адам және әлеуметтік капиталдың құрылымы, институционалдық және әлеуметтік-мәдени орта, қаржыландыруға қол жеткізу шарттары, инфрақұрылым). Бұл, әсіресе, инновациялық қызметті жүзеге асырудың аймақтық ерекшеліктері айтарлықтай ерекшеленетін Қазақстанға қатысты. Есептеулерден көрініп отырғандай, Қазақстан Республикасының өңірлері экономикалық өсу қарқынымен айтарлықтай ерекшеленеді: жан басына шаққандағы ЖӨӨ-нің өсу қарқынының минималды мәні 2015 жылы Қызылорда облысы үшін тіркелді, ал 2011 жылы Павлодар облысы үшін ең жоғары мәнге қол жеткізілді. Зерттеулер мен әзірлемелерге жұмсалған шығындар зерттеу кезеңінде 0,007 %-дан 0.709 %-ға дейін болды, бірақ ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстар ҒЗТҚЖ шығындарынан жоғары болды, 2013 жылы Астана үшін ең жоғары көрсеткіш 26,3 %-ды құрады.

Авторлар Қазақстан үшін эндогендік өсу модельдерін тексерді, әлеуметтік сүзгі құрастырды, панельдік модельдің екі сипаттамасын белгіленген эффектілермен есептеді және республиканың аймақтарына эконометрикалық үлгіні салу мүмкіндігін талдады. Модельдік есептеулер технологиялық инновациялардың шығындары аймақтық экономикалық өсу қарқынына оң әсер етеді деген болжамды растады. Технологиялық инновациялық шығындардың ауыспалы ағымы бар оң және маңызды коэффициент – кеңістіктік құрылым мен білім ағындары аймақтық экономикалық өсу үшін маңызды деген болжамды растады. Сонымен қатар өңірлер білімнің тиімді ағымының алғышарты болып табылатын сіңіру қабілетін сақтау үшін өздерінің инновациялық саясатын жүргізуге міндетті.

Зерттеу нәтижелерін мемлекеттік органдар Қазақстан Республикасындағы аймақтық инновациялық саясатты қалыптастыруда қолдана алады, атап айтқанда:

- аймақтық экономиканы модернизациялаудағы ұлттық стратегиялық басымдықтарды негіздеу;
- ғылыми-техникалық прогресті мемлекеттік басқару жүйесі туралы ұсыныстың негіздемесі;
- университеттер, технопарктер, инновациялық және технологиялық орталықтар, бизнес-инкубаторлар, сараптама орталықтары, технологиялар трансферті, кластерлеу және т.б. кіретін базалық инновациялық инфрақұрылымды қалыптастыру.

Осы ғылыми бағыттағы жұмыс одан әрі аймақтық инновациялық жүйелерді зерттеудің теориялық және әдістемелік негіздерін дамытуға бағытталуы керек. Осы зерттеуді іске асыру инновациялық дамудың заңдылықтарын және Қазақстанның әртүрлі аймақтарындағы инновациялық процестердің ерекшеліктерін ашады. Кейіннен осы негізде инновацияларды тарату тетіктерін жасауға болады, бұл, өз кезегінде, Қазақстан аймақтарының тұрақты инновациялық дамуына ықпал етеді.

Түйін сөздер: инновациялық даму, инновациялардың таралуы, аймақтық экономикалық өсу, ҒЗТҚЖ, эконометрикалық модельдер.

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ДИФфуЗИЯ ИННОВАЦИЙ, ПЕРЕТОК ЗНАНИЙ И ЭКОНОМИЧЕСКИЙ РОСТ РЕГИОНОВ КАЗАХСТАНА: ВЗАИМНОЕ ВЛИЯНИЕ

Аннотация. В стимулировании инновационной активности, играющей решающую роль в переходе от сырьевой направленности экономики к индустриальному развитию, немаловажное значение отводится диффузии инноваций и перетоку знаний между территориями. Анализ характера накопления знаний позволяет не только объяснить существующие разрывы в производительности между отдельными странами и видами экономической деятельности (а также внутри них), но и спрогнозировать их дальнейшее

расширение в условиях нарастания «разности знаниевых потенциалов». Как правило, процессы создания и накопления знаний в значительной степени определяют будущий статус национальной экономической системы в быстроменяющейся глобальной экономике.

Перетоки технологических инноваций, стимулируя процессы создания новых продуктов и технологий, способствуют повышению темпов регионального экономического роста. Решение этой проблемы очень важно для Казахстана, экономика которого в значительной степени зависит от добычи полезных ископаемых, а доля высоких технологий в ней невысока. При этом республика располагает инновационным потенциалом, выраженным в высоком уровне образованного населения, значительной доле высококвалифицированных специалистов, а также необходимыми ресурсами для реализации индустриально-инновационных проектов. Однако недостаточные масштабы и низкая скорость распространения нововведений характеризуют современную инновационную политику страны.

Цель исследования состоит в количественной оценке влияния затрат на НИОКР и технологические инновации, их перетоков в пространстве на экономический рост регионов Казахстана.

Формулировка базовой модели, представленной в работе, соответствует традиционным моделям догоняющего эндогенного роста. Для расчета модели использовались ежегодные данные Комитета по статистике МНЭ РК временного периода с 2005 по 2018 годы. Географическими единицами анализа и объектом, на примере которого выполнено данное исследование, стали регионы Казахстана.

Совершенно очевидно, что реальные социально-экономические условия того или иного региона характеризуются множеством специфических параметров, определяющихся контекстом территории. Именно конкретный региональный контекст (структура человеческого и социального капитала, институциональная и социокультурная среда, условия доступа к финансированию, инфраструктура) оказывает решающее влияние на инновационное развитие. Это особенно актуально для Казахстана, где региональные особенности осуществления инновационной деятельности имеют существенные различия. Как следует из проведенных расчетов, регионы РК значительно дифференцированы по темпам экономического роста: минимальное значение темпов прироста ВРП на душу населения было зарегистрировано для Кызылординской области в 2015 г., в то время как максимальное значение было достигнуто в 2011 г. для Павлодарской области. Затраты на НИОКР варьировались от 0,007% до 0,709% в исследуемый период, тогда как затраты на технологические инновации были выше затрат на НИОКР, достигнув максимального значения в 26,3% для Астаны в 2013 г.

Авторами проведена верификация моделей эндогенного роста для Казахстана, построен социальный фильтр, проведены расчеты двух спецификаций панельной модели с фиксированными эффектами и проанализирована возможность построения эконометрической модели для регионов республики. Расчеты по моделям подтвердили гипотезу о положительном влиянии затрат на технологические инновации на темпы экономического роста регионов. Положительный и значимый коэффициент при переменной перетоков затрат на технологические инновации подтвердил предположение о значимости пространственной структуры и перетоков знаний для регионального экономического роста. Однако это не снижает важности проведения регионами собственной инновационной политики с целью поддержания своей абсорбционной способности, являющейся обязательным условием эффективного перетока знаний.

Результаты исследования могут быть использованы органами государственной власти при формировании региональной инновационной политики Республики Казахстан, в частности, при:

- разработке стратегических национальных приоритетов модернизации региональной экономики;
- обосновании предложений по совершенствованию системы государственного управления НТП;
- формировании базовой инновационной инфраструктуры, включающей университеты, технопарки, инновационно-технологические центры, бизнес-инкубаторы, центры экспертизы, трансфера технологий, кластеризации и другие объекты.

Дальнейшая работа по данному научному направлению должна быть ориентирована на разработку теоретико-методологических основ исследования региональных инновационных систем. Реализация данного исследования позволит выявить закономерности инновационного развития и специфику инновационных процессов в различных казахстанских регионах. В последующем на этой базе представляется возможной разработка механизмов диффузии инноваций, что, в свою очередь, будет способствовать устойчивому инновационному развитию казахстанских регионов.

Ключевые слова: инновационное развитие, диффузия инноваций, региональный экономический рост, НИОКР, эконометрические модели.

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SUPPLY CHAIN MANAGEMENT FROM A SOCIAL RESPONSIBILITY PERSPECTIVE

Abstract. World experience shows that the companies' social responsibility nowadays is becoming a prerequisite for ensuring competitiveness in global markets. The customers want to see not only eco-friendly products, but also they want to know that the production process is also not posing a threat to the environment. This has become a new condition of leadership and sustainable consumption. At the present day, the eco-technologies have become a new technology trend, which also spread in recent years following the information technologies, communication technologies, and biotechnologies. The developed countries' experience on the example of Finland shows that investing in efficient and environmentally friendly economic trends leads to savings in energy, resources, and raw materials costs, which generally leads to lower production costs in future. The article discusses the development trends of the global market for environmental goods and services. The annual growth of the global market for environmental goods and services is estimated at an average of 5%. Overall, it is forecasted that the share of products and technologies related to ecology and energy rise up to 40% of total world production in the first half of the 21st century. In this context, the corporate sustainability has already become a global trend, and thus determines the features for some markets' development. The most part in assessing corporate responsibility is made by environmental responsibility, and impacts upon environment. This indicates on an attempt to maximize the companies' involvement in preserving environmentally-friendly factors in all their observed occurrences. The article discusses the corporate practices for implementing the corporate sustainability concept regarding these indicators (At Northrop Grumman, Target, and other companies). However, this is not enough at the present stage of the market development, thus the companies must comply with "the rules of the game" not only within their production cycle, but also to observe the "environment sustainability" of all inputs and outputs.

Key words: corporate responsibility, supply chain management, corporate sustainability, efficient supply chain, environment sustainability.

Introduction. The development of social entrepreneurship is one of the most actual problems of our time [1].

Entrepreneurship brings many benefits for society due to creating corresponding benefits in the form of goods and services, thus providing employment opportunities and expanding business partnerships. Every year, the corporate activities are increasingly influenced by the dynamic process in society that is changing legislative and social norms; gradually, there at comes an understanding that meeting the society's needs is the root cause of their wealth and well-being. The social security of employees that is expressed in raising salaries and making payments in legal forms, the employees' professional growth and training for new personnel, and generous social package formation come to the fore in ensuring the companies' competitiveness, achieving high productivity, and production profitability, and achieving high non-economic indicators for the companies' performance. At the same time, the factors of introducing environment sustainable, energy-saving technologies and materials, which significantly reduce environmental pollution, play an increasingly important role. The social role and corporate responsibility of businesses in fighting poverty and responsible behaviour in developing countries is addressed in works by Wayne Visser (Visser, 2014). The business *corporate sustainability* (including formation and management of responsible supply chains that provides for increased coordination between all elements) ultimately leads to improved customer's satisfaction (Prashant&Wagle, 2014).

The article purpose. The purpose of this article is to define the indicators for assessing supply chain management from the standpoint of social responsibility.

Research results. The *corporate sustainability* has become a competitive advantage of the corporations' functioning in modern conditions. The main forms of company's corporate social responsibility can be identified as follows: adoption and publishing of social, ethical and other codes; introduction of new accounting and reporting standards in the field of CSR; preparation of regular social reports subject to monitoring by special organizations; developing a green business using European approaches and tools; increasing of environmentally friendly goods production; introduction of mandatory social and environmental labelling of goods, for example, "eco-goods", "made from waste", etc.; implementation of social investments; transparency, informing consumers about goods and services.

The implementation of CSR principles is voluntary today. Nevertheless, companies that strive to be competitive not only today, but also in 5-7 years, are implementing these principles currently. In connection with the increasing importance of analysing the social consequences of economic globalization, as well as environmental consequences, the concept of CSR in modern conditions is gaining its further innovative development. It is becoming highly evident that the movement of goods, people and ideas does not fit into the existing framework for regulating its social, cultural and political consequences.

The forms of corporate social responsibility manifestation are influenced by the fact that companies strive to create "green" technologies, "green" products, considering the wishes of customers to see not only environmentally friendly products, but also to know that the production process also does not make threats to the environment. So-called "green" alliances can be formed, and they have great advantages: free access to information regarding the environmental friendliness of products (where exactly was manufactured and by what technology, what components, ingredients were used, etc.); consumer trust to the proposed environmental materials; access to new markets, competitiveness; eco-materials, due to their positive characteristics, can create ads for themselves; consumer consultation at any stage (from the production of goods to the moment of operation and the warranty period). In recent years, the eco-technologies, which today have become a new technology trend, following the information and communication technologies and biotechnologies, have gone mainstream. Such topical issues as climate change, environmental pollution, global disasters, etc. - all these factors gave impetus to searching for new solutions.

Over the past decade, the science and technologies development has brought great achievements in the field of economics, construction, ecology, thereby reaching a new level of research, namely eco-technology. Every day, this issue is becoming increasingly relevant, and humanity is striving for optimal interaction with the environment. Since this time, investments in environmental technologies began to grow in the world, that is, a set of measures for the release of goods and the provision of services allowing assessing, limiting, preventing, correcting, or minimizing harm made to the environment and/or society as a whole. The prerequisites for the development of eco-technologies are the growth of industrial production and the improvement of legislation; an company and society represented by the state should not only be willing to solve environmental problems, but also have the economic opportunity to implement them. The state should contribute to the formation of the eco-technology market with the help of various programs and mechanisms that are widely used around the world to stimulate the growth of the economy and its particular industries, as well as strengthen strict standards for environmental emissions. In turn, there are negative circumstances, namely, a contradiction of the business' and society's interests in resolving environmental problems. To some extent, the environmental technology market depends on the current environmental policy of the state and may be in a state of forces distribution and strategies determination. The main problem for the environmental technologies formation is the lack of technologies suitable for implementation, and the lack of "commercial" technical solutions.

The main reason for investing in eco-technologies is environmental legislation, the aim of which is to reduce environmental pollution. Special attention is paid to activities related to wastewater, minimization and prevention of air pollution. The introduction of stricter environmental legislation leads to the development of a new industry, the eco-industry. One of the most developed countries in the field of eco-industry is Finland that has about ten companies that are world leaders in the field of environmental technologies. Finland managed to become a country of advanced technology in the 1990s. Finnish companies are world leaders in energy efficiency and the use of environment sustainable technologies. Competent business in the field of energy and ecology, as well as the practice accumulated in this

industry, are significant components of the country's reputation. Experience in technology and pure nature are well combined into one. Industrial companies invest in efficient and environmental sustainable industries, since they can be used to save energy, materials and raw materials. This helps to reduce production costs. In addition, taking care of the environment, it is possible to make the business more profitable.

In Finland, control and automation systems, wind energy, bio-energy technologies, efficient materials, effluent treatment and air purity control are rapidly developing. Finnish companies invest heavily in the technologies of the future, conduct research and development of products related to smart grids, produce electric cars, bio-fuels, and nano-material are at the highest world level. Therefore, many countries and companies seek to adopt the Finnish experience. Today, the global market for environmental technologies is about €140 billion annually, with North America and Western Europe accounting for most of this amount. Scientists estimate the global market for environmental goods and services at about \$500 billion, as dynamic and rapidly updated.

Its annual growth is more than 5%, while in some countries the growth rates are projected even higher. Particularly, the growth rates are projected to go up to 8% per year in the Baltic countries, and up to 10% over the next five years in Canada. The market for environmental goods and services in Eastern Europe, including the CIS countries, is estimated at about \$ 20 billion, and the average annual growth is estimated at more than 1%. The largest sector in the eco-technologies field is energy efficiency, followed by water supply. Their market growth is expected to double in the next ten years. The sphere associated with the materials' efficiency is developing faster, and if counting with the energy production, their volume is likely to triple in ten years. Experts also note that in the first half of the 21st century, up to 40% of world production there will be the products and technologies related to ecology and clean energy generation. Consequently, the companies that have already incorporated such new opportunities for using the environmental component of the business in their strategies will receive great benefits. The eco-technologies development occurs in the following industries: wastewater and effluent treatment; waste management and recycling; environmental monitoring; minimization or prevention of air emissions; health and safety in the workplace; energy recovery; transport.

Having studied the experience in implementing the corporate social responsibility concept, we will make a detailed study of the forms how the companies' socially responsible activities are manifested in different sectors of economy, thus exploring best practices in business activities. Overall, on a world-wide scale, the business giants adhere to the rules and principles of corporate responsibility. Moreover, the social responsibility concept has already become a global trend, and thus it determines the directions for some markets' development. The most part in assessing the *corporate sustainability* concept includes such elements as environment sustainability, relations within the company, and environmental impacts (table 1).

Table 1 – Evaluation indicators of the best companies in terms of social responsibility (100 best, 2019)

| Indicator group | Weight (% of total) | The number of factors in the group |
|--|---------------------|------------------------------------|
| Climate change | 18,0 | 27 |
| Employee Relations | 20,5 | 24 |
| Environment | 18.0 | 28 |
| Finance | 4,5 | 8 |
| Control | 7,5 | 10 |
| Management: ISS-ESG: Corporate Ranking | 8,0 | 2 |
| Human rights | 11,0 | 17 |
| Stakeholders and Society | 12,5 | 18 |
| Total | 100 | 134 |

As we can see, the largest number of factors that are the elements in the company's social responsibility assessment correlates with the indicators of environmental impact and relations with personnel; this is an evidence of an attempt to maximize the companies' involvement in preserving environmental factors in all their occurrences. The main data panels for the assessment include several groups of indicators (table 2).

Table 2 – Data panel type

| | Disclosure | Policy | Indicators |
|---------|---|---|--------------------------------|
| Example | Does the company disclose the amount of energy saved as a result of energy-saving programs? | Does the company apply the same social responsibility standards to suppliers and sellers (across the supply chain)? | The total amount of water used |
| | Binary | Numerical | |
| | – “true” accounts as a positive value – “false” and irregular fields counted as neutral weight | – Countable values relative to other companies to create a rating | |

The annual rating “100 best corporate citizens” has been estimated in relation to these indicators since the beginning of the 21st century. According to the results of the rating estimated in 2018, the best companies in the world with the highest level of social responsibility are located in the USA (table 3).

Table 3 – The World's Top 20 Most Reputable Companies For Corporate Responsibility 2018

| Rank | Company | Symbol | General indicator | Staff Relations | Environment | Climate change | Stakeholders and Society | Human rights | ISS-ESG Rank | Control | Finance |
|------|-------------------------------|--------|-------------------|-----------------|-------------|----------------|--------------------------|--------------|--------------|---------|---------|
| 1 | OWENS CORNING | OC | 84,97 | 42 | 47 | 31 | 6 | 1 | 1 | 346 | 116 |
| 2 | INTEL CORP. | INTC | 83,32 | 4 | 5 | 13 | 7 | 65 | 2 | 704 | 8 |
| 3 | GENERAL MILLS, INC. | GIS | 82,72 | 30 | 84 | 9 | 9 | 13 | 95 | 466 | 65 |
| 4 | CAMPBELL SOUP CO. | CPB | 80,84 | 143 | 36 | 101 | 11 | 12 | 96 | 34 | 110 |
| 5 | HP, INC. | HPQ | 80,69 | 41 | 71 | 1 | 41 | 76 | 97 | 35 | 140 |
| 6 | MICROSOFT CORP. | MSFT | 80,09 | 114 | 65 | 162 | 3 | 10 | 98 | 99 | 19 |
| 7 | NIELSEN HOLDINGS PLC | NLSN | 79,91 | 29 | 30 | 308 | 15 | 4 | 3 | 36 | 795 |
| 8 | ECOLAB, INC. | ECL | 79,81 | 18 | 24 | 153 | 58 | 9 | 57 | 347 | 658 |
| 9 | GAP, INC. | GPS | 78,01 | 16 | 49 | 140 | 80 | 11 | 151 | 194 | 762 |
| 10 | CISCO SYSTEMS, INC. | CSCO | 77,22 | 100 | 50 | 32 | 49 | 41 | 41 | 348 | 372 |
| 11 | FORD MOTOR CO | F | 77,19 | 11 | 25 | 156 | 119 | 16 | 129 | 268 | 209 |
| 12 | CITIGROUP, INC. | C | 77,16 | 70 | 7 | 23 | 2 | 2 | 257 | 452 | 184 |
| 13 | HASBRO, INC. | HAS | 77,13 | 9 | 42 | 94 | 144 | 3 | 280 | 467 | 520 |
| 14 | ALTRIA GROUP, INC. | MO | 77,02 | 91 | 43 | 60 | 32 | 7 | 321 | 468 | 71 |
| 15 | CBRE GROUP, INC. | CBRE | 76,87 | 165 | 72 | 114 | 8 | 75 | 4 | 2 | 760 |
| 16 | JOHNSON & JOHNSON | JNJ | 76,70 | 24 | 160 | 17 | 12 | 126 | 99 | 522 | 405 |
| 17 | ABBVIE, INC. | ABBV | 76,63 | 8 | 11 | 97 | 131 | 52 | 42 | 720 | 306 |
| 18 | XYLEM, INC. | XYL | 76,52 | 128 | 150 | 50 | 95 | 26 | 5 | 24 | 574 |
| 19 | HEWLETTPACKARD ENTERPRISE CO. | HPE | 76,24 | 236 | 16 | 18 | 73 | 124 | 100 | 37 | 674 |
| 20 | NEWMONT MINING CORP. | NEM | 76,21 | 87 | 29 | 131 | 13 | 22 | 101 | 38 | 90 |

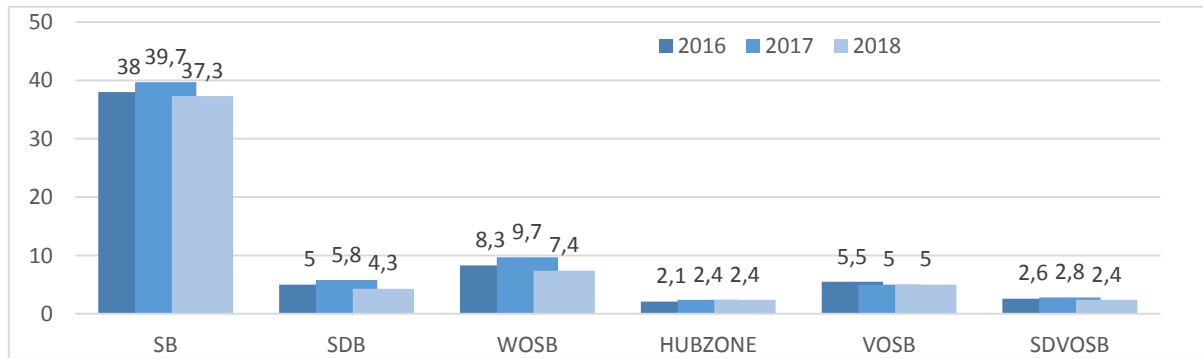
The implementation of corporate responsibility best practice can be found among global leaders. For example, At Northrop Grumman presents key indicators of social responsibility, including women and different races representation in the company in its reports. For example, since 2010, women's representation at the Vice-President and higher level has increased from 16% to 33%, and People of Colour representation at the Vice-President level and higher has increased from 11% to 18%. In addition, the company invests significant resources in its employees' training: over 50% of management employees have passed training, thus leadership staff is strengthening. In 2018, At Northrop Grumman was one of four companies to receive the highest award from Catalyst (a global non-profit organization oriented on promoting women in corporate leadership).

The company's social responsibility structure includes not just individual actions or directions, but also the formation of systematic diverse supply chains. For over 13 years, At Northrop Grumman has exceeded the US legal goal of partnering with small businesses of at least 23% of all contractors. In 2018, the company subcontracted 37% of domestic purchases, or \$ 3.1 billion, to small business suppliers, including businesses owned by women, veterans, and minority owners. As part of the Global Supplier Diversity Program, the company is developing partnerships with the small business community to provide technologically advanced products and services that support the supply chains' growth and development. For example, working with the US Department of Defence's Mentoring Program, the company collaborates with the Centre for Economic Development at the University of Southern California and several historically established colleges and universities to provide cyber-security training to approximately 4,000 vendors.

In addition, in 2008, the company launched a green NG eco-sustainability program aimed at improving operational efficiency and long-term cost savings. For instance, the company sets a target for the amount of greenhouse gas emissions, reducing it by 33% (244 110 cubic tons) compared to 2010. The targets are also set for water consumption (reducing consumption by 155 million gallons per year) and solid waste recycling (an increase from 52% to 62% of the solid waste diversion).

At Northrop Grumman and the Northrop Grumman Foundation are looking to increase community engagement. One of the main activities is to support STEM (Science, Technology, Engineering, and Mathematics) training opportunities for students and lecturers around the world. In 2018, the company provided about \$20 million to various organizations and programs working in the fields of science, technology, engineering and mathematics. The company pays special attention to the social responsibility of companies throughout the supply chain, maintaining its ethical principles within its entire dimension, focusing on the production of the most innovative and affordable technological solutions for customers. In the process of competition, all suppliers go through an assessment process, which identifies companies that are at risk of reduced productivity. Efficiency is assessed in several main categories, including management, technical support, schedule, cost, offer, mission implementation, supply chain management and customer satisfaction, with emphasis on the "most important suppliers" with basic business requirements. At Northrop Grumman, the vision is to be a leader in providing integrated and efficient supply chain solutions by harmonizing and using common strategies, processes, people and systems to create value. The company relies on suppliers that supply raw materials, chemicals, components and subsystems for products, as well as manufacture components and equipment trims, provide software and intellectual property, and also provide some services to end customers (for example, repair or maintenance), and do this is in accordance with all applicable laws, rules and contract terms. In 2018, the company subcontracted \$ 8.3 billion with a wide supplier base covering all of 50 US states.

The company sets standards of business conduct for all suppliers, employees and subcontractors at all levels. At Northrop Grumman develops and maintains a diverse supply chain that provides an optimal value for the company and customers. The Northrop Grumman Global Supplier Diversity Program Office (GSDP) is an interlink to small and low-income business owners, as well as partners at colleges and universities. The company holds information events for small businesses, offers mentoring programs and sponsors academic, consumer and industry events that support the growth and development of small businesses (figure).



The ratio of diverse suppliers to the company, 2018, %.

SB – small business; SDB - small disadvantaged business (SDB)

(this is a small business that is at least 51 percent owned by one or more people who are in a disadvantaged social and economic situation.

The status of the SDB gives the company the right to participate in tendering and contracting for preferential programs related to federal procurement);

WOSB - a women-owned small business;

HUBZONE - a historically underutilized business zone;

VOSB - a veteran-owned small business;

SDVOSB - a service-disabled veteran-owned small business

The supply chain control focuses on the following measures: preventing product quality reduction at all stages of its production, banning counterfeit parts, and observing cyber security regulations, protecting intellectual property; for that purpose a special program has been developed to train how to ensure authenticity of materials for supplies throughout the chain, improving product quality, engineering procurement, etc. Thus, only those suppliers who have been trained or tested for training in preventing product quality reduction or getting into the counterfeit product chain are allowed to get to the supply chain (Corporate..., 2018).

Building a socially responsible supply chain remains a topical problem for the trading companies, in which these chains are very diversified and wide. Target, a retail company, has introduced its social responsibility development strategy throughout the supply chain, providing a decent salary. The company works with strategic partners, raising and controlling the level of wages for three million people in factories and in the communities where the company's products are manufactured. The company also joined the Nest standards platform for homes and small workshops (a non-profit organization focused on the development of the global crafts and craft industry in order to improve the living standards of artisans and homeworkers).

In 2017, the company joined Nest and other retailers to develop more than 130 compliance standards for home seminars that cover employee rights and business transparency, child protection, fair compensation and benefits, employee well-being, health and safety, and environmental sustainability. The company also collaborates on the CARE Decent Work Initiative: in 2017, a partnership was launched with CARE, an international non-governmental organization dedicated to the economic integration and marginalization of women and their communities, with the goal of empowering working women in the supply chain in Bangladesh, Indonesia and Vietnam. In 2018, this work continued to provide working women with enhanced opportunities to identify, formulate and advocate issues that affect their well-being. At the same time, one of the key components of building the company's value chain is ensuring labour safety for employees. The company has developed vendor engagement standards that require a safe and healthy work environment that complies with local laws and minimizes occupational hazards.

Target was one of the founders of the Alliance for Bangladesh Worker Safety in 2013 and continues to work with the Alliance to improve safety conditions for garment factory workers throughout Bangladesh. It uses its seat on NATO Board of Directors to conduct industry-wide transformations and local factory support, as it continues to complete the restoration process to adopt exact Alliance security standards. The company is responsible for protecting the people who help produce the products, and undertakes every effort to deliver products to consumers in an ethical and responsible manner. In 2017, the

company continued to deepen its obligations to identify and, if found, to prevent forced labour in the supply chain, working to eliminate the factors that allow forced labour to exist worldwide. In collaboration with suppliers, key partners and experts, standards to prevent forced labour in global supply chains and standards for preventing malversation outside of the main production are developed. These key principles include the right to freedom of movement, absence of pay for work and coercion to work.

Target in partnership with Verité has developed a supplier protection policy for foreign contractors in the supply chain, aiming to establish clear expectations for suppliers and set out verification procedures, standards and mechanisms. As part of this initiative, the company joined the RBA initiative on responsible work and recruiting migrants. The LaborLink program is also focused on preventing human trafficking throughout the supply chain and preventing child labour, especially in North India (a standard for flow-through supply chain mapping has been developed for these companies to identify child labour risks) (Future at heart, 2018).

Conclusions. Corporate social sustainability of companies has become not just a moral competitive advantage, but an urgent need, which is associated with the increasing influence of ecology and social movements in society. However, this is not enough at the present stage of the market development, thus the companies must comply with “*the rules of the game*” not only within their production cycle, but also to observe the “*environment sustainability*” of all inputs and outputs. A certain “*cascade*” social responsibility is being formed, which is based on the company’s full responsibility for all stages of the production cycle (from the starting idea up to disposal). At the same time, the observed occurrences of social responsibility may differ depending on the company’s activity type, the company’s size, and may appear not only in standardization activities. As we can see from the case studies of best practices for the social responsibility concept implementation, the companies with different levels of market influence implement very diverse corporate sustainability instruments. Also, it can be stated that significant efforts by the companies to manifest their social responsibility are reflected in their financial performance.

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ӘЛЕУМЕТТІК ЖАУАПКЕРШІЛІК ТҮРҒЫСЫНАН ЖЕТКІЗІЛІМ ТІЗБЕГІН БАСҚАРУ

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УПРАВЛЕНИЕ ЦЕПОЧКАМИ ПОСТАВОК С ПОЗИЦИЙ СОЦИАЛЬНОЙ ОТВЕТСТВЕННОСТИ

Аннотация. Цель. Определение основных механизмов управления цепочками поставок с позиций социальной ответственности.

Результаты. Мировой опыт свидетельствует, что социальная ответственность предприятий становится необходимой предпосылкой для обеспечения конкурентоспособности на глобальных рынках. Условием лидерства и разумного потребления становится желание клиентов видеть не только экологически чистые продукты, но и знать, что процесс производства тоже не несет угрозы окружающей среде. В последние годы вслед за информационно-коммуникационными технологиями и биотехнологиями также получили распространение эко-технологии, которые сегодня стали новым трендом технологий. С каждым днем этот вопрос приобретает все большую актуальность, а человечество стремится к оптимальному взаимодействию с окружающей средой. Опыт развитых стран (например, Финляндии) свидетельствует, что инвестирование в

эффективные и экологически чистые направления приводят к экономии затрат на энергию, материалы и сырье, что в целом приводит к снижению затрат на производство. В статье рассмотрены тенденции развития мирового рынка экологических товаров и услуг, ежегодный рост которого оценивается в среднем в 5%, в целом прогнозируется, что в первой половине XXI века до 40% мирового производства составит продукция и технологии, связанные с экологией и энергетикой. Предпосылки для развития экотехнологий заключаются в росте промышленного производства и совершенствовании законодательства, предприятие и общество в лице государства должны не только желать решать экологические проблемы, но иметь экономическую возможность их воплощения. Государство должно способствовать формированию рынка экотехнологий с помощью различных программ и механизмов, которые широко используются во всем мире для стимулирования роста экономики и определенных ее отраслей, а также усиливать жесткие нормы на выбросы в окружающую среду. В свою очередь существуют и негативные обстоятельства, а именно – противоречие интересов бизнеса и общества в решении экологических проблем. В некоторой степени рынок экотехнологий зависит от сложившейся экологической политики государства и может находиться в состоянии распределения сил и определения стратегий. Основной проблемой для формирования экотехнологий становятся дефицит технологий, целесообразных к внедрению и отсутствие «коммерческих» технических решений. Предпосылки для развития экотехнологий заключаются в росте промышленного производства и совершенствовании законодательства, предприятие и общество в лице государства должны не только желать решать экологические проблемы, но иметь экономическую возможность их воплощения. Государство должно способствовать формированию рынка экотехнологий с помощью различных программ и механизмов, которые широко используются во всем мире для стимулирования роста экономики и определенных ее отраслей, а также усиливать жесткие нормы на выбросы в окружающую среду. В свою очередь существуют и негативные обстоятельства, а именно - это противоречие интересов бизнеса и общества в решении экологических проблем. В некоторой степени рынок экотехнологий зависит от сложившейся экологической политики государства и может находиться в состоянии распределения сил и определения стратегий. Основной проблемой для формирования экотехнологий становятся дефицит технологий, целесообразных к внедрению, и отсутствие «коммерческих» технических решений. В этом контексте корпоративная социальная ответственность стала уже глобальным трендом и определяет развитие некоторых рынков, в оценке корпоративной ответственности максимальную часть занимает экологическая ответственность, отношения внутри компании и влияние на окружающую среду, что свидетельствует о попытке максимально вовлечь компании в сохранение экологических факторов во всех их проявлениях. Относительно этих показателей в статье рассмотрены корпоративные практики реализации корпоративной ответственности (At Northrop Grumman, Target и другие). Контроль за цепочками поставок концентрируется на недопущении уменьшения качества продукта на всех этапах его производства, запрете контрафактных частей и соблюдении кибербезопасности, защите интеллектуальной собственности, для чего была разработана специальная программа обучения подлинности материалов для поставок во всей цепочке, повышения качества продукции, инжиниринг и т.д. Таким образом, к цепочке поставок допускаются только те поставщики, которые прошли обучение или проверку на предмет обучения по предотвращению производства или попадания в цепочку контрафактной продукции. Актуальным вопросом построения социально ответственной цепочки поставок остается для торговых компаний, в которых эти цепочки очень диверсифицированы и широки. При этом одним из ключевых компонентов построения производственно-сбытовой цепочки компаний является обеспечение безопасности труда для работников. В компании разработаны стандарты вовлеченности поставщиков, которые требуют обеспечения безопасной и здоровой рабочей среды, соответствующей местным законам и сводящей к минимуму производственные риски. Однако на нынешнем этапе развития рынка этого уже недостаточно, и компании должны соблюдать правила игры не только внутри своего производства, но и соблюдать «экологичность» всех входящих и исходящих потоков.

Выводы. Социальная ответственность компаний стала уже не просто моральным конкурентным преимуществом, а острой необходимостью, что связано с возрастающим влиянием экологических и социальных движений в обществе. Формируется некая «каскадная» социальная ответственность, в основе которой лежит полная ответственность компании за все этапы производства – от идеи до утилизации. При этом проявления социальной ответственности могут отличаться в зависимости от рода деятельности той или иной компании, ее размеров и могут проявляться далеко не только в стандартизации деятельности. Как видим из анализа примеров лучших практик реализации социальной ответственности, компании с различным

уровнем рыночного влияния реализуют весьма разнообразные инструменты социальной ответственности. Также можно констатировать, что значительные усилия компаний по проявлению своей социальной ответственности находят отражение в их финансовых результатах деятельности.

Ключевые слова: корпоративная ответственность, управление цепочками поставок, корпоративное развитие, экологическая безопасность.

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BALANCED SCORECARD: ESSENCE AND IMPORTANCE FOR MAKING GOOD BUSINESS DECISIONS TO ENSURE SUSTAINABLE DEVELOPMENT OF BUSINESS

Abstract. In recent decades, the economic processes at both micro and macro levels have been affected significantly by the globalization, resulting in strengthening the ties and interaction between economies, promoting industrial development, tougher sector-wide competition and scientific and technological advancement. It has become increasingly challenging for many businesses to sustain a stable market position, not to mention business growth. It is beyond doubt that by focusing on growth and sustainability, economic entities develop the economy in general. However, it can affect other areas too. For example, expansion of production has a negative ecological impact, causing resource depletion and environmental pollution; and the desire to reduce costs often affects the working conditions and the wellbeing of employees. Recently, economic entities all over the world have been paying special attention to the environmental impact and social responsibility of business, which are two of the three main components of sustainable development. Therefore, the concept of sustainable development has been playing an increasingly significant role in every country in the world.

Undoubtedly, many economic entities of today strive to adhere to the principles of sustainable development of business, which include economic success, environmental protection, and social wellbeing.

The definition of “sustainable development” was first introduced in 1987 by the International Commission on Environment and Development. Despite this, the process of introducing the postulates of the International Commission into the activities of modern economic entities is still ongoing. Undoubtedly, many modern economic entities strive to adhere to the strategy of sustainable development, shaping their activities in the framework of compliance with the principles of financial success, causing the least damage to the environment and taking into account the social component.

It is worth noting that the implementation of the concept of sustainable development in the management of a business entity requires the use of effective tools.

Key words: analysis, business processes, globalization, methods, perspective, production, balanced indicators, system, strategy, turbulence, sustainable development, financial success, economic entity, performance.

Introduction. Sustainable development is a matter of top priority for any entity. It determines the way the entity functions in terms of social responsibility, rational use of resources, environmental protection, and affects both the past, present, and future of the company.

Sustainable development is understood as such development of a business entity, where a balance is maintained between all spheres of its functioning, namely: economic, social, and environmental, to ensure the well-being of the current generation and improve the living conditions for future ones [1].

The issues of sustainable development of economic entities are primarily addressed at the macro-level (countries, regions, etc.), and Russia is no exception. It should be noted that this topic does not attract the attention of many scholars around the globe, and the approaches to and methods for ensuring sustainable development of business remain open to question and relevant in any historical period.

In our opinion, the concept of sustainable development should be introduced not only at the macro level but should also cover the micro-level. When discussing the model of sustainable development of economic entities at the micro-level, one should understand that any entity can be seen as a system covering both economic and social aspects and influenced by both external and internal factors. Therefore, the sustainability of economic entities can be divided into internal and external sustainability.

Internal sustainability is nothing more than a systemic interaction between structural elements of an economic entity, aimed at achieving a balance between the interests of its employees, owners, and other stakeholders. In turn, such balance promotes the achievement of the main business goal of any economic entity, i.e. maximizing the business profit.

External sustainability of an economic entity is primarily understood as a conflict-free interaction between the entity and the environment, state, consumers, competitors, suppliers, financial and credit institutions.

In the modern economy, to grow, an entity needs a certain mechanism to ensure its sustainable development by increasing its energy efficiency and labor productivity, without an additional burden on other resources, including natural ones.

The concept of sustainable development forms an inextricable connection between economic, social and environmental concerns of an economic entity. Sustainable development should be viewed as a balanced combination of its components: social, environmental and economic sustainability, from the perspective of the stakeholders.

Sustainable development of an economic entity is ensured by its production, technological, organizational, managerial and human capital, reasonable pricing, marketing, innovation, and investment policies, altogether aimed at increasing the entity's financial stability. It is also critical not to underestimate the importance of information, especially in the current turbulent and crisis-ridden environment.

The classification of sustainable development extends far beyond external and internal sustainability and takes into account the goal and tasks set before the entity (see figure 1).

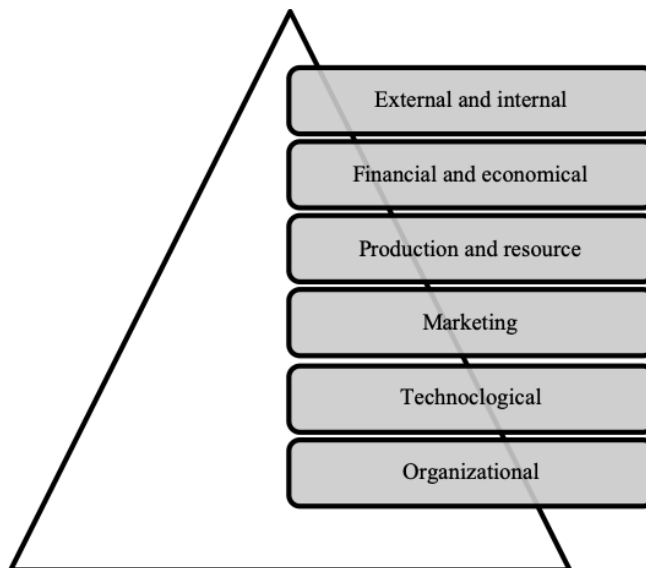


Figure 1 – Classification of sustainable development of an economic entity (developed by the authors)

As for the financial sustainability of an economic entity, attention should be paid to ensuring a steady expansion of the entity's capital, with a proper balance between own and borrowed funds, in order to increase the revenue and minimize the costs and, thus, achieve higher profits. A financially sustainable economic entity is an entity that can use its resources most efficiently to maximize its financial results. Financial sustainability and economical sustainability principally mean the same.

Sustainable production is mainly characterized by the efficient distribution of the entity's human, material and production resources in the production of goods, works, or services.

Marketing sustainability can be understood through its direct connection to the entity's marketing policy aimed at sustainable development. Such policy cannot be implemented without regularly obtaining up-to-date information about the supply and demand for goods, works, services sold by the entity, and about the market situation in general.

Technological sustainability is directly related to the innovation processes, in which the business entity is involved. Technological sustainability characterizes the progressiveness of the technology used by the business entity and the level of automation of production, which cannot be implemented without innovations.

Organizational sustainability of an economic entity is understood as the best organizational structure and effective interaction with other market participants and the public sector.

According to E.N. Kucherova, the sustainability of economic entities is "a combination of industrial, managerial, environmental, marketing and socio-economic sustainability" [2].

In achieving its main goal, each economic entity seeks to reach a balance between the interests of its owners, employees, the external environment, and public institutions with a minimum risk of negative implications for itself. This is the essence of the concept of sustainable development of economic entities, which manifests itself in the balance between economic, social and environmental aspects of a business.

In reviewing the main aspects of sustainable development of an economic entity, it should be noted that the concept of sustainable development only works if the entity has enough capabilities to apply innovative breakthrough technologies to support its economic, social and, of course, environmental activities.

Today, many economists and managers believe that innovation is the key to effective economic development at the macro and micro levels. One can hardly argue that, especially given numerous economies that boosted due to their innovation policies (India, China, Korea, Singapore).

In Russia, the national innovation policy has major importance for the entire economy. Over the past decade, more than 70% of all projects have been implemented with the active involvement of the state. Many other developing economies adhere to the same approach and develop national innovation policies aimed at economic, social, and environmental improvement.

Methods. A. General

It is undeniable that the methods for analyzing sustainable development of economic entities are of interest and have been studied by numerous leading scholars, both in Russia and abroad. The most significant scientific works, in our opinion, are those of R. Kaplan, D. Norton, E.N. Kucherova, N.B. Klishevich, R.V. Morozova, V.N. Pulyayeva and others. The majority of papers focus on the methods for implementing, analyzing and evaluating the sustainable development of economic entities. To evaluate the sustainable development of an economic entity, a complex analysis thereof must be conducted, by applying such methods as comparison, correlation, generalization, factor analysis, and a Balanced Scorecard (BSC).

Balanced Scorecard (BSC) is widespread both in theory and in practice. Ambitious economic entities introduce BSC to ensure their sustainable development. Examples of such successful companies characterized by a high level of sustainable development are IKEA, Philips Electronics, Best Buy, and even the city of Charlotte, USA.

B. Algorithm

This paper summarizes and systemizes the features of a Balanced Scorecard and defines the essence and importance of a Balanced Scorecard for making good business decisions to ensure sustainable development of business.

The authors highlight that before the introduction of a Balanced Scorecard the majority of managerial approaches focused primarily on financial indicators. However, it should be noted that such financial indicators use a retrospective approach and properly reflect the situation only for industrial entities that do not make significant investments in customers, employees, business processes, etc. In turn, a Balanced Scorecard expands the analytical capabilities and provides reliable information about the entity's standing and sustainability, based on a triune approach to economic, social and environmental development.

C. Flow Chart

It should be noted that the sustainable development of an economic entity is a complex mechanism based on economic, social and environmental aspects. A Balanced Scorecard allows stakeholders to assess the actual sustainability of a business entity at a given time.

A Balanced Scorecard is not just a system for measuring the performance of economic entities, but also a functional tool used for strategic management. It was developed by US scholars R. Kaplan and D. Norton who tried to answer the question “Why do some strategies not work?” [3]. Its advantage over other tools is the ability to evaluate both financial indicators and other components that disclose information about business processes, customer satisfaction, employee training and development. Having identified the weaknesses in previous managerial approaches, the scholars proposed to balance the financial side of an entity’s activities only.

By integrating the financial and non-financial indicators, a Balanced Scorecard reveals the cause-and-effect relations between the resulting indicators and the impact factors. A Balanced Scorecard ensures itemized monitoring of the economic entity’s performance to increase the efficiency and effectiveness of the decision-making process, control business processes through key performance indicators (KPI) [4]. Moreover, this tool focuses on the corporate strategy of business entities, thus contributing to its successful implementation.

By developing a Balanced Scorecard, the scholars aimed “to create a tool to coordinate the actions of the employees and departments at all levels in order to achieve the strategic goals at the lowest cost” [5]. Kaplan and Norton also introduced the concept of a strategy map, which is an effective tool for laying down and implementing the strategy of any economic entity. A strategy map is “a visual representation of an organization’s overall objectives and how they relate to one another. A typical strategy map organizes objectives into four categories: finances, customers, internal processes and staff learning and growth” [6].

Results. As mentioned above, a strategy map is a visual representation of an organization’s overall objectives and how they relate to one another. The main advantages and disadvantages of this managerial approach are given below (see figure 2).

Pros of a Balanced Scorecard:

1. Provides a comprehensive picture of a business entity by analyzing auxiliary factors in addition to financial indicators.
2. Facilitates the interaction between employees at all levels, ensures feedback and promotes employee satisfaction.
3. Helps obtain a large array of data in an understandable form, by highlighting 15 to 25 indicators, divided into four blocks.

Cons of a Balanced Scorecard:

1. There is no BSC that can be used for all entities, i.e. in developing a BSC, it is necessary to take into account the specifics of the economic entity concerned, the industry sector, location, size, internal management methods and other specific features. This is especially important for corporations with branches around the world. In such case, a separate BSC must be developed for each branch.
2. There is a risk of information leakage. The management must be careful to protect and keep all information secret. For the successful introduction of a BSC, employees at all levels should be informed about the BSC indicators, the strategic goals of the enterprise, thus increasing the risk of unauthorized disclosure.

Figure 2 – BSC pros and cons (supplemented by the authors)

Despite the significant drawbacks, a Balanced Scorecard is an effective management tool that has another major advantage of ensuring the sustainable development of a business entity. This is explained by the fact that a Balanced Scorecard focuses on the long run and seeks to achieve not only fast results but to invest in customers, employees, suppliers, business processes and technology.

Economic entities that want to be successful in the current economic environment must adhere to the principles of sustainable development. Such principles are implemented by contributing to the wellbeing of future generations, achieving comprehensive business development in all spheres. For example, investing in customers in order to improve customer satisfaction or increase the customer base may seem

unprofitable in the short term, however, in the longer run, such customers can return to the company and provide financial growth, thus implementing the concept of sustainable development.

F. Figge has modified the concept of a Balanced Scorecard to add social, ethnic and environmental factors (Sustainability Balanced Scorecard) [7]. Such modified concept of a Balanced Scorecard is more conducive to the principles of sustainable development.

Discussions. As mentioned above, a Balanced Scorecard consists of four blocks (finances, customers, business processes, personnel) with a total of 15 to 25 indicators (see table).

Balanced Scorecard Indicators

| № | Main units of the system | Evaluation indicators |
|---|--------------------------|--|
| 1 | Finance | Gain in net profit (loss) |
| | | Growth of revenue of LFL |
| | | Total assets |
| | | Total assets per employee |
| | | Share of income in total assets |
| | | Revenue per employee |
| | | Revenue from innovative products |
| | | Increase in profitability |
| | | Balance of expenses |
| | | Optimization of tax policy |
| 2 | Clients | NPS Consumer Loyalty Index |
| | | Flexible price policy |
| | | Weighted average turnover per customer |
| | | Weighted average time to communicate with one customer |
| | | Index of customer satisfaction |
| | | Market share |
| | | Number of clients |
| 3 | Business processes | Stock rate and inventory level |
| | | Deliver resources and products on time |
| | | Increase in labor productivity |
| | | Optimization of administrative and management costs |
| | | Production preparation time |
| | | Valuation of administrative errors |
| | | Share of innovation technology and technology |
| 4 | Personnel | Index of the involvement of employees |
| | | Index of satisfaction of employees |
| | | Level of turnover of staff |
| | | Skill level of employees |
| | | Age criterion (average age of staff) |
| | | Annual staff training and development costs |

In the retail sector, such indicators may include the following:

– An increase in net profit (loss) is a standard performance indicator. It is also an important indicator for a public company, allowing its shareholders to track the dynamics and absolute values thereof.

– Like for Like Growth (LFL) is one of the most demonstrative indicators in retail activities. In contrast to the total revenue, it helps to evaluate the efficiency of stores operating for over a year and not just the growth in turnover due to an increase in the number of stores.

– Net Promoter Score (NPS) helps to evaluate indicators in the “Clients” block of the strategy map. NPS evaluates how much a client is likely to recommend the company to others on a 10-point scale, where 10 is the maximum. Based on the score, customers are classified into three groups - promoters (9 to

10 points), passives (7to 8 points), detractors (0 to 6 points). NPS = Share of Supporters - Share of Detractors [8, 13-18].

– Stock Rate (Inventory Level) is an indicator that evaluates the number of products in stock required to meet the needs of customers. The allowed range for this indicator is determined by the analysts of the company and then adhered to for effective stock management.

– Employee engagement index. There are several methods for calculating the level of employee engagement. They are usually based on employee surveys. Managers need to choose one method and conduct such surveys at least once a year and monitor future dynamics.

A BSC is used by many enterprises in various fields, especially in the USA. Below are the most striking examples of companies that have successfully implemented a BSC in their management system.

Best Buy is an American multinational consumer electronics retailer, the largest one in the US and Canada. It is a customer-oriented business; therefore, its stores focus on a specific target audience. After the introduction of a BSC in 2003, all financial indicators of the company, including the revenue, the company's market value, and the dividends have grown significantly, confirming the effectiveness of this approach [9].

IKEA is a large Swedish group of companies selling furniture and household goods. This company has introduced a Sustainability Product Score Card, which is a combination of a BSC and the concept of sustainable development. The Score Card has a laundry list of criteria for products, including energy-efficient production, renewable energy used in production, recycled material [10]. In the future, such an approach may contribute to the improvement of other items of a BSC, such as increasing customer loyalty, resulting in better financial results.

Philips Electronics is a Dutch multinational conglomerate corporation focused on the area of electronics and health technology. Philips is known to have achieved significant financial benefits by implementing a BSC worldwide in the 2000s. The company has introduced a BSC at all levels. Philips employees use BSC indicators as their own KPIs. A BSC is also used to link the corporate strategy with the strategic objectives of each unit [11].

Another well-known example of the successful implementation of a BSC in the public sector is the city of Charlotte in North Carolina, USA. The difference from the private sector is that financial indicators are not that important but improving the quality of life of city residents is a major concern [12].

Conclusion. In modern conditions, the concept of sustainable development is becoming increasingly important for the growth of economic entities. The main idea of this concept is that economic entities must adhere to a balance in the economic, social and environmental spheres and be aimed at long-term development. The successful implementation of this approach in managing an economic entity is ensured through the use of a Balanced Scorecard developed by American scientists R. Kaplan and D. Norton. The main idea of a Balanced Scorecard is that managers should pay equal attention to financial indicators and business processes, clients, employee training and development.

One of the main advantages of a Balanced Scorecard is that it provides a comprehensive picture of a business entity, facilitates the interaction between employees at all levels, and helps obtain a large array of data in an understandable form. It should be noted that, since a Balanced Scorecard promotes the long-term development of an entity, it can be successfully implemented into a sustainable development system. In turn, a company that seeks to maintain a stable position in the market must take into account customer needs, employee satisfaction and efficiency of its business processes.

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КӨРСЕТКІШТЕРДІҢ БАЛАНСТЫҚ ЖҮЙЕСІ: ЭКОНОМИКАЛЫҚ СУБЪЕКТІЛЕРДІҢ ТҰРАҚТЫ ДАМУЫНА БАҒЫТТАЛҒАН БИЗНЕС-ШЕШІМ ҚАБЫЛДАУДАҒЫ МӘНІ МЕН ҚҰНЫ

Аннотация. Соңғы онжылдықтарда жаһандану микро және макро деңгейлердегі экономикалық процестерге айтарлықтай әсер етті, бұл экономикалар арасындағы байланыстар мен өзара әрекеттестіктің нығаюына, индустриялық дамудың, саладағы қатал бәсекелестіктің және ғылыми-техникалық прогрестің

дамуына әкелді. Көптеген кәсіпорындар үшін, бизнестің өсуін айтпағанда, тұрақты нарықтық позицияны сақтау қиынға соғады. Экономикалық субъектілер өсу мен тұрақтылыққа назар аударып отырып, экономиканы тұтастай дамытады. Алайда бұл басқа салаларға әсер етуі мүмкін. Мысалы, өндірісті кеңейту қоршаған ортаға теріс әсер етеді, ресурстардың сарқылуына және қоршаған ортаның ластануына әкеледі; және шығындарды азайтуға деген ұмтылыс көбінесе еңбек жағдайлары мен жұмысшылардың әл-ауқатына әсер етеді. Соңғы уақытта бүкіл әлемдегі шаруашылық жүргізуші субъектілер тұрақты дамудың негізгі үш компонентінің екеуі болып табылатын қоршаған ортаға әсерге және бизнестің әлеуметтік жауапкершілігіне ерекше назар аударып келеді. Сондықтан тұрақты даму тұжырымдамасы әлемнің кез келген елінде маңызды рөл атқарады.

Бүгінгі таңда көптеген шаруашылық жүргізуші субъектілер экономикалық табысты, қоршаған ортаны қорғауды және әлеуметтік әл-ауқатты қамтитын тұрақты бизнесті дамыту қағидаттарын ұстануға тырысады.

«Тұрақты даму» анықтамасын алғаш рет 1987 жылы Қоршаған орта және даму жөніндегі халықаралық комиссия енгізген. Осыған қарамастан, Халықаралық комиссияның постулаттарын қазіргі заманғы экономикалық субъектілердің қызметіне енгізу процесі әлі де жалғасып келеді. Қазіргі заманғы көптеген кәсіпкерлік субъектілер қоршаған ортаға аз зиян келтіретін және әлеуметтік компонентті ескеретін қаржылық жетістік қағидаттарын ұстану аясында өз қызметін қалыптастыра отырып, тұрақты даму стратегиясын ұстануға тырысады.

Экономикалық субъектіні басқаруда тұрақты даму тұжырымдамасын жүзеге асыру тиімді құралдарды қолдануды талап етеді. Тұрақты даму тұжырымдамасын іске асырудан және ағымдағы процестерді өзгертуге бағытталған жаңа парадигманы енгізуден туындайтын белгілі бір қиындықтардың ықтималдығы айқын, сондықтан кәсіпкерлік субъектілерін басқарудың тиімді тәсілдерін қолдану қажет. Осы құралдардың бірі – теңдестірілген көрсеткіштер картасы. Қазіргі турбулентті ортада шаруашылық жүргізуші субъектінің тұрақты дамуына қол жеткізудің оңтайлы әдісін іздеу қажеттілігі оның қазіргі уақыттағы өзектілігін растайды.

Басқарушыларға жоғарыда аталған тұрақты дамудың қағидаттарын іске асыру үшін және жаңа парадигмаға көшу кезінде туындайтын проблемаларды жеңу үшін тиімді құралдар мен әдістер қажет екенін атап өткен жөн. Осындай құралдардың бірі – теңдестірілген көрсеткіштер картасы (BSC). Қазіргі экономикалық дағдарыс жағдайында экономикалық субъектінің тұрақты дамуына қол жеткізудің ең жақсы әдісін іздеу өте маңызды.

Түйін сөздер: талдау, бизнес-процестер, жаһандану, әдістер, перспектива, өндіріс, теңдестірілген көрсеткіштер, жүйе, стратегия, турбуленттілік, тұрақты даму, қаржылық жетістік, экономикалық пән, көрсеткіштер.

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СБАЛАНСИРОВАННАЯ СИСТЕМА ПОКАЗАТЕЛЕЙ: СУЩНОСТЬ И ЗНАЧЕНИЕ ПРИ ПРИНЯТИИ БИЗНЕС-РЕШЕНИЙ, НАПРАВЛЕННЫХ НА УСТОЙЧИВОЕ РАЗВИТИЕ ЭКОНОМИЧЕСКИХ СУБЪЕКТОВ

Аннотация. В последние десятилетия глобализация оказала значительное влияние на экономические процессы как на микро-, так и на макроуровне, что привело к укреплению связей и взаимодействия между экономиками, содействию промышленному развитию, ужесточению конкуренции в отрасли и научно-техническому прогрессу. Многим предприятиям становится все сложнее сохранять стабильные позиции на рынке, не говоря уже о росте бизнеса. Не вызывает сомнений, что, ориентируясь на рост и устойчивость, экономические субъекты развивают экономику в целом. Однако это может повлиять и на другие области. Например, расширение производства оказывает негативное воздействие на окружающую среду, вызывая истощение ресурсов и загрязнение окружающей среды; и стремление сократить расходы часто влияет на условия труда и благополучие работников. В последнее время экономические субъекты во всем мире уделяют особое внимание воздействию на окружающую среду и социальной ответственности бизнеса, которые являются двумя из трех основных компонентов устойчивого развития. Поэтому концепция устойчивого развития играет все более важную роль в каждой стране мира.

Несомненно, многие хозяйствующие субъекты сегодня стремятся придерживаться принципов устойчивого развития бизнеса, которые включают в себя экономический успех, защиту окружающей среды и социальное благополучие.

Определение «устойчивое развитие» было впервые введено в 1987 году Международной комиссией по окружающей среде и развитию. Несмотря на это, процесс внедрения постулатов Международной комиссии в деятельность современных экономических субъектов все еще продолжается. Несомненно, многие современные хозяйствующие субъекты стремятся придерживаться стратегии устойчивого развития, формируя свою деятельность в рамках соблюдения принципов финансового успеха, наносящих наименьший ущерб окружающей среде и учитывающих социальную составляющую.

Реализация концепции устойчивого развития в управлении хозяйствующим субъектом требует использования эффективных инструментов. Вероятность возникновения определенных трудностей при реализации концепции устойчивого развития и внедрении новой парадигмы, направленной на изменение текущих процессов, очевидна, в связи с чем требуется использование наиболее эффективных подходов со стороны руководства хозяйствующих субъектов. Одним из таких инструментов является сбалансированная система показателей. Необходимость найти наиболее оптимальный метод достижения устойчивого развития хозяйствующего субъекта в современных условиях турбулентной среды подтверждает его актуальность и актуальность в настоящее время.

Стоит отметить, что руководителям нужны эффективные инструменты и методы для реализации вышеупомянутых принципов устойчивого развития в жизни и преодоления проблем, неизбежно стоящих перед лицом при переходе к новой парадигме. Одним из таких инструментов является сбалансированная система показателей (BSC). Поиск наилучшего метода достижения устойчивого развития экономического субъекта чрезвычайно актуален в сегодняшних бурных экономических условиях.

Ключевые слова: анализ, бизнес-процессы, глобализация, методы, перспектива, производство, сбалансированные показатели, система, стратегия, турбулентность, устойчивое развитие, финансовый успех, экономический субъект, показатели.

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ACCOUNTING AS A MEETING POINT BETWEEN INTERESTS OF STATE AND BUSINESS

Abstract. Accounting is one of the main management functions along with functions such as planning, regulation, organization and incentives. This means that improving management and creating a market mechanism are inextricably linked with the development of the entire accounting system.

The priority area for using the information generated in the accounting system is meeting the needs of a certain circle of interested parties.

Accounting, by virtue of its constituent elements and methods of maintenance, is an information system that gives its internal and external users a complete picture of financial and economic activities.

Russian accounting is traditionally focused on tax legislation, and the problem arises of the need to keep records for both tax authorities and for the purposes of the financial market.

The globalization processes taking place in the global system have a significant impact on the formation of various concepts, including accounting concepts. Due to the main objective and subjective factors - liberalization and increased competition in the national markets of developed countries, improving the technology of financial accounting operations, the overall growth of world production - economic globalization processes have become possible.

The problem of accounting unification is one of the main ones in the global economy.

The state's interest in expanding the scope of export-import operations, selling shares and securities on exchanges of different countries, in attracting foreign capital to the country stimulates the processes of standardization and unification of accounting processes and principles, bringing them into line with international standards, which is necessary to facilitate understanding of financial user reports from different countries.

In the case when the primary interests of the state affect domestic policy issues, the accounting and reporting system is formed under the influence of the needs of national lenders and investors, reflecting the principles and concepts adopted in this country.

Accounting is considered as an area of coordination of interests of the state and business in the context of globalization of the global economy. Globalization has led to the fact that many aspects of accounting as a scientific discipline and practical activity have acquired international coloring, while accounting has not yet been taken to a new level of the methodology used in the global system. It is necessary to follow uniform rules for accounting, calculating financial results and preparing financial statements, which will ensure sufficient transparency of the reporting data, their understanding and unambiguous interpretation in the international context.

Theory of accounting is a combination of diverse concepts, united by the laws and specifics of the requirements and goals of users of information generated in accounting as a set of directions, trends and schools that explain the accounting process from their methodological positions.

The current state of accounting theory does not meet the requirements of its reform. First of all, the tasks adopted by the Concept for the Development of Accounting and Reporting in the Russian Federation cannot be solved by methods accepted in theory. Accounting requires a revision of goals, reformulation of approaches to the presentation of basic theoretical principles. Modern theory has not yet been able to find effective solutions to pressing problems of accounting during its reform in connection with the transition to IFRS. When developing the theory of accounting, information from new areas of economic life (stock market, insurance, investment, bankruptcy, etc.) is practically not taken into account, the problem of reconciling the diverse interests of users of accounting

information and the composition of such users has not been resolved. Existing accounting principles (assumptions and requirements) do not allow for an unambiguous interpretation of the results of an entity's business activities.

Convergence is understood as the process of convergence of accounting and reporting systems by selecting (moving towards each other) the IASB, together with national regulatory authorities, of accounting solutions that will ensure the preparation and presentation of clear, comparable and reliable information in the financial statements.

The multivariance of approaches to the convergence process is due to the variety of discrepancies between IFRS and national standards of different countries.

Today, accounting theory and methods are the key areas for improvement; they help evaluate long-established and recently emerging accounting principles and use them as the basis for the theoretical, regulatory and methodological support of the accounting processes.

Accounting is an instrument used by the state to ensure proper financial regulation and implementation of a unified financial policy, including taxation rules. Its purpose is to enforce the constitutional right to information about economic and business activities that must be carried out in accordance with the principles of equality, contracting, competition and risk. Moreover, accounting is seen by the Constitution as one of the core elements of a single economic space, which is a cornerstone of the constitutionally established state order. As one of the key users of the accounting information, the state is very much concerned about the efficiency of the accounting principles to ensure regulatory compliance of business [1,5].

The current globalization processes result in the emergence of new concepts, including those in accounting. Economic globalization has been promoted by such processes as liberalization, intensification of competition in the developed markets, advancement of accounting technology, expansion of world production.

Key words: globalization, accounting, reporting, accounting concepts, statistical concepts, transparency

Introduction. Following the transition to the information society, accounting has been treated as the basis of a comprehensive information system. The economic globalization and the transition to the post-industrial society were predetermined by the emergence of the new high-end technology and intensive IT penetration. In the coming days, economic processes will develop under the influence of two main factors: world globalization and the information revolution.

The availability of accounting information to the public is highly influenced by the global economic environment, which is characterized by the following institutional and legal factors: membership in international organizations, national professional associations, application of common reporting principles. There are numerous international associations of accounting professionals, including the following:



Figure 1 – International associations of accounting professionals

The major challenge of the global standardization process, including harmonization of accounting rules, is its systemic nature. Enhanced interaction between the public, private, and social components of the system is promoted by improved informational support of the standardization process to ensure effective accounting. Another import issue is ensuring proper financing of such interaction at the expense of the public and private sectors.

Methods and materials general description. In many countries, internationalization and harmonization of accounting standards and practices take place within the global framework of financial

reporting development. The International Federation of Accountants has a major role in the development of international accounting standards [11,15].

Globalization of financial markets is impossible without first harmonizing the accounting rules, which otherwise retain their specific national features. In such case, one of the primary tasks is to develop standards acceptable to all countries. To create common accounting standards, the International Accounting Standards Board was created.

B. Algorithm

By viewing globalization as a stage in economic development, it can be defined as the process of increasing changes in the institutional and economic organization of society, that involves two levels of analysis:

1. institutional analysis, including regulations and other mechanisms that shape the institutional environment;
2. economic analysis [9].

Globalization can also be seen as a key factor in the development of accounting. At the moment, the main approach to the development of accounting has been established through International Financial Reporting Standards. However, the theory and methods for studying the globalization driven processes are still to be established.

The mechanisms to promote harmonization of national accounting systems have not been clearly defined. There are only specific approaches, such as principles and requirements, but a new accounting culture or transnational accounting structure are still to be established globally.

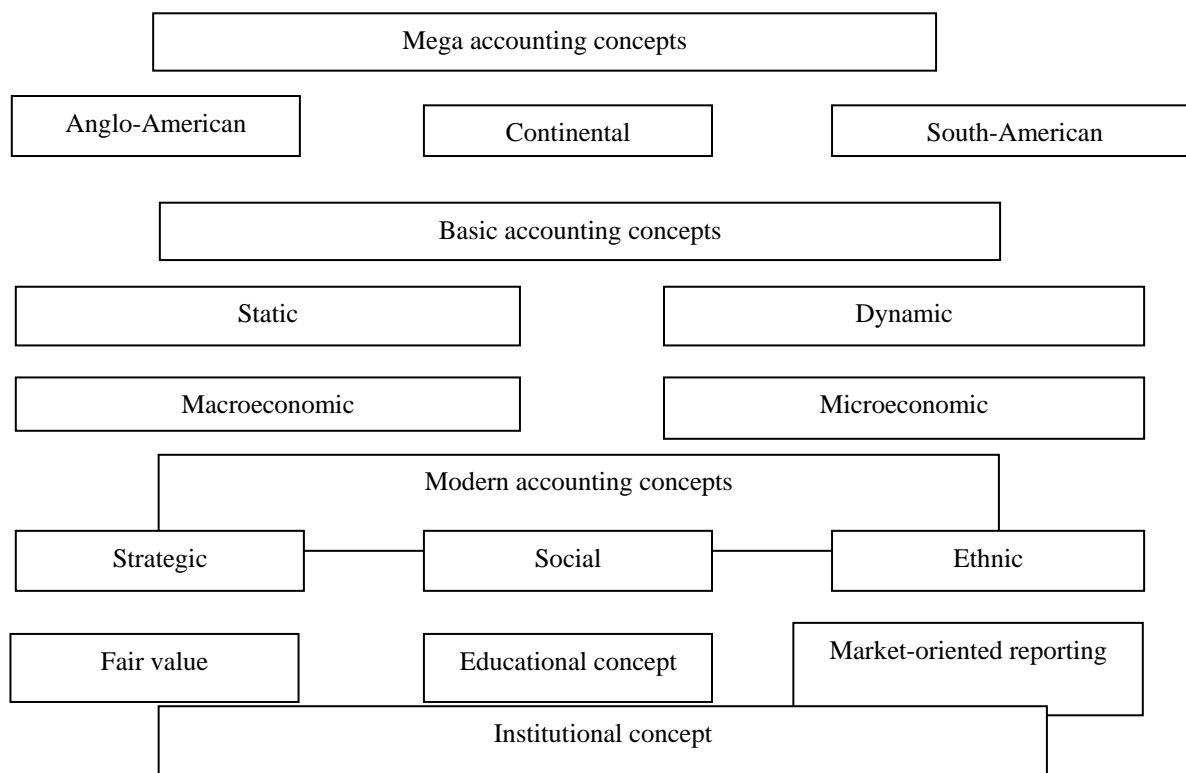


Figure 2 – Basic accounting concepts

Important for the harmonization of different systems, including the accounting ones, are global studies, which reveal not only the process of natural transformation of the existing concepts, such as money or loan, but also the occurrence of new processes within the holistic world system. Global processes urge to find new concepts, categories, and approaches to understand, study, describe and regulate the world. All of this also affects the accounting system. Global studies see the external economic relations of the national economy as the struggle to participate in the creation and distribution of the global profit, they also re-define the Government’s role in regulating the economic and financial flows. Global

studies invalidate many national doctrines and development strategies and provide means for assessing the possibility for adaptation of new accounting techniques [8,16].

Moreover, one of the effects of globalization is that many issues of accounting science and practice become global. It should be noted that the accounting theory and methods must be updated to match the insights of global studies. The new theoretical and methodological approaches allow distinguishing different types of accounting and grouping them in a unified manner [2,7,13].

Being a major instrument for international communication, accounting plays an important role in developing the global strategy of the state and business. Common rules for accounting, computing financial results, and reporting ensure data transparency and their unambiguous interpretation in an international context.

Russia cannot completely replace national standards with international ones. By starting the transition to IFRS, Russia stepped into the global economic space. However, the transition process has some natural restraints explained by Russia's specifics. In studying global problems of accounting, it is important to mind the cultural aspect in a broader sense. To determine the future of accounting in Russia, the ethnic and national specifics of the Russian culture should be taken into account [3,10]. The active search for an adequate national accounting doctrine for the new model of managerial accounting, including the strategy for its long-term implementation, and the development of conceptual approaches to developing the action plan, began only in recent decades [4].

It is important that the Accounting Concept is compatible with the adopted Concept of the State National Policy of the Russian Federation, which includes the strategic plan of actions for the state and society as a whole. In view of the rapidness of the global processes, it is important to develop the national development strategy, define the main principles to form the basis of the Concept of Accounting Development, its strategy, and means of implementation [6].

Globalization processes, development trends, and accounting enhancement are currently predetermined by a number of accounting and analytical aspects, the key ones being the direct influence of the external economic environment, the availability of the market relations, the nature of property rights, etc.

Table 1 – EAEU countries in the Doing Business-2018 rating and its sub-ratings (place out of 190), 2007, 2015, 2018

| Year | Indicator | Armenia | Belarus | Kazakhstan | Kyrgyzstan | Russia |
|--|--------------------------|---------|---------|------------|------------|--------|
| 2007 | Doing business | 34 | 129 | 63 | 90 | 96 |
| | Creation of enterprises | 46 | 148 | 40 | 41 | 33 |
| | Property registration | 2 | 96 | 76 | 31 | 44 |
| | Enforcement of contracts | 18 | 36 | 27 | 38 | 25 |
| | Trade across borders | 119 | 113 | 172 | 173 | 143 |
| 2015 | Doing business | 45 | 57 | 77 | 102 | 62 |
| | Creation of enterprises | 4 | 40 | 55 | 9 | 34 |
| | Property registration | 7 | 3 | 14 | 6 | 12 |
| | Enforcement of contracts | 119 | 7 | 30 | 56 | 14 |
| | Trade across borders | 110 | 145 | 185 | 183 | 155 |
| 2018 | Doing business | 47 | 38 | 36 | 77 | 35 |
| | Creation of enterprises | 15 | 30 | 41 | 29 | 28 |
| | Property registration | 13 | 5 | 17 | 8 | 12 |
| | Enforcement of contracts | 47 | 24 | 6 | 139 | 18 |
| | Trade across borders | 52 | 30 | 123 | 84 | 100 |
| Note: Compiled by the authors based on data [3]. | | | | | | |

Improving the quality of the institutional environment is largely due to the integration processes, which are reflected in a number of performance indicators. The overall indicator of the business environment in the economies of the EAEU began to noticeably outpace the neighboring countries. Thus, in particular, over the past decade, the EAEU countries have shown significant progress in the Doing Business Index, rising in the ranking. Russia (from 96 in 2007 to 35 in 2018) and Belarus (from 129 in 2007 to 38 in 2018), Kyrgyzstan (from 102 in 2015 to 77 in 2018) and Kazakhstan (from 77 in 2007 to 36 in 2018) realized a breakthrough during the period of participation in the EAEU (table 1). The EAEU

countries demonstrate high values for such important indicators as the creation of enterprises and the registration of property, as well as the key (including in institutional theory) point - ensuring the implementation of contracts, with the only exception - in Kyrgyzstan. In terms of integration, the fulfillment of contracts ensures an increase in the level of trust in the business environment in the Union [5].

Inflation has resulted in the requirement to use the discounted value in financial and managerial accounting. Due to the globalization of the economy, a need arose to create an effective reserve system at all levels: from the institutional unit to the state. The state budget and its proportionality play an important role here

To cover expenses and deficits, it is necessary to increase the flow of funds to the state budget. To understand what income depends on, we will conduct a correlation analysis.

Based on the nature of state budget revenues, we have taken a set of socio-economic variables:

From the revenues of the state budget;

X1 – GDP;

X2 – average monthly nominal salary;

X3 – Tax revenues.

To identify the tightness of the relationship between the variables, a correlation analysis was performed. The results of the analysis are shown in table 2. The matrix of correlation coefficients on the Cheddock scale shows that the variables are multi-disciplinary among themselves and it is necessary to move to a new dimension – chain growth rates and again conduct a correlation analysis. The resulting transformed data corresponds to the law of normal distribution. There are no highly correlated values (+,– 0.7).

Table 2 – Growth rate Correlation matrix

| | The growth rate of income | GDP growth rate | The growth rate of the average monthly wage | Growth rate of tax revenues |
|---|---------------------------|-----------------|---|-----------------------------|
| The growth rate of income | 1 | | | |
| GDP growth rate | 0,662057594 | 1 | | |
| The growth rate of the average monthly wage | 0,584858052 | 0,687871655 | 1 | |
| Growth rate of tax revenues | 0,84586946 | 0,955863183 | 0,668704987 | 1 |

The results of the correlation matrix show that the highest correlation of income is observed with the factor – tax revenues ($r=0.84$). This connection is explained by the fact that tax revenues are one of the main components of budget revenues. In turn, tax revenues are strongly correlated with other factors: GDP ($r=0.95$) and average monthly wages ($r=0.66$).

The coefficient of determination in the analysis is 93%, that is, 93 % of changes in deposits are due to variable features, and 2% are unaccounted for factors. The overall R-square correlation coefficient is 0.97, indicating that there is a close relationship between performance and factor characteristics.

In all cases, the normal distribution of factors is confirmed. due to the fact that the Shapiro - Wilk criterion is greater than the p-value, the null hypothesis of the normal distribution is accepted.

Thus, the correlation and regression analysis revealed the factors that most affect state budget revenues: GDP, average monthly wages and tax revenues. Regression statistics confirmed the significance of three factors. Based on the results of the analysis, a multiple regression equation was created:

$$Y=225+2,81X_1+0,563X_2+1,28X_3$$

The growth of x_1 -GDP by 1%, other things being equal, will lead to an increase in state budget revenues by 2.81% for 2010-2018. An increase of $[(X)]_2$ -the average monthly nominal wage by 1%, other things being equal, caused an increase in state budget revenues by 0.563%. The growth of $[(X)]_3$ -tax revenues by 1%, other things being equal, caused an increase in state budget revenues by 1.28%. With the globalization of the economy, the importance of asset and liability management, also known as balance sheet immunization, has significantly increased. The essence of balance sheet immunization is to obtain the maximum balance between its sides. Immunization is created by achieving a balance between the real value of assets and the reported value of liabilities [12].

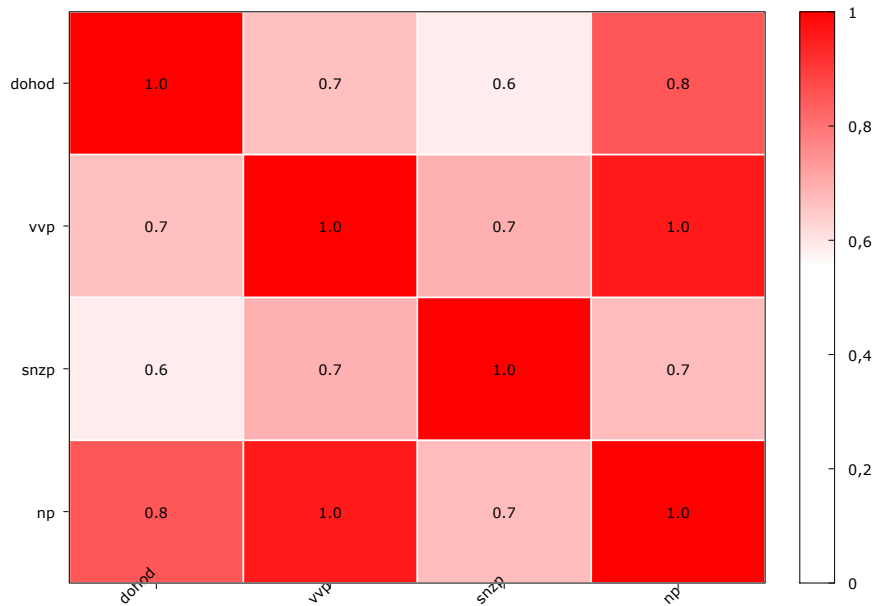


Figure 3 – Correlation field

The state and development of accounting are influenced by many factors inherent in a functioning market, such as:

1. interest and tax rates;
2. inflationary processes;
3. pricing policy;
4. trust relations;
5. political situation in the country.

The process of globalization entails the emergence of new technologies that have been incorporated by institutional units and the state into global, regional and corporate networks, which leads to the emergence of a networked economy.

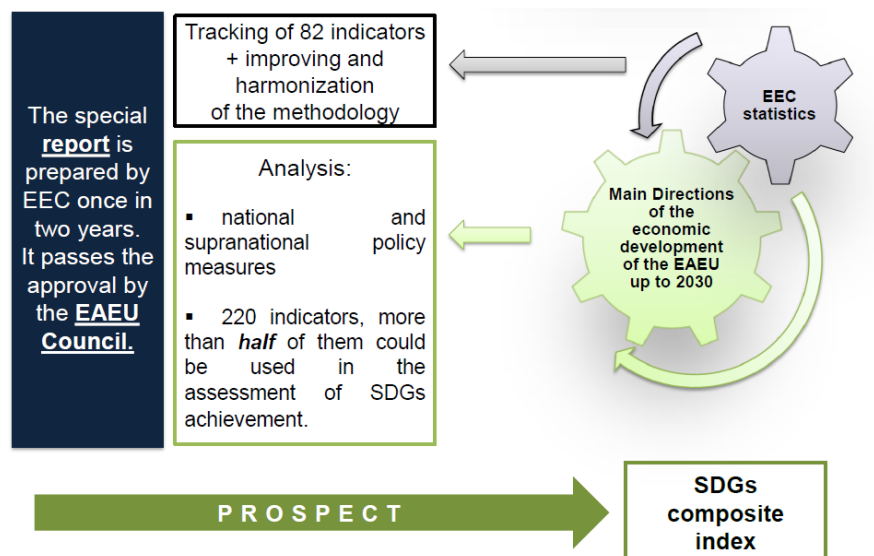


Figure 4 – Monitoring SDGs achievement

In order to improve the efficiency of budget investments, it is necessary to improve the monitoring system and evaluate their implementation.

In our opinion, monitoring is one of the tools for improving the decision-making process and the timeliness of their adoption, moreover, monitoring is a tool to provide feedback and answers the questions “how effective is the investment project” or “what measures will ensure the planned results”.

To introduce common approaches to monitoring and evaluating the implementation of investment projects, it is proposed to develop uniform rules and procedures for monitoring and evaluating implementation for all investment projects involving the state, regardless of the method of financing [9,10].

In this connection, we determine the key factors that should be considered when monitoring and evaluating the implementation of projects (table 3).

Table 3 – Key factors of various types of budget investments for monitoring and evaluating implementation

| Criteria | Kinds | Key factors |
|--|-----------------|---|
| 1 | 2 | 3 |
| On investment objectives | Investments A* | achievement of goals based on the implemented tasks within the strategic directions of the BPA (budget program administrators) documents, i.e. compliance with the results achieved goals |
| | Investments B** | - increase production efficiency; - increase in production and expansion of activities; - financial results; |
| On investment objects | Investments A | - a comparative analysis of the planned technical and economic parameters with actual ones; |
| | Investments B | - assessment of the value and liquidity of the invested funds, including financial assets; |
| According to the method of implementation | Investments A | - the appropriateness of the choice and method of project implementation, the socio-economic efficiency of the project; |
| | Investments B | - analysis of financial indicators confirming the increase in income and / or value of the state asset |
| <p><i>Note:</i> * Investments A - budget investments to create state assets - this is financing from the republican or local budget, aimed at solving social and economic problems by creating state assets; ** Investments B - budget investments to increase the value of state assets - financing from the republican or local budget, aimed at developing and expanding the activities of state bodies and subjects of the quasi-state sector to increase the value of assets state.</p> | | |

Thus, in order to increase the efficiency of the state bodies regulating the financial system, it has been proposed to change the approach to managing budget investments based on project management [11]. The study proposed an integrated approach to the budget process: from planning budget investments to their evaluation after implementation, and using the information received, as well as lessons learned, in the process of planning the next investment. As a result of the implementation of this approach, it is expected:

- reduction of the general terms and procedures for planning investment projects;
- improving the efficiency of budget expenditures by eliminating duplication of projects, optimization of financing schemes;
- taking into account the results of previously implemented projects when planning follow-up (lessons learned, work on errors).

To make an institutional accounting system real, the state’s economic role in the regulatory control of accounting must be changed. While there is evident progress in the development of the legal framework of accounting in recent years, the same cannot be said about the practical application of such legislation. This is notable in vertical relations, e.g. between the state and the entrepreneur, and in horizontal relations between entrepreneurs. In practice, contractual breaches are often between entrepreneurs. These factors have a negative impact on the formation and development of the institution of accounting [14,17].

Regulation of the accounting system should be based on a reasonable combination of efforts of both public authorities and the professional community. The purpose of such distribution of responsibilities is to ensure the implementation of the constitutional right to information about economic and business activities. Accounting and reporting are the cornerstones of a single market and the unity of the economic space in Russia [18,19].

Results and discussion. In the mid-term Concept of Development of Accounting and Reporting in the Russian Federation, the following tasks of public authorities are identified:

1. develop the state's accounting and reporting policy;
2. update the legal framework of accounting and reporting;
3. develop the procedure for introduction of IFRS;
4. develop a mechanism for the creation and approval of Russian accounting standards and regulations;
5. monitor regulatory compliance.

Table 4 – SWOT analysis of the development of accounting

| Strength | Weakness |
|--|---|
| Approval of the law on accounting and financial reporting that meets international requirements Reporting of financial institutions and other entities with foreign capital in accordance with IFRS Increasing the competence of users of financial reports Joining higher education institutions to the Bologna process Availability of international accounting certification programs The use of accounting data as a basis for drawing up of tax declarations | Relatively high cost of accounting reform Insufficient level of the mechanism for implementing and monitoring legislation and regulations in the field of accounting Preparation of financial reports on standard forms that contain a significant amount of information and at the same time do not reflect the real property and financial position of the subject Insufficient disclosure of financial information by most entities Insufficient role of civil service training in the field of accounting, including the legal and fiscal fields Lack of qualified specialists required for accounting and preparation of financial statements in accordance with IFRS Unavailability of financial reports for various categories of users, including a wide audience |
| Opportunities | Threats |
| Ensuring international comparability of data from entities' financial reports Free access of users to information from financial reports Creating favorable conditions for attracting foreign investment Attracting external financial and technical assistance for the development of accounting and auditing Modernization of the educational process and training of specialists for professional certification Ensuring transparency and improving financial disclosure | Lack of necessary financial resources to continue accounting reforms Inappropriate interpretation of accounting regulations by civil servants and accounting personnel of the subject The delay in the implementation of IFRS by some public interest entities Difficulty in understanding international standards by users |

In General, it can be noted that accounting has achieved some success in implementing IFRS. However, the reform will be completed when company managers are really interested in providing reliable and objective information, and every accountant has a professional knowledge of the basics of IFRS.

The tasks of the professional community, as those are set out in the Concept, should also be noted:

1. develop proposals to improve the legal framework of accounting and reporting;
2. assist in drafting or independently draft Russian standards and regulations in accounting, reporting, and auditing;
3. professionally review IFRS in the process of their approval by government bodies of the Ministry of Finance of the Russian Federation;
4. develop and distribute guidelines and information materials on accounting, reporting, and auditing;
5. cooperate with international non-governmental organizations on the key matters.

The purpose of state reforms is to ensure targeted changes in the economy, including those in accounting. In addition to developing a strategy for reforming the accounting system, another important task is to develop measures to ensure a new approach to the Government's role, without which transition to IFRS is impossible.

The transfer of certain functions to professional associations is an important and serious task. It is also important to properly choose self-regulatory public organizations to perform the functions that were previously performed by the Department for Regulation of Accounting, Financial Reporting and Auditing of the Ministry of Finance of the Russian Federation. The main challenge is that some of these functions are not provided for by the by-laws of such self-regulatory organizations. Moreover, the level of professional competence is also very important; and the procedure for appointing training centers for the training and retraining of accountants still needs to be developed.

Conclusion. Currently, there is a significant degree of uncertainty in accounting information. Its complete elimination is impossible due to various reasons, both objective and subjective. The objective reasons include continuous changes in the economy, associated primarily with IT penetration into society.

An important factor is that the public has lost trust in financial statements, resulting in changing how investors assess the contents of corporate reports. It should be noted that the company value is significantly affected by such resources as information and competence of its staff. However, it is not decided yet how to report such resources. The key problem is the lack of valuation methods to ensure accurate assessment of such assets since the application of the historical cost method would result in underestimating their value, and the generally accepted market approach is unacceptable due to the impossibility of their sale. Therefore, the purpose of accounting is to rethink the methods of preparing information. The subjective reasons include the insufficient level of competence of many accountants, which do not meet the requirements of the modern economy. To solve this problem, it is necessary to update the procedures for training and periodic retraining of accountants.

Another important factor causing the uncertainty of accounting information is the violation of accounting ethics, which manifests itself in intentional misrepresentation and reporting incorrect data. To solve this problem, the code of ethics for professional accountants must be improved and intolerance towards violators must be fostered. State regulation will help reduce uncertainty in accounting, but it cannot eliminate it completely. Therefore, to further solve this problem, the accounting procedures must be properly organized by an entity itself.

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**БУХГАЛТЕРЛІК ЕСЕП:
МЕМЛЕКЕТ ПЕН БИЗНЕС МҮДДЕЛЕРІН ҮЙЛЕСТІРУ АЙМАҒЫ РЕТІНДЕ**

Аннотация. Бухгалтерлік есеп жоспарлау, реттеу, ұйымдастыру және ынталандыру сияқты функциялармен бірге, басқарудың негізгі функцияларының бірі болып саналады. Бұл басқаруды жетілдіру және нарықтық тетікті құру бүкіл бухгалтерлік жүйенің дамуымен тығыз байланысты екенін білдіреді.

Бухгалтерлік есеп жүйесінде қалыптасқан ақпаратты пайдаланудың басым бағыты – белгілі бір мүдделі тараптардың қажеттіліктерін қанағаттандыру.

Бухгалтерлік есеп – өзінің құраушы элементтері мен қызмет көрсету әдістеріне байланысты ішкі және сыртқы пайдаланушыларына қаржылық-шаруашылық қызметтің толық көрінісін беретін ақпараттық жүйе.

Ресейлік бухгалтерлік есеп әдетте салық заңнамасына бағдарланған, сондықтан негізгі мәселе салық органдарында да, қаржы нарығының мақсаттары үшін де есепке алуды жүргізу қажеттілігіне байланысты болады.

Әлемдік жүйеде болып жатқан жаһандану процестері әртүрлі ұғымдардың, оның ішінде бухгалтерлік есеп тұжырымдамаларының қалыптасуына айтарлықтай әсер етеді. Негізгі объективті және субъективті факторлардың арқасында, дамыған елдердің ұлттық нарықтарындағы ырықтандыру мен бәсекелестіктің артуы, қаржылық есеп жүргізу технологиясының жетілдірілуі, әлемдік өндірістің экономикалық жаһандану процестерінің жалпы өсуі мүмкін болды.

Бухгалтерлік есепті біріздендіру мәселесі әлемдік экономикадағы басты мәселелердің бірі болып табылады.

Мемлекеттің экспорттық-импорттық операциялар аясын кеңейтуге, акцияларды және бағалы қағаздарды әртүрлі елдердің биржаларында сатуға, шетелдік капиталды елге тартуға мүдделілігі стандарттау және бухгалтерлік есеп процестері мен қағидаттарын халықаралық стандарттарға сәйкестендіруге және ынталандыруға ықпал етеді. Әртүрлі елдердің қаржылық пайдаланушыларының есептерін түсінуді жеңілдету үшін қажет.

Мемлекеттің негізгі мүдделері ішкі саясат мәселелеріне әсер еткен жағдайда, есеп беру және есеп беру жүйесі осы елде қабылданған қағидаттар мен тұжырымдамаларды көрсететін ұлттық несие берушілер мен инвесторлардың қажеттіліктерінің әсерінен қалыптасады.

Бухгалтерлік есеп әлемдік экономиканың жаһандануы жағдайында мемлекет пен бизнестің мүдделерін үйлестіру саласы ретінде қарастырылады. Жаһандану бухгалтерлік есептің ғылыми пән ретінде және практикалық қызмет ретінде көптеген аспектілері халықаралық түске ие болуына әкелді, алайда бухгалтерлік есеп жаһандық жаһандық жүйеде қолданылатын әдістеменің жаңа деңгейіне көтеріле алмады. Бухгалтерлік есеп жүргізудің, қаржылық нәтижелерді есептеу мен қаржылық есептілікті дайындаудың бірыңғай ережелерін сақтау қажет, бұл есептік деректердің жеткілікті ашықтығын, оларды халықаралық контекстте түсіну мен біркелкі түсіндіруді қамтамасыз етеді.

Бухгалтерлік есеп теориясы – бухгалтерлік есеп процесінде олардың әдіснамалық позицияларын түсіндіретін бағыттар мен мектептер жиынтығы ретінде бухгалтерлік есепте пайда болатын ақпаратты пайдаланушылардың талаптары мен мақсаттарының ерекшеліктері мен заңдылықтарымен біріктірілген әртүрлі ұғымдардың жиынтығы.

Бухгалтерлік есеп теориясының қазіргі жағдайы оны реформалау талаптарына жауап бермейді. Біріншіден, Ресей Федерациясында бухгалтерлік есеп пен есептілікті дамыту тұжырымдамасында қабылданған міндеттерді теорияда қабылданған әдістермен шешу мүмкін емес. Бухгалтерлік есеп мақсаттарды қайта қарауды, негізгі теориялық қағидаларды ұсыну тәсілдерін қайта құруды талап етеді. Қазіргі заманғы теория ХКЕС-ке көшуіне байланысты оны реформалау кезіндегі бухгалтерлік есептің өзекті мәселелеріне тиімді шешім таба алмады. Бухгалтерлік есеп теориясын әзірлеу кезінде экономикалық өмірдің жаңа салаларындағы ақпарат (қор нарығы, сақтандыру, инвестициялау, банкроттық және т.б.) іс жүзінде ескерілмейді, бухгалтерлік ақпаратты пайдаланушылардың әртүрлі мүдделерін және олардың құрамын келісу проблемасы ескерілмейді. мұндай пайдаланушылар шешілген жоқ. Қолданыстағы бухгалтерлік есеп қағидааттары (жорамалдар мен талаптар) субъектінің іскери қызметінің нәтижелерін біржақты түсіндіруге мүмкіндік бермейді.

Конвергенция дегеніміз – қаржылық бақылауда нақты, салыстырылатын және сенімді ақпаратты дайындауды және ұсынуды қамтамасыз ететін, ұлттық реттеуші органдармен бірлесіп, IASB есеп жүргізу және есеп беру жүйелерінің жақындасу процесі деп түсініледі. мәлімдемелер.

Конвергенция процесінің көпжақтылығы ХКЕС және әртүрлі елдердің ұлттық стандарттары арасындағы әртүрлі сәйкессіздіктерге байланысты.

Бүгінгі таңда бухгалтерлік есеп теориясы мен әдістері жетілдірудің негізгі бағыттары болып табылады; олар бұрыннан қалыптасқан және жақында пайда болған бухгалтерлік есеп қағидаларын бағалауға және оларды бухгалтерлік есеп процестерін теориялық, нормативтік және әдістемелік қамтамасыз етуге негіз ретінде пайдалануға көмектеседі.

Бухгалтерлік есеп – бұл мемлекет тиісті қаржылық реттеуді және бірыңғай қаржылық саясатты, оның ішінде салық салу ережелерін іске асыруды қамтамасыз ететін құрал. Оның мақсаты – конституцияны күшейту.

Түйін сөздер: жаһандану, бухгалтерлік есеп, есеп беру, есеп ұғымдары, статистикалық ұғымдар, ашықтық.

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БУХГАЛТЕРСКИЙ УЧЕТ КАК ОБЛАСТЬ СОГЛАСОВАНИЯ ИНТЕРЕСОВ ГОСУДАРСТВА И БИЗНЕСА

Аннотация. Бухгалтерский учет является одной из основных функций управления наряду с такими функциями, как планирование, регулирование, организация и стимулирование. Это означает, что совершенствование управления и создание рыночного механизма неразрывно связаны с развитием всей системы учета.

Приоритетным направлением использования информации, генерируемой в системе бухгалтерского учета, является удовлетворение потребностей определенного круга заинтересованных сторон.

Бухгалтерский учет, в силу составляющих его элементов и методов обслуживания, представляет собой информационную систему, которая дает своим внутренним и внешним пользователям полную картину финансово-хозяйственной деятельности.

Российский бухгалтерский учет традиционно ориентирован на налоговое законодательство, при этом возникает проблема необходимости вести учет как для налоговых органов, так и для целей финансового рынка.

Процессы глобализации, происходящие в глобальной системе, оказывают значительное влияние на формирование различных концепций, в том числе концепций бухгалтерского учета. Благодаря основным объективным и субъективным факторам – либерализации и усилению конкуренции на национальных рынках развитых стран, совершенствованию технологии операций финансового учета, общему росту мирового производства – стали возможными процессы экономической глобализации.

Проблема унификации бухгалтерского учета является одной из основных в мировой экономике.

Заинтересованность государства в расширении масштабов экспортно-импортных операций, продаже акций и ценных бумаг на биржах разных стран, в привлечении в страну иностранного капитала стимулирует процессы стандартизации и унификации процессов и принципов бухгалтерского учета, приводя их в соответствие с международными стандартами, что необходимо для облегчения понимания финансовых отчетов пользователей из разных стран.

В случае, когда основные интересы государства затрагивают вопросы внутренней политики, система учета и отчетности формируется под влиянием потребностей национальных кредиторов и инвесторов, отражающих принципы и концепции, принятые в этой стране.

Бухгалтерский учет рассматривается как область согласования интересов государства и бизнеса в условиях глобализации мировой экономики. Глобализация привела к тому, что многие аспекты бухгалтерского учета как научной дисциплины и практической деятельности приобрели международный оттенок, а бухгалтерский учет еще не вышел на новый уровень методологии, используемой в глобальной г системе. Необходимо соблюдать единые правила учета, расчета финансовых результатов и подготовки финансовой отчетности, что обеспечит достаточную прозрачность отчетных данных, их понимание и недвусмысленную интерпретацию в международном контексте.

Теория бухгалтерского учета представляет собой совокупность разнообразных понятий, объединенных законами и спецификой требований и целей пользователей информации, генерируемой в бухгалтерском учете как совокупности направлений, направлений и школ, которые объясняют процесс бухгалтерского учета с их методологических позиций.

Современное состояние теории бухгалтерского учета не соответствует требованиям ее реформы. Прежде всего, задачи, принятые Концепцией развития бухгалтерского учета и отчетности в Российской Федерации, не могут быть решены общепринятыми методами. Бухгалтерский учет требует пересмотра целей, переформулирования подходов к изложению основных теоретических принципов. Современная теория еще не смогла найти эффективных решений актуальных проблем бухгалтерского учета при его реформировании в связи с переходом на МСФО. При разработке теории бухгалтерского учета информация из новых областей экономической жизни (фондовый рынок, страхование, инвестиции, банкротство и т.д.) Практически не учитывается проблема согласования разнородных интересов пользователей учетной информации и состава, такие пользователи не были разрешены. Существующие принципы бухгалтерского учета (предположения и требования) не допускают однозначного толкования результатов хозяйственной деятельности организации.

Конвергенция понимается как процесс конвергенции систем бухгалтерского учета и отчетности путем выбора (перемещения навстречу друг другу) МСФО вместе с национальными регулирующими органами решений по учету, которые обеспечат подготовку и представление четкой, сопоставимой и надежной информации в финансовой отчетности. заявления.

Многовариантность подходов к процессу конвергенции обусловлена разнообразием расхождений между МСФО и национальными стандартами разных стран.

Сегодня теория и методы бухгалтерского учета являются ключевыми областями для улучшения; они помогают оценить давно установившиеся и недавно появившиеся принципы бухгалтерского учета и используют их в качестве основы для теоретического, нормативного и методологического обеспечения процессов бухгалтерского учета.

Бухгалтерский учет – это инструмент, используемый государством для обеспечения надлежащего финансового регулирования и реализации единой финансовой политики, включая правила налогообложения. Его целью является обеспечение соблюдения конституции.

Ключевые слова: глобализация, бухгалтерский учет, отчетность, бухгалтерские концепции, статистические концепции, прозрачность.

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**CURRENT STATE AND PERSPECTIVES
OF EDUCATIONAL WORK OF THE MINORS CONDEMNED
IN THE INSTITUTIONS OF THE FSIN OF RUSSIA**

Abstract. The article presents the current state of educational work with juvenile convicts in educational colonies of the Federal Penitentiary Service of Russia. The author determines that the recidivism of youth and adolescents in the current period remains one of the acute problems in the Russian Federation.

So, juvenile delinquency is a powerful source of self-determination of crime as such. Today, juvenile delinquency produces crime of young people (from 14 to 17 years old), translates negative criminal experiences into the future, which, according to the laws of social education, again “returns” to tomorrow’s teenagers as the “social heritage” of previous generations. And also do not forget that juvenile delinquents are the social base of organized and recidivism in modern Russia.

It can also be noted that by committing repeated criminal offenses the offender is firmly convinced of his impunity. Relapse of crimes committed by juveniles sentenced to suspended sentences (or corrective labor), or to insignificant real terms of imprisonment, emphasizes the ineffectiveness of the sentence, which is reflected in the increase in the number of repeated criminal offenses committed by minors. Therefore, it is very real that, due to the weakness and inefficiency of penitentiary resocialization in prisons, the number of crimes committed by convicts, but in a more perverse form, may increase in a few years (not excluded in the composition of an organized criminal group). And also juvenile delinquency promotes the spread of a criminal way of thinking and a way of behavior in a “healthy” teenage environment, leading to its criminal infection. So, Taoist wisdom says - ... be afraid of your thoughts, for they are the beginning of your actions - Lao Tzu (VI – V centuries BC). Teenage crime causes harm to the personal development of the juvenile offender himself, thereby contributing to the continuation of the criminal activity of the minor. Based on the foregoing, juvenile delinquency should be considered as one of the most serious and significant socio-legal problems of modern Russian society.

In the article, the author proposes a “model” of the development of penitentiary institutions, includes a description of the goals and objectives of the Educational Center of the Federal Penitentiary Service of Russia, its functional and organizational structure, conditions for serving sentences and detention of juvenile convicts. The model of the educational center of the Federal Penitentiary Service of Russia for juvenile convicts is presented.

Key words: juvenile convict, resocialization, modern methods and approaches of educational work, juvenile recidivism, the social perspective of the convict, educational colony of the Federal Penitentiary Service of Russia, educational center of the Federal Penitentiary Service of Russia, Criminal Executive Code of the Russian Federation, Criminal Code of the Russian Federation, Concept - 2020, OCG – organization of a criminal group.

The deep socio-economic and political transformations in the country, the entry of the Russian Federation into the European Community and the need to implement the Council of Europe recommendation on the observance of the uniform European penitentiary rules for the treatment of prisoners entailed changes in the criminal and penal policy, reform of the legal and organizational base of the criminal executive system, bringing it closer to world standards [1,2].

The transformations aimed at humanizing and approximating the conditions of serving a sentence to the rules for the treatment of convicts and prisoners adopted in the international community affected the order and conditions for organizing the execution of sentences in educational colonies of the FSIN of Russia [3].

So, juvenile convicts due to age and social immaturity constitute a special group of convicts from among those serving criminal sentences in prison. Peculiarities of adolescence (puberty) to some extent complicate the work with the contingent, as they force the staff of educational colonies of the Federal Penitentiary Service of Russia. Considering the “explosiveness” and “impulsiveness” of their pupils, but at the same time the “plasticity” of the developing personality of the adolescent, one can hope for the success of targeted social and pedagogical work specially trained in the field of juvenile law and social pedagogy of the staff of educational colonies of the Federal Penitentiary Service of Russia [12].

In addition, the maximum possible sentences, limited to ten years, determine the social prospects for working with juvenile prisoners. The terms of punishment of adults, especially convicts, for life imprisonment doom them to a long stay in places of deprivation of liberty and postpone or deprive of any possibility of release. Convicts at a minor age drop out of the educational colony of the Federal Penitentiary Service of Russia at an active age that allows them to socially determine and gain a foothold in the future: to continue their studies, find a job, create a family, etc. "Social prospects" of the contingent of educational colonies of the Federal Penitentiary Service of Russia, determines the differences in the organization of the activities of correctional colonies, colonies of settlements of the Federal Penitentiary Service of Russia [14,15].

In accordance with the current criminal executive legislation of the Russian Federation, juvenile convicts are serving sentences of imprisonment in educational colonies of the Federal Penitentiary Service of Russia, where they are held separately from adults. This is due to the need to prevent the negative impact of more experienced adult criminals on juvenile convicts. Convicted minors held in educational colonies serve their sentences in ordinary, facilitated, preferential and strict conditions. The four-stage system of regime requirements, stimulating the process of correction of convicts, helps to increase the effectiveness of the educational impact on them [7].

So, during the scientific-practical conference on reforming the penal system, which was held on September 10, 2009 in Moscow, the tasks for reforming the penal system were identified. The solution to these problems is aimed, on the one hand, to further humanize the system of the execution of sentences, and on the other, to increase its ability to achieve the goals of correcting convicts and preventing them from committing new crimes [8, 14]. A set of measures to solve these problems was reflected in the draft Concept of the development of the penal system in the Russian Federation for the period until 2020, and further developed in the Concept of the federal target program "Development of the penal system (2017 - 2025)"¹.

Thus, the Model for the Development of Penitentiary Institutions includes a description of the goals and objectives of the Educational Center of the Federal Penitentiary Service of Russia, its functional and organizational structure, the conditions for serving sentences and the detention of juvenile convicts. The Model also presents and currently implements a characteristic of the educational center management system, as well as offers on the organization of certain areas of its activity, an approximate calculation of the staff number of the staff of the FSIN of Russia is developed. The proposals on the material and technical base of the educational center are fully presented, the issues of training personnel for working with juvenile prisoners are implemented [9,15].

A model for the development of penitentiary institutions has been prepared and is being implemented taking into account the provisions of the draft Concept for the development of the penal system in the Russian Federation for the period up to 2017-2025, based on an analysis of the International Standards of Penitentiary Activities, domestic and positive foreign experience. Statistical and other data were used on the execution of sentences of imprisonment of juvenile convicts, census materials of minors serving their sentences, questionnaires from employees of educational colonies, expert assessments and photographs of working hours of the staff of the FCU Educational Colonies of the Federal Penitentiary Service of Russia.

¹See: The concept of the federal target program “Development of the penal system (2017 - 2025)” was approved by Decree of the Government of the Russian Federation of 23.12.20016 No 2808-p.

According to the draft Concept - 2020, minors sentenced to deprivation of liberty are serving their sentences in correctional facilities of a new type - educational centers with regular and intensive supervision. The main principle of creating a system of educational centers for juvenile convicts is to ensure their separate content, depending on the public danger of the crimes committed and the level of criminal infection of the individual. Today, approaches to the implementation of social, psychological and educational work with juvenile prisoners in educational centers have been changed based on the use of individual forms of influence, wider interaction with the public.

All this made it possible to resolve the issue of creating a correctional institution of the Federal Penitentiary Service of Russia for juvenile convicts of a new type, taking into account European standards of penitentiary activity, as well as accumulated domestic and positive foreign experience. The main task of this institution is to organize a comprehensive, completed system of the execution of imprisonment for persons who have committed a crime in their minor age, aimed at socializing an adequate personality of the convicted person [9,10,16].

Today the main thing is that the state, represented by the central governing body of the penal system of the Ministry of Justice of the Russian Federation, is trying to determine the ideology and content of the correctional and educational process in the context of the emergence of new forms of state power and market relations. Since without the presence of a state Concept in the field of the correctional process, the convict cannot seriously talk about the effectiveness of the penal system in Russia. At the same time, in recent years there has been a disregard for Russian and Soviet correctional policies and attempts to Americanize them. The goal of educational work in the institutions of the Federal Penitentiary Service of Russia, both earlier and now, is to change the "criminal views", beliefs, attitudes, bad habits and prepare the convict for an honest life in freedom. At present, all educational work in the institutions of the Federal Penitentiary Service of Russia is oriented towards a specific person, as a carrier of an asocial subculture that poses a danger to society. At the present stage of the functioning of the PKU "EC" of the Federal Penitentiary Service of Russia, the educational work of convicts is based on individual and group programs [9,10,13,15].

So, educational programs for various categories of juvenile convicts serving their sentences, this is the plan of activity of the staff of PKU "EC" of the Federal Penitentiary Service of Russia and, first of all, the chiefs of detachments, psychologists, social workers in organizing work to provide corrective action and re-socialization of juvenile convicts in order to prevent the commission of them new crimes.

The relevance of the development of programs was emphasized in the main areas of social reorientation of the penal system, where it was recommended as the main document determining the content of the execution of sentences for each juvenile convict an individual program of regime and psychological and pedagogical impact.

This idea was also expressed in the Concept of reform of the Criminal Executive System - 2020, approved by the decision of the Board of the Ministry of Internal Affairs of the USSR of July 16, 1990, which determined the basis for the correction of convicts to put programs of differential exposure, taking into account their behavior, mental state and degree of social neglect [12,16,18].

In connection with the introduction of the psychological service into the Criminal Executive System, the educational work with convicts has undergone some changes:

- 1) The development and implementation of methods of socio-psychological study, psychological-psychiatric, socio-pedagogical diagnosis of the personality of a minor convict began;
- 2) Development and implementation together with other employees of prisons of individual and group programs of differential impact on offenders, taking into account their personal characteristics, the degree of social and educational neglect of a minor convict;
- 3) Adjustment of individual programs, psychological counseling and prevention of stressful conditions of juvenile prisoners [16,17].

In 1997, the goal of correction of juvenile convicts was fixed by the criminal-executive legislation of the Russian Federation. Such a statement is fully consistent with the need for more complete consideration of international legal acts regulating the treatment of prisoners and the behavior of personnel in places of deprivation of liberty.

Currently, in order to achieve the main goal of correction of a minor convict in the penal system of Russia, the following tasks are carried out:

- 1) Compliance with the convicts in the penal system of Russia all the requirements of the law, rules of conduct, order and discipline;
- 2) The desire of a minor convict to achieve the necessary level of moral and legal consciousness;
- 3) The upbringing of a convicted juvenile of a sense of positive responsibility for his actions and the assigned case;
- 4) The development in a juvenile convict of a useful initiative for society and the awakening of self-esteem, self-confidence;
- 5) Formation in a minor convicted person of the desire for the further development of professional knowledge, skills - (training in a professional lyceum (school), general education (shift) school);
- 6) Education of a convicted juvenile of a conscious attitude to work and socio-legal culture [10,19].

It should also be noted that it is of great importance in the socio-pedagogical work with juvenile convicts of the psychological service of the PKU "EC" of the FSIN of Russia.

Thanks to the psychological and diagnostic work of practical psychologists, at the present time, solving problems related to the re-socialization and correction of juvenile convicts has become more productive. Because with the socio-psychological support of educational programs for the re-socialization of juvenile convicts, expertise and the preparation of corrective recommendations by psychologists. In the process of serving a sentence, as well as relying on the frequency of psychological examinations, a specialist psychologist can track changes in the behavior and personal characteristics of juvenile convicts, provide psychological information to prison staff in a timely manner, which makes it possible to approach the educational work with juvenile convicts more differentially, with taking into account the development of the dynamics of their personal characteristics.

In the implementation of the "Concept - 2020", such scientific organizations as the Research Institute of the Federal Penitentiary Service of Russia (Moscow), the Academy of Management and Law of the Federal Penitentiary Service of Russia (Ryazan), the Vladimir Law Institute of the Federal Penitentiary Service of Russia (Vladimir), Voronezh Institute of the Federal Penitentiary Service of Russia (Voronezh), Perm Institute of the Federal Penitentiary Service of Russia (Perm), Samara Law Institute of the Federal Penitentiary Service of Russia (Samara). Also, Swiss experts working in the Penitentiary System are also involved in active work. On the basis of educational institutions of the Federal Penitentiary Service of Russia, professional training of the staff of the penitentiary institutions of the Federal Penitentiary Service of Russia is carried out for subsequent work with minors convicted in the framework of the implementation of the "Concept - 2020" [9,16,20].

So, on April 20, 2000, the Ministry of Justice of the Russian Federation approved the "Concept of educational work with juvenile convicts in the context of reforming the penal system"². She suggests using the accumulated experience of organizing educational work with juvenile convicts in institutions of the Federal Penitentiary Service of Russia. Also, this work is currently being improved taking into account trends in the development of socio-economic, political, state and legal, moral and ethical foundations of society and the state, the state of the structure and dynamics of crime, introduce foreign experience, scientific recommendations. This Concept defines a system of views, principles, priorities, it is based on the principles of humanism, the priorities of correctional goals in the execution of sentences, the development of amateur principles, consistency and continuity, the inclusion of juvenile convicts in full social activity, suggests relying on positive personality traits, restoration of social and useful links of juvenile prisoners [10,16].

According to the current criminal law of Russia (Article 56 "Imprisonment for a fixed term" of the Criminal Code of the Russian Federation), the Federal Penitentiary Institution of the Federal Penitentiary Service of the Federal Penitentiary Service of Russia has general and high security prisoners sentenced to imprisonment who have not reached the age of majority by the time the court pronounces the sentence [5,6].

²See: The concept of educational work with convicts in the context of reforming the penal system (approved by the Ministry of Justice of the Russian Federation on April 20, 2000).

So, as of March 1, 2020, in the current period in the introduction of the Federal Penitentiary Service of Russia there are 23 PKU "Educational Colonies" of the Federal Penitentiary Service of Russia. Of these, 21 educational colony - for the maintenance of non-adult male convicts and 2 colonies (in Belgorod and Tomsk regions) for the maintenance of female juvenile convicts³. So, as of March 1, 2020, 1134 convicted persons, including 105 female minors, are serving a criminal sentence of imprisonment in the PKU "EC" of the Federal Penitentiary Service of Russia.

So, the proportion of juvenile convicts serving a criminal sentence of imprisonment in the institutions of the Federal Penitentiary Service of Russia consists of the following types of crimes: convicted for theft - 15.2%, for robbery - 14.1%, for robbery - 12.2%, for deliberate infliction of grievous bodily harm - 11.8%, for murder - 10.1%, for rape - 12.6%, other crimes - 24% of juvenile convicts. Including previously had conditional conviction, compulsory or corrective labor - more than 74.8% of convicts serving criminal sentences in prison. As well as those who had previously served a criminal sentence of imprisonment in the institutions of the Federal Penitentiary Service of Russia, such 38 convicted persons⁴.

Today, in all penitentiary institutions of the penal system of Russia, the following tasks of the Concept are successfully implemented:

1) Ensuring the priority of universal values in all aspects of the social and educational work carried out with juvenile convicts;

2) The upbringing of the penitentiary system staff with respectful and benevolent attitude towards juvenile convicts on the basis of principles of justice, humanism and partnership;

3) Ensuring an individual and differentiated approach, taking into account the degree of public danger and socio-pedagogical neglect of juvenile convicts;

4) The socio-psychological and pedagogical process of the convict, aimed at preventing (preventing) further criminalization of the person, substantive use of the conclusions and recommendations of psychologists and teachers in working with juvenile convicts in institutions of the penal system of Russia;

5) Creation of conditions and opportunities for juvenile convicts to improve themselves, to work on themselves to recognize their own guilt and harm done to other people, to form a desire to correct existing personal and negative qualities, as well as self-regulation of their behavior in society;

6) Preservation, strengthening and maintenance of social and personal relations of juvenile convicts, satisfaction of their spiritual needs;

7) Strengthening the educational orientation of labor, general and vocational training, the orientation of educational work on the formation and development of aspirations for engaging in socially useful activities, raising one's own educational and cultural level, and developing intelligence;

8) The development of forms of self-government in the activities of the penitentiary institutions of the FSIN of Russia through the wide participation of juvenile convicts in amateur organizations, the solution of domestic issues, leisure activities, cultural and sports and recreational activities, the creation of interest groups (organization of Orthodox parishes under the Federal Public Institution "EC" FSIN of Russia);

9) The direction of the potential of all employees of the PKU "EC" of the Federal Penitentiary Service of Russia for the continuous psychological and pedagogical impact on juvenile convicts in various activities: labor, educational, social, leisure and creative [9,10].

As a result, in our opinion, legal education takes an important place, aimed at forming juvenile convicts a correct understanding of the prescription of laws, raising confidence in the inadmissibility of violating them and developing a stable habit of their exact execution. At the same time, take into account the existing distortions in the legal consciousness of convicts serving sentences.

First of all, this should be noted such a defect as legal ignorance - lack of knowledge of legal norms by a part of minors. The prevalence of this defect is evidenced by the results of a study of the legal knowledge of violators. 88.9% of juvenile convicts do not clearly know the law on criminal liability [as of 03/01/2020].

³See: Federal Penitentiary Service (FSIN of Russia) [Electronic resource] // Access mode : <http://фсин.рф> / (accessed: 02.17.2020).

⁴See: Statistics and Analytics. Federal Service for the Execution of Punishment (Federal Penitentiary Service of Russia) [Electronic resource] // Access mode : <http://фсин.рф> / (date of access: 02.21.2020).

The situation is worse when the cause of legal ignorance is the person's reluctance to obtain relevant knowledge, or he considers them to be optional. Here, legal ignorance grows into a more serious defect - "social-legal infantilism", expressed in an indifferent attitude to the rule of law.

The next defect in legal awareness is the lack of a legal culture in which a minor convict agrees with the requirements of the legal norms of the regime in the PKU "EC" of the Federal Penitentiary Service of Russia, is convinced of the need to comply with them, but violates all requirements due to the lack of a habit of law-abiding behavior. Often there is such a defect in legal awareness as legal nihilism, which expresses in a wrong, distorted understanding of legal norms, disagreement with their requirements, this is the result of an incorrect assessment of the ratio of personal and public. Under legal nihilism, legal feelings are "dulled", a teenage convict is inclined to self-justification of his criminal behavior by referring to others, their incorrect behavior. The thirst for self-assertion among their own kind in a children's colony provokes the desire of a teenage convict to prove at all costs immediately by any, even unlawful actions, "bravado", "self-mutilation", etc. [14].

The deepest defect in the moral and legal consciousness of people in social isolation is "socio-legal cynicism", which is manifested in the denial of the significance of any prohibitions. They are their own legislators. It is they themselves who create their "laws" in the PKU "EC" of the FSIN of Russia, demanding that the rest of the convicts strictly implement them.

Most often, defects in the legal consciousness of offenders are exacerbated by defects in their moral consciousness, consisting in the presence of antisocial views. Moreover, the considered defects of legal consciousness significantly affect the behavior of the individual in conditions of social isolation, and without their elimination it is difficult to talk about the prevention of deviant behavior of juvenile convicts in the Federal Penitentiary Institution "EC" of the FSIN of Russia. In order to solve the problems of preventing deviant behavior, it is important to intensify the legal education of juvenile convicted "offenders" of the regime [14,15].

Skillfully, using knowledge in the field of psychology, the teaching staff with greater return can carry out work among minor convicts in the PKU "EC" of the Federal Penitentiary Service of Russia. Means of protection and supervision, regime restrictions should create conditions in places of social isolation that would exclude the possibility of committing offenses, would contribute to the destruction of criminal habits and attitudes and the formation of habits of immoral behavior. Preventive work also includes the creation of conditions for the psychological and physical isolation of the "worst" morally convicted and young men from the "best". This is due to the fact that the concentration in the colony of a greater number of people with different depths of the "I" of a different combination of moral defects, criminal infection, generates specific social and psychological phenomena of mutual criminalization in the process of their interpersonal and intergroup interaction [17].

The psychological isolation of the "worst" from the "best" in the PKU "EC" of the FSIN of Russia is ensured as follows:

- 1) Dissociation of negatively directed "groups", "groups", hindering mutual contacts of convicts from among the "authorities" (criminal elite) with each other by placing them on different shifts in a comprehensive school (vocational school) and in the production of an educational colony;
- 2) Attaching "activists" to negatively minded individuals;
- 3) Providing an advantage in each contact group (study group, class, team, etc.) of positively convicted prisoners over negatively convicted prisoners;
- 4) Applying moral condemnation and boycott to them [14,17].

In cases that cannot be delayed by violators of the regime, order and discipline (those who refuse to work and study, who are prone to self-harm and escape from prison), physical isolation measures are applied - temporary placement in a disciplinary isolation ward (disciplinary room) of an educational colony. A very effective means of preventing delinquency and deviant behavior is the reorientation of emerging or emerging criminal groups, which is achieved by the effort of their positive core (if there are such persons in the group) or by reorienting the "informal leader", "squad hill", bringing him closer to the teacher and organizing with him individual and preventive work. At the same time, the discrediting of "thieves' authorities" in the eyes of the bulk of juvenile convicts, the display of their cruelty, injustice, dishonesty in relations with the "lower classes" and the bulk of minors can play a significant role. Creation

of all necessary conditions for the manifestation of “leadership qualities” of convicts with positive attitudes, around which later friendly groups would form in the detachment of the educational colony [14].

As a result, today, an important condition for the effectiveness of the prevention of any types of deviant behavior of convicts in the colony is to ensure the daily employment of each inmate, their active inclusion in general and vocational training, in cultural and sports activities, etc. Thus, some offenses are committed by juvenile convicts who have various deviations from the mental norm, which were not revealed during the investigation and trial, this should be taken into account in the preventive work of teachers of the educational colony of the Federal Penitentiary Service of Russia.

In the system of measures for the prevention of juvenile delinquency, they occupy the PKU “EC” of the Federal Penitentiary Service of Russia. In the context of socio-economic reforms, it is necessary to radically improve the activities of educational colonies and bring the entire system of the execution of sentences for juvenile convicts in accordance with the requirements of international standards [12,15,16].

Next, we will present the key problems in the activities of educational colonies of the FSIN of Russia, and the main directions for their improvement. Today, unfortunately, the educational colonies of the penal system of Russia of the Ministry of Justice of the Russian Federation have largely preserved the attributes inherent in correctional colonies and prisons in Russia. In fact, at the present time, further processing of the existing criminal executive legislation of Russia governing the activities of educational colonies is required. But it is impossible not to notice the fact that the Russian penitentiary system is increasingly turning to new practically verified and theoretically substantiated conclusions for help, which make it possible to explain and predict the processes occurring in crime and within the limits of their possible control. Work with persons who have committed a crime and are serving sentences in educational colonies requires knowledge of various factors that affect juvenile delinquency in Russia. Factors can be classified as follows:

- 1) Demographic nature (increasing general social mobility, changing gender and age structure and more);
- 2) The economic nature associated with the level of well-being of the population of Russia;
- 3) Social, socio-psychological nature, which includes a description of the educational and cultural level of the Russian population, its social activity, public opinion, free time budget, level of social control and more;
- 4) Organizational and legal nature in the field of social process management [14,16].

So, the criminal and penal legislation of the Russian Federation establish the principle of differentiation of the appointment and execution of sentences. Article 80 of the Penal Code of the Russian Federation establishes the separation of men and women, minors and adults. This requirement is also provided for in international standards for the treatment of prisoners (paragraph 29 of the UN Rules concerning the protection of minors deprived of their liberty) [2,7].

Thus, this principle determines the infrastructure of the penal system, which is required to ensure the isolation of minors and adults by placing them in various types of penitentiary institutions of the Federal Penitentiary Service of Russia. According to Part 1 of Article 87 of the Criminal Code of the Russian Federation, - “Minors are persons who are fourteen years old at the time of the commission of the crime, but not eighteen years old” [5].

This concept is fully consistent with the definition of a minor given in the United Nations Rules for the Protection of Juveniles Deprived of their Liberty and the “Convention on the Rights of the Child”, which states that “every human being is under the age of eighteen years old” (article 1)⁵.

At the same time, both Article 96 of the Criminal Code of the Russian Federation and Article 139 of the Criminal Procedure Code of the Russian Federation allow serving sentences in educational colonies for persons over 18 years of age until they reach 19 years of age, that is, joint detention of minors and persons who have left this age [5,7].

This decision is generally positive, since it allows to consolidate the results of educational work with pupils, as well as to attract 18-19-year-old prisoners to the chores that are necessary for the institution, on

⁵See: UN Convention on the Rights of the Child (approved by the UN General Assembly on 11/20/1989) (entered into force for the USSR on 09/15/1990) Article 1.

which teenagers should not be used. But, and when setting the age limit of 19 years, not all convicts have time to serve the appointed term of punishment [7,16,17].

However, the extension of the possibility of serving a sentence in an educational colony for persons who have overcome the eighteen-year-old age barrier of a minor. Thus, the age ratio of minors and adults noticeably changes, with the predominance of the latter, leads to an increase in the number of contingent as a whole, and poses new problems for the staff of the PKU “EC” of the Federal Penitentiary Service of Russia, which is forced to restructure its work taking into account the increasing age range of prisoners [16,17].

This also places additional financial burdens on the educational colony of the Federal Penitentiary Service of Russia, which are forced to provide adult convicts with the nutrition and logistics standards set for juvenile convicts [5,7].

It is proposed to create sections in educational colonies working in the penal colony of the general regime for pupils of the Federal Penitentiary Institution “EC” of the Federal Penitentiary Service of Russia who have reached the age of 18 years before completing their sentences without age restrictions. To implement the proposal, it is required to make appropriate changes to the Criminal Code of the Russian Federation and the PEC of the Russian Federation. Given these problems and their solutions, it is proposed to create an educational center of the Federal Penitentiary Service of Russia.

So, in our opinion, the “Educational Center” of the Federal Penitentiary Service of Russia is, first of all, one of the types of the penitentiary institution of the Federal Penitentiary Service of Russia for persons who have committed a crime at a minor age and accumulates all areas of social and educational work with the contingent.

The purpose of creating such a complex is to put a barrier to the further criminalization of juvenile convicts. The creation of the complex is carried out on the basis of an educational colony and is focused on administrative centers, which will make it possible to organize the functioning of all its structural divisions.

The creation of such a complex in the penal system of Russia, which will include two regime types of surveillance [“normal” and “enhanced”] contingent stays. And a rehabilitation center focused on the post-penitentiary adaptation of convicts preparing for release, as well as focused on consolidated work with administrative centers (municipalities) for further post-penitentiary adaptation of a minor convict, will be implemented at the educational center of the Federal Penitentiary Service of Russia [7,14,16].

Thus, the creation of a single type of regime will make it possible to protect juvenile convicts from serving a sentence in a high security colony “EC” from the negative influence of adult criminals, it will make it possible to include public associations and parents in the educational system with convicts, and it will facilitate the resolution of issues related to the labor and welfare of those released take full advantage of the rights granted by law. In addition, this will make it possible to reduce the expenses stipulated by the budget for transportation of convicts across the territory of the Russian Federation.

So, when organizing the educational process, the educational work in the colony is aimed at preparing a more socialized personality of the minor convict. Overload of juvenile convicts with negative experience has not yet been the subject of correction. On the contrary, the objective conditions of education in the artificially created closed world of places of deprivation of liberty create additional conditions for the criminalization of the environment and the prisoners themselves [16,17].

All regime requirements for a convicted person in places of deprivation of liberty are focused on the formation of an independent, professionally oriented and law-abiding personality of the convicted person. Compliance with the regime’s requirements of the colony, compulsory attendance at a general (shift) school, vocational school, and employment were assessed, first of all, from the point of view of organizing the life and work of places of deprivation of liberty and how much the convicted person “fit” into this structure. This is what determines the degree of correction.

At present, the minor convict who arrived from the pre-trial detention center in the PKU “EC” of the Federal Penitentiary Service of Russia finds signs of total social maladaptation. He, like all convicts serving a sentence of imprisonment in VK, does not know how to build relationships with their peers, to determine the line of behavior in society, to ensure their physical and spiritual needs, observing generally accepted legal and moral standards [14,16,17].

The main task that the Educational Center of the Federal Penitentiary Service of Russia should solve when carrying out educational work with the convict is, first of all, to find out the reasons for the social maladjustment of the personality of the minor convict, to correct those personal qualities that prevented him from adapting to the requirements of a law-abiding modern Russian society, and to prepare a socialized personality.

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РЕСЕЙ ЖОҒҚ МЕКЕМЕЛЕРІНДЕГІ КӘМЕЛЕТКЕ ТОЛМАҒАН СОТТАЛҒАНДАРДЫҢ ТӘРБИЕ ЖҰМЫСЫНЫҢ ҚАЗІРГІ ЖАҒДАЙЫ МЕН БОЛАШАҒЫ

Аннотация. Мақалада Ресей Федералды пенитенциарлық қызметінің оқу колонияларындағы кәмететке толмаған сотталғандармен жүргізілетін тәрбие жұмысының қазіргі жағдайы келтірілген. Автор қазіргі кезеңдегі жастар мен жасөспірімдердің рецидиві – Ресей Федерациясындағы өткір проблемалардың бірі екенін анықтайды.

Сонымен, кәмететке толмағандар арасындағы құқық бұзушылық – қылмысты анықтаудың қуатты көзі. Бүгінгі таңда кәмететке толмағандар арасындағы құқық бұзушылықтар кәмететке толмағандар арасындағы құқық бұзушылықты тудырады (14 жастан 17 жасқа дейінгі), теріс қылмыстық тәжірибені болашаққа жеткізеді, бұл әлеуметтік білім заңдарына сәйкес, ертеңгі жасөспірімдерге алдыңғы ұрпақтың «әлеуметтік мұрасы» ретінде қайтып келеді. Сонымен қатар кәмететке толмағандар арасындағы қылмыс қазіргі Ресейдегі ұйымдасқан және рецидивизмнің әлеуметтік негізі екенін ұмытпаңыз.

Сондай-ақ қайталанатын қылмыстық құқық бұзушылықтар жасау арқылы құқық бұзушы өзінің жазаланбайтынына нық сенімді екенін атап өтуге болады. Шартты түрде бас бостандығынан айыруға сотталған кәмететке толмағандар жасаған қылмыстардың қайталануы (немесе түзеу жұмыстары) немесе бас бостандығынан айырудың нақты мерзімдері жазаның тиімсіздігін көрсетеді, бұл кәмететке толмағандар тарапынан бірнеше рет жасалған қылмыстар санының өсуінен көрінеді. Сондықтан түрмелердегі пенитенциарлық қайта құрылымдаудың әлсіздігі мен тиімсіздігіне байланысты сотталушылар жасаған, бірақ одан да бұрмаланған түрдегі қылмыстар бірнеше жылдан кейін артуы мүмкін (бұл ұйымдасқан қылмыстық топтардың құрамына кірмейді). Сондай-ақ кәмететке толмағандар арасындағы құқық бұзушылық қылмыстық ойлау мен мінез-құлықтың «сау» жасөспірімдер ортасында таралуына ықпал етеді, оның қылмыстық жолмен жұқтырылуына әкеледі. Сонымен, Даостың даналығы былай дейді: «... ойларыңыздан қорқыңыз, өйткені олар сіздің әрекеттеріңіздің бастауы» – Лао Цзы (б.з.д. VI-V ғасырлар). Жасөспірім қылмысы кәмететке толмаған құқық бұзушының жеке басының дамуына зиян келтіреді, осылайша кәмететке толмағанның қылмыстық әрекетін жалғастыруға ықпал етеді. Жоғарыда айтылғандарға сүйене отырып, кәмететке толмағандар арасындағы құқық бұзушылықтар қазіргі Ресей қоғамының маңызды және маңызды әлеуметтік-құқықтық проблемаларының бірі ретінде қарастырылуы керек.

Мақалада автор пенитенциарлық мекемелерді дамытудың «моделін» ұсынады, Ресей Федералды пенитенциарлық қызметінің білім беру орталығының мақсаттары мен міндеттерін, оның функционалды және ұйымдастырушылық құрылымын, жазасын өтеу шарттары мен кәмететке толмаған сотталғандарды ұстауды сипаттайды. Сонымен қатар дәлелдеме ретінде біз Ресей Федерациясының қылмыстық атқару жүйесі тұжырымдамасын – «Тұжырымдама – 2020» әзірлеуді жүзеге асырудағы тұжырымдамалық тәсілдерді талдаймыз. Ресей Федерациясының Қылмыстық атқару қызметі кәмететке толмаған сотталғандарға арналған білім беру орталығының моделі ұсынылған.

Түйін сөздер: кәмететке толмаған сотталушы, қайта орналастыру, тәрбие жұмысының заманауи әдістері мен тәсілдері, кәмететке толмағандардың қайталануы, сотталушының әлеуметтік көзқарасы, Ресей Федералды қылмыстық атқару қызметінің оқу колониясы, Ресей Федералды Қылмыстық атқару қызметінің оқу орталығы, Ресей Федерациясының Қылмыстық атқару кодексі, Ресей Федерациясының Қылмыстық кодексі, Тұжырымдама – 2020, ұйымдасқан қылмыстық топтар.

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СОВРЕМЕННОЕ СОСТОЯНИЕ И ПЕРСПЕКТИВЫ ВОСПИТАТЕЛЬНОЙ РАБОТЫ НЕСОВЕРШЕННОЛЕТНИХ ОСУЖДЁННЫХ В УЧРЕЖДЕНИЯХ ФСИН РОССИИ

Аннотация. В статье представлено современное состояние воспитательной работы с несовершеннолетними осуждёнными в воспитательных колониях ФСИН России. Автором определяется то, что рецидивная преступность молодежи и подростков в настоящий период остаётся одной из острых проблем в Российской Федерации.

Так, подростковая преступность является мощным источником самодетерминации преступности как таковой. Сегодня криминальная заражённость несовершеннолетних продуцирует преступность лиц молодого возраста (от 14 – 17 лет), транслирует негативный криминальный опыт в будущее, который, по законам социального обучения, вновь «возвращается» завтрашним подросткам в качестве «социального наследия» предыдущих поколений. А также не стоит забывать и о том, что несовершеннолетние преступники являются социальной базой организованной и рецидивной преступности в современной России.

Также можно отметить, что, совершая повторные уголовные преступления, правонарушитель твердо убеждён в своей безнаказанности. Рецидив преступлений несовершеннолетних осуждённых к условным срокам уголовного наказания (либо исправительных работ), или к незначительными реальными сроками лишения свободы подчёркивает неэффективность вынесенного наказания, что отражается в росте числа повторных уголовных преступлений, совершаемых несовершеннолетними. Поэтому весьма реально то, что из-за слабости и неэффективности пенитенциарной ресоциализации в местах лишения свободы через несколько лет может возрасти число преступлений, совершаемые осуждёнными, но в более извращённой форме (не исключено и в составах ОПГ). А также преступность несовершеннолетних способствует распространению криминального образа мыслей и способа поведения в «здоровой» подростковой среде, ведет к её криминальному заражению. Так, даосская мудрость гласит: «...бойтесь своих мыслей, ибо они начало ваших поступков» (Лао-Цзы, VI– V веков до н.э.). Подростковая преступность причиняет вред личностному развитию самого несовершеннолетнего преступника, способствуя тем самым продолжению криминальной деятельности несовершеннолетнего. С учётом вышеизложенного, преступность несовершеннолетних следует рассматривать в качестве одной из наиболее серьёзных и значимых социально-правовых проблем современного российского общества.

В статье автором предлагается «модель» развития пенитенциарных учреждений, включает в себя описание целей и задач Воспитательного центра ФСИН России, его функциональной и организационной структуры, условий отбывания наказания и содержания под стражей несовершеннолетних осуждённых. Также в качестве доказательной базы, анализируются концептуальные подходы реализации развития Концепции уголовно-исполнительной системы Российской Федерации до 2020 года – «Концепция – 2020». Представлена модель Воспитательного центра ФСИН России для несовершеннолетних осуждённых.

Ключевые слова: несовершеннолетний осуждённый, ресоциализация, современные методы и подходы воспитательной работы, рецидивная преступность несовершеннолетних, социальная перспективность осуждённого, воспитательная колония ФСИН России, воспитательный центр ФСИН России, Уголовно-исполнительный кодекс РФ, Уголовный кодекс РФ, Концепция – 2020, ОПГ – организация преступной группы.

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EFFECT OF PROBLEM BASED LEARNING MODELS ON THE ABILITY TO REMEMBER ENGLISH VOCABULARY IN PRESCHOOL

Abstract. Early childhood is a fundamental period for the life of a human being, the selection of learning models in the world of education makes children active students. However, the active involvement of children is something that must still be considered in teaching and learning activities in Indonesia. Quasi-experimental research was conducted using 60 children aged 4-5 years, on the influence of the problem-based learning model on the ability to recognize English vocabulary in kindergarten. Bloom's Taxonomic thinking concept is a reference to children's ability to remember English vocabulary such as mentioning, identifying, showing, and pairing pictures using English. Comparison between the control class of 30 children and the experimental class with the number of 30 children was done in obtaining the results of a comparison of the effects generated on the learning model. The results showed that the ability to remember English vocabulary in the experimental class in the application of the problem based learning model increased significantly compared to the research control class. Differences in outcomes are likely to arise due to research interventions, for this reason further study is required by using a larger sample size of the study to obtain the accuracy of the effects caused by the application of the problem based learning model to the ability to remember English vocabulary in kindergarten and higher education levels. Further adjusted to the stages in the concept of higher Bloom Tasonomics thinking skills.

Key words: Problem Based Learning Model, the ability to remember English vocabulary, the concept of Bloom's Taxonomy thinking.

Introduction. Learning model is a design that aims to anticipate the adaptive and generative behavior of students in achieving learning goals (Hanafiah & Suhana, 2009). Adaptive behavior is related to self and social maturity (age and culture) in carrying out daily activities whereas generative behavior is an activity carried out to explore oneself. Enjoyable environmental conditions help children to develop rapidly, with the concept of active learning and student centers making children more easily understand the concept of learning (Zare, Sarikhani, Salarii, & Mansouri, 2016). The teacher has the task of forming a learning pattern that is related to the experience the child has gained through a series of learning activities. Many studies state that there are still many teachers who use models that are not right, so the lack of motivation of children in participating in learning activities and lack of achievement of learning objectives (Isnaini, Sugiarti, & Indah, 2013; Margaret, 2014; Kenzhaliyev et al., 2019; Lavrinenko et al., 2020; Zhapbasbayev et al, 2016). The selection of the right learning model will help the child to learn and carry out activities more effectively so that the skills and knowledge gained are in accordance with the learning objectives that are achieved well and are beneficial for children in the future (Putri et al., 2020).

The problem based learning model is a learning model that makes children active learning with the opportunities given directly in compiling knowledge, developing children's independence and confidence

(Tsoukalas, 2011). The application of this model has been proven to increase the ability of students in every level of education, such as the ability of children in learning science (Zhang, Parker, Emberhardt, & Passalacqua, 2011) geography in students in grade 7 (Simons & Klein, 2007), biology in grade 9 and grade 12 (Goodnough & Cashion, 2006), increasing the acquisition of chemical values in grade 9 children (Tarhan, Raziye, Urek, & Acar, 2008), majoring in chemistry and biology at the S1 level (Overton & Bradley, 2010; Sahin, 2010) and majoring in psychology and business administration in graduate students (Hays & Vincent, 2004). In a study conducted by Zhang (2011) explained that the problem based learning model is very helpful for children in improving their abilities and ideas (Zhang et al., 2011), contextual understanding of the activities in the structure of its implementation is better than the learning model traditional.

Problem solving in problem based learning models makes children active individuals in learning activities, so that an understanding of learning goals is created (Arends, 2012). The opportunity for children to explore themselves is important in supporting children's abilities (Atayeva et al., 2019; Fauzi, Basikin, Duisenbayeva, & Kassymova, 2020) The opportunities provided make it easier for children to gain maximum understanding compared to traditional learning models requires children to memorize learning (Ningsih, Rahman, & Muhammad, 2019). Student-centered learning and the presence of small groups in learning are characteristics of this learning model (Arends, 2012). The teacher acts as a facilitator in learning activities which include activity planners and supporting media needed in learning. Planning problems that will be raised in children's activities related to children's daily lives, it is intended that children gain skills in solving problems in their lives and obtain new information from the activities that he went through from the activity. The opportunities given by the teacher in the activities carried out by children must be in a pleasant learning environment

Cognitive development is an ability that includes the ability to think, give reasons, change of mind, intelligence, and language abilities that children have (Sujiono, 2010). There are four stages of cognitive development according to Jean Piaget (Santrock, 2016), namely the sensorimotor stage (0-2 years), the pre-operational stage (2-7 years), the concrete operational stage (7-11 years), and the formal operational stage (11-15 years). The pre-operational stage (2-7 years) is characteristic of children in this study where symbolic is the ability of children at this stage and the children do not involve the operational thoughts they have. at this age, the child is in an egoistic and intuitive period which is a symbolic stage of thinking, but does not involve operational thinking. Egocentrism can be interpreted as the inability of children to distinguish the perspectives they have from others. Intuitive children go through when they are at the age of 4-7 years, primitive reasoning is used by children in this age. Children's curiosity about everything also happens at this age, in this case the child is considered to know about something but cannot explain rationally. In the cognitive theory proposed by Piaget, children actively build their cognitive world (Janssen-Vos & Pompert, 2012), the availability of information from the environment is not simply poured into children's minds but rather how children perceive the world and how these changes occur systematically in their minds (Santrock, 2016).

English is an international language, which is used as the language of instruction in primary, secondary and tertiary education (Santrock, 2007), Vocabulary plays an important role in everyday human life (Ismawati, 2011). The use of traditional learning models such as memorization is often used as a teacher in carrying out teaching and learning activities that result in a lack of active children (Lin, 2010; Min & Hsu, 2008) Using the PBL approach, second language learners (L2) can explore the meaning of vocabulary through collaboration between group members, developing their knowledge of vocabulary in real life contexts. Knowledge of the construction process can guide these students to realize the meaning of vocabulary and its use in the context of communication. Determining the final success of the use of English is when the child is at an early age (Santrock, 2016) Regulation of the Minister of Education of the Republic of Indonesia number 58 regarding Early Childhood Education Standards explains the Standards of Development Achievement Levels of Children aged 4-5 namely repeating simple sentences, answering questions simple, expressing feelings with adjectives, mentioning known nouns, expressing opinions to others, telling the contents of fairy tales. In the EFL context, empirical research examining the influence of problem based learning models is very limited. Then this study will look at the effect of problem based learning chosen as a learning model in overcoming problems of the ability to remember

Table 1 – The steps of the problem based learning model

| No | Learning Steps | Information |
|----|---|--|
| 1 | The first step Provide orientation about problems to children | Children observe and describe the pictures Children pay attention to the teacher's explanation about the introduction of various means of transportation in the media provided by the teacher Children ask questions and answers about the names of the means of transportation on the media provided by the teacher |
| 2 | Second step Prepare students to study | Children pay attention to examples of activities to remember English vocabulary that will be done in learning (means of transportation) |
| 3 | Third step Guiding independent and group investigations | The child does the activity of remembering transportation independently and in groups |
| 4 | Fourth step Develop and present the work | The child starts to convey the results of the activity considering the means of transportation they have done |
| 5 | Step Five Analyze and evaluate the problem solving process | Children get explanations and reflections about English vocabulary |

English vocabulary by following the steps contained in the problem based learning model (table 1) with the theme "Transportation" in preschool.

Methods. This study conducted research on 60 children aged 4-5 years in kindergarten as research subjects. There were 2 research classes: 30 children in the control class and 30 children in the experimental class. The teacher in this study acts as a learning activity implementer and the researcher as an observer who assesses the achievement of the ability to remember English vocabulary. Research design in this uses a quasi-experimental design with two classes. These classes are divided into two conditions: experimental conditions and control conditions. In the control condition, the children received the activity of remembering English vocabulary as usual. Meanwhile, in experimental conditions, children receive the ability to remember English vocabulary using a problem based learning model. The learning theme presented in each class is the same theme for children. Assessment of Children's Abilities used the concept of thinking skills in Bloom's Taxonomy is a reference to the ability to remember English vocabulary in applying problem based learning models. Activities on the ability to recognize or remember are at the Lower Order Thinking Skills (LOTS) thinking ability which includes mentioning, identifying, showing, and pairing pictures using English with the theme "Transportation Equipment". The media used in the assessment of activities that children do in the form of picture cards and miniature transportation (cars, planes, ships, and trains). Data collection tool in the form of observation sheets recorded by researchers using a 4 rating scale (table 2).

Table 2 – Assessment of the ability to remember English vocabulary

| Type of activity | Learning subject | Remarks on Rating Rubric |
|------------------|----------------------------|--|
| Mentioning | Car, plane, ship and train | Value 1, if the child can mention 1 vocabulary of transportation in English Value 2, if the child can mention 2 vocabulary words of transportation in English Value 3, if the child can mention 3 vocabulary of transportation in English Value 4, if the child can mention 4 vocabulary of transportation in English |
| Identifying | | Value 1, if the child can identify 1 means of transportation in English Value 2, if the child can identify 2 means of transportation in English Value 3, if the child can identify 3 means of transportation in English Value 4, if the child can identify 4 means of transportation in English |
| Showing | | Value 1, if the child can show 1 means of transportation in English Value 2, if the child can show 2 means of transportation in English Value 3, if the child can show 3 means of transportation in English Value 4, if the child can show 4 means of transportation in English |
| Pairing | | Value 1, if the child can pair 1 of the same means of transportation in English Value 2, if the child can pair 2 of the same means of transportation in English Value 3, if the child can pair 3 of the same means of transportation in English Value 4, if the child can pair 4 similar means of transportation in English |

There are three stages in this research, namely pretest stages, implementation stages and posttest stages. At the implementation stage the children in the control class participate in the application of the traditional learning model led by the teacher, while the experimental class applies the problem based learning model to the learning activities. The researcher serves as an observer in assessing the ability to remember English vocabulary in different activities by the way children work alternately. The absence of 10 children in this study in the completion of the intervention at the pretest and posttest stages, there were only 50 children who completed the application of the problem based learning model in the ability to remember English vocabulary. The existence of this shortage then the distribution of pretest and posttest data cannot be calculated in the test for normality and homogeneity of variance, for that researchers report the findings of this study using non-paramateric tests with the Mann-Whitney U test with SPSS 22.00.

Results. Table 3 shows the average ability score given the vocabulary for the control class at the pretest stage is 2.6, while the experimental class obtains an average of 2.8. These results indicate that before the application of the problem based learning model the ability of each class the average value of the ability possessed was relatively the same. At the posttest stage of the study, a significant difference was seen in the acquisition of the average ability to remember vocabulary in the control class 3.4 and the experimental class to get an average result of 5.6 after applying the problem based learning model in learning activities.

Table 3 – Average value of vocabulary recall ability

| Condition | Mean | |
|---------------------------|---------|----------|
| | Pretest | Posttets |
| Control Class (n=25) | 2.6 | 3.4 |
| Experimental Class (n=25) | 2.8 | 5.6 |
| Total n = 50 | | |

Pretest and Posttest results obtained from the calculation of the ability to remember English vocabulary using Mann-Whitney U. The first step is to look for the normality of research data (table 4). The significant value of the Shapiro-Wilk test at 0.05 indicates that the normality of the data is $0.00 < 0.05$. From these results it can be said that the normality value at the pretest stage of the study is not normal. Then, the researchers continues the test using homogeneity test of varian where the significant value was $0.607 > 0.05$ (table 5).

Table 4 – Pre-test Significant Normality Test based on Shapiro-Wilk Test

| | Shapiro- Wilk | | |
|--------------------|---------------|-----|------|
| | Statistic | d f | Sig. |
| Control Class | .785 | 25 | .000 |
| Experimental Class | .815 | 25 | .000 |

Table 5 – Pretest Test Values for Homogeneity of Variance

| Based on Mean | Levene Statistic | Sig |
|---------------|------------------|------|
| | .269 | .607 |

From the results of the normality and homogeneity test, it can be concluded that the data on the ability to remember English vocabulary is homogeneous but not normal. In the non-parametric difference test it is intended that the researcher can find out the value of the differences that occur in the control class and the experimental class using Mann-Whitney. From the results of calculations performed the results of different tests at the pretest stage is $0.556 > 0.05$ (table 6). The results of these calculations can be used as a conclusion of children's ability to remember English vocabulary of children aged 4-5 years in kindergarten, so it can be said that the forerunner of the problem based learning model at the pretest stage did not have a significant effect on the ability to remember English vocabulary.

Table 6 – Mann-Whitney Test in Pretest Research

| | |
|------------------------|------------------------------------|
| | the ability to remember vocabulary |
| Asymp. Sig. (2-tailed) | .556 |

In the second stage, the teacher implements the learning model in the experimental class, then the researcher does the normality calculation at the posttest stage. The significance test value from the Shapiro-Wilk test calculation shows that the posttest data is not normal for both the control and experimental classes, the conclusion of this normality test is obtained from the calculation results obtained namely $0.00 < 0.05$ (table 7).

Table 7 – Test Significance of Posttest Value for Shapiro-Wilk Normality Test

| | Shapiro- Wilk | | |
|--------------------|---------------|-----|------|
| | Statistic | d f | Sig. |
| Control Class | .634 | 25 | .000 |
| Experimental Class | .732 | 25 | .000 |

In the second stage, the teacher implements the learning model in the experimental class, then the researcher does the normality calculation at the posttest stage. The significance test value from the Shapiro-Wilk test calculation shows that the posttest data is not normal for both the control and experimental classes, the conclusion of this normality test is obtained from the calculation results obtained namely $0.00 < 0.05$ (table 7). After searching for the significance value of normality, the researcher calculated the average significance of the homogeneity tests of the two classes. From the results of the calculation of the ability to remember English vocabulary based on the average Sig. obtained is $0.039 > 0.05$ (table 8), it can be concluded that the two classes can be declared not homogeneous.

Table 8 – Test Values of Posttest Homogeneity Variance

| | | |
|---------------|------------------|------|
| Based on Mean | Levene Statistic | Sig |
| | 4.489 | .039 |

From the results of normality and homogeneity tests, it can be concluded that the ability to remember English vocabulary is homogeneous but not normal. In the non-parametric difference test it is intended that the researcher can find out the value of the differences that occur in the control class and the experimental class using Mann-Whitney. From the results of calculations performed the results of different tests at the pretest stage were $0.00 > 0.05$ (table 9). So it can be concluded that at the posttest stage in the application of problem based learning models significantly influence the ability to ask for English vocabulary of children aged 4-5 years in kindergarten by sharing media and activities carried out by children in the model.

Table 9 – Mann-Whitney Test in Pretest Research

| | |
|------------------------|------------------------------------|
| | the ability to remember vocabulary |
| Asymp. Sig. (2-tailed) | .000 |

Discussion. The final result calculation shows that at the pretest stage there was no significant effect on the ability to remember English vocabulary of children aged 4-5 years in kindergarten. The teacher's full mastery of learning makes children passive in accepting learning. The habit of activeness of children from an early age in learning will create students who are ready to face the future. Improving the ability of children can be accustomed through the application of learning models that stimulate children to be independent in learning and willing to explore (Fauzi et al., 2020). The application of problem based learning models brings children to experimental activities or learning through their own experiences. This is the basis for a significant influence on the ability to remember children's vocabulary through problem based learning models. Children should be given the freedom to prove, express their opinions, and find a

way out of the design of related problems in the real life they live (Arends, 2012). The activity of mentioning, identifying, showing, and pairing pictures and concrete objects using English in the ability to remember in this study teaches children to be focused in developing their skills. Learning media that come from concrete objects around children's lives make learning more interesting. These tangible objects make children interested in doing activities compared to the worksheets they have to do (Kauchank&Eggen, 2012)

In applying the problem based learning model, the effect obtained by the child is based on the presence of information processing. The new knowledge or information they get is entered into their cognitive system (assimilation), the new information is adjusted to the knowledge they get from direct experience activities (accommodation) and then the child's cognitive abilities will balance that knowledge so that the information and knowledge they get becomes relevant to their thinking (Santrock, 2016; Sujiono, 2014). The steps in the problem based learning model ensure the teacher is only a facilitator for children in exploring themselves, teachers are allowed to provide assistance in stages according to what children need until they can work on it themselves (scaffolding) (Santrock, 2016). that in their child-centered learning activities and the presence of real problem designs presented, children will get an explanation of the activities they have done (Marra, Jonassen, Palmer, &Luft, 2014; Ningsih, Rahman, & Muhammad, 2019; Arend, 2012).

The opportunity provided is a learning model that is needed in the implementation of learning in Indonesia where the teacher provides the opportunity for children to explore the knowledge they have gained. The right theoretical development in applying this model in kindergarten will have an effective impact on children. This learning model is child-centered learning, has a problem design that is presented, and is carried out in small groups (Arends, 2012). This model will make children explain and identify problems that have been designed (Marra, Jonassen, Palmer, &Luft, 2014; Ningsih, Rahman, & Muhammad, 2019; Arend, 2012), which is also a set of learning that uses problems as a focus in developing problem solving skills, materials and self-regulation owned by children (Kauchank&Eggen, 2012). The series of activities carried out in this learning model resulted in obtaining a maximum understanding of achievement than the learning model that requires children to memorize learning material making this learning model suitable to be applied in enhancing the skills and abilities that children have.

Conclusion. From the results of the study that aims to determine the effect caused by the problem-based learning model on the ability to remember children aged 4-5 years in kindergarten, a significant effect occurs at the posttest stage of the study. Learning that gives children the opportunity needed in education at this time, where their skills are stimulated through the activities presented in the problem-based learning model. Not only children, but teachers as facilitators must also have knowledge and understanding of problem-based learning models and the abilities and needs of children in their English vocabulary. This is done so that the teacher can design problems and activities that are suitable for what the child needs. The provision of media on this model is required for the concrete objects of the child, therefore the creativity of the teacher in choosing learning media also determines the influence caused in the ability to remember vocabulary child English. The research model of problem-based learning in research with a larger sample is needed in exploring the application of the problem-based learning model in all learners' abilities.

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АҒЫЛШЫН ТІЛІНІҢ МЕКТЕПКЕ ДЕЙІНГІ ЛЕКСИКАСЫНА ПРОБЛЕМАЛЫҚ ОҚЫТУ ҮЛГІЛЕРІНІҢ ӘСЕРІ

Аннотация. Ерте балалық шақ – бұл адам өмірінің маңызды кезеңі, білім беру әлемінде оқыту моделін таңдау балаларды белсенді студенттерге айналдырады. Алайда балалардың белсенді қатысуы Индонезиядағы оқыту мен оқу іс-әрекетінде әлі де ескерілуі керек мәселе. Квази-эксперименталды зерттеу 4-5 жас аралығындағы 60 баланың көмегімен проблемалық оқыту үлгісінің балабақшадағы ағылшын тілінің сөздік құрамын

тану қабілетіне әсер етті. Блумның таксономиялық ойлау тұжырымдамасы – бұл балалардың ағылшын тіліндегі сөздерді есте сақтау қабілетіне сілтеме, мысалы, ағылшын тілін қолдану арқылы суреттерді атап өту, анықтау, көрсету және жұптастыру. Оқу үлгісіне келтірілген әсерлерді салыстыру нәтижелерін алу үшін 30 баланың бақылау сыныбы мен эксперименталды сыныпты 30 баланың санымен салыстыру жүргізілді. Зерттеу нәтижелері тәжірибелік сабақта ағылшын тілінің сөздік қорын есте сақтау қабілеті зерттеуді бақылау класымен салыстырғанда едәуір артқандығын көрсетті. Зерттеулерге байланысты нәтижелерде айырмашылықтар пайда болуы мүмкін, сондықтан зерттеудің проблемалық моделін есте сақтау қабілетіне қолдану нәтижесінде туындаған әсерлердің дәлдігін алу үшін зерттеудің үлкен көлемін қолдану арқылы қосымша зерттеу қажет. Балабақшадағы және жоғары білім деңгейіндегі ағылшын тілінің лексикасы. Одан әрі Блум таксономикасының жоғары ойлау қабілеті тұжырымдамасындағы кезеңдерге бейімделеді.

Проблемалық оқыту үлгісінің балабақшадағы 4-5 жас аралығындағы балалардың есте сақтау қабілетіне тигізетін әсерін анықтауға бағытталған зерттеу нәтижелері зерттеудің кейінгі кезеңінде айтарлықтай нәтиже береді. Қазіргі уақытта балаларға білім алуға қажетті мүмкіндік беретін оқыту, олардың проблемалары негізінде оқыту моделінде ұсынылған іс-әрекеттер арқылы олардың дағдылары ынталандырылады. Тек балалар ғана емес, сонымен бірге фасилитаторлар ретінде мұғалімдерде проблемалық оқыту модельдері туралы білуге және олардың ағылшын тіліндегі сөздік қорындағы балалардың қабілеттерімен қажеттіліктеріне ие болуы керек. Мұны мұғалім баланың қажеттіліктеріне сәйкес келетін мәселелер мен іс-әрекеттерді орындай алатындай етіп жасайды. Осы модель бойынша ақпарат құралдарын беру баланың нақты объектілері үшін қажет, сондықтан мұғалімнің оқу құралдарын таңдаудағы шығармашылығы баланың ағылшын тілінің сөздік қорын есте сақтау қабілетіне әсер етуді де анықтайды. Зерттеудегі проблемалық оқытудың үлгісі барлық оқушылардың қабілеттерінде проблемалық-оқыту моделін қолдануды зерттеу үшін қажет.

Түйін сөздер: Мәселеге негізделген оқыту моделі, ағылшын тілінің лексикасын есте сақтау қабілеті, Блум таксономиясы туралы түсінік.

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ВЛИЯНИЕ ПРОБЛЕМНЫХ МОДЕЛЕЙ ОБУЧЕНИЯ НА ДОШКОЛЬНУЮ ЛЕКСИКУ АНГЛИЙСКОГО ЯЗЫКА

Аннотация. Ранее детство является фундаментальным периодом жизни человека, выбор моделей обучения в образовании делает детей активными учениками. Тем не менее, активное участие детей - это то, что должно учитываться в преподавании и обучении в Индонезии. Было проведено квазиэкспериментальное исследование в детском саду влияния проблемной модели обучения на способность распознавать словарный запас английского языка с участием 60 детей в возрасте 4-5 лет. В концепции таксономического мышления Блума отмечается способность детей запоминать английский словарь, такие как упоминание, идентификация, показ и соединение картинок с использованием английского языка. Было сделано сравнение результатов эффектов, генерируемых на модели обучения между контрольным классом из 30 детей и экспериментальным классом из 30 детей. Результаты показали, что способность запоминать словарный запас английского языка в экспериментальном классе при применении проблемной модели обучения значительно возросла по сравнению с контрольным классом исследования. Различия в результатах, вероятно, возникли из-за вмешательства, по этой причине требуется дальнейшее изучение с использованием большей выборки исследования для более точного эффекта от применения проблемной модели обучения к способности запоминать английский словарь в детском саду и на более высоких уровнях обучения. Далее они адаптированы к этапам концепции высших навыков мышления Таксономии Блума.

Исходя из результатов исследования, целью которого является определение влияния, вызванного моделью проблемного обучения, на способность запоминать детей в возрасте 4-5 лет в детском саду, значительный эффект наблюдается на посттестовой стадии исследования. Это обучение дает детям возможность стимулирования их навыков посредством действий, представленных в модели проблемного обучения. Не только дети, но и учителя в качестве помощников должны также обладать знаниями и пониманием проблемных моделей обучения, а также способностей и потребностей детей в английском словаре. Это делается для того, чтобы учитель мог разработать нужные ребенку задачи и задания.

Предоставление мультимедиа по этой модели требуется для конкретных потребностей ребенка, поэтому креативность учителя в выборе средств обучения также определяет влияние, вызываемое умением запоминать словарный запас ребенка. Исследовательская модель проблемно-ориентированного обучения в исследованиях с более обширной выборкой необходима для изучения возможности применения этой модели обучения в способностях всех учащихся.

Ключевые слова: проблемно-ориентированная модель обучения, способность запоминать английский словарь, концепция таксономического мышления Блума.

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IMPORTANCE OF SPIRITUAL WORLDVIEW FOR FUTURE TEACHERS

Abstract. The importance of a spiritual worldview for future teachers was relevant at all stages of the development of society. All the qualities that characterize the spiritual worldview of teachers are changed, depending on the social structure of the state and its ideology, religious and secular views, and the level of development of pedagogical science. The spiritual worldview of teachers is one of the most important characteristics of the pedagogical preparation of the individual. The formation and development of the spiritual worldview, is interconnected from the moral choice of the ideal of good and humanistic point of view. The work discusses the pedagogical problems of the spiritual worldview of future teachers. The article defines the concept of “Spiritual worldview”. The aim of this work is to generalize and systematize the problem, to determine the role and place of the spiritual worldview of future teachers. This study discusses some of the findings of scientists on the worldview and spirituality in education to achieve the goal. There were discussed the fundamental principles of development and the existing scientific work on the problem of the spiritual worldview. The presented characteristic of important aspects of the spiritual worldview of future teachers for universities, future teachers, schools and students. It is argued that a deep study of the spiritual worldview will make the importance clear for future teachers. The methodological basis of the study is the scientific works of domestic, Russian and foreign researchers, their main provisions for the study of spirituality and worldview. In the work are used the methods of system analysis, comparison of foreign, domestic and Russian works on the problem of the spiritual worldview of future teachers in modern society.

Key words: worldview; spirituality; education; society; teacher.

Introduction. The changes in education in recent years require the teacher to be reconsidered. The main task of the teacher is to conduct the subject at the level, develop and implement academic disciplines. In addition, teachers have the task of encouraging students to learn, patriotic education, and making good intentions in learning. First of all, the primary goal of educating a person and a citizen is to create a spiritual worldview for students. Formation of a spiritual world is characteristic of a teacher who is a professional, a master of his profession, and a person who has a spiritual worldview. That is why the authors believe that the issue of the spiritual vision of future teachers is relevant.

The problem of the spiritual worldview of future teachers is not only a social problem, but also a pedagogical problems. It is required that the teacher acquire moral qualities and spiritual development because of many changes in the world currently. There are different views on the concept of “spiritual worldview” in the modern scientific theory. It is difficult to find deep, fundamental, formulated work from the scientific literature, although major and important work is being done in this direction. There is less research on the spiritual worldview of future teachers, its genesis and history. Paridinova published a joint study on the basic concepts, essence and problems of development of the spiritual worldview of future teachers [1]. In addition, she co-authored explored the problem of spirituality in the context of the concept of spiritual security in science. Authors studying the role of knowledge in ensuring human security and on issues of human spiritual intelligence [2]. Therefore, the authors aim at a wider analysis of the topic due to the lack of research on the problem. The authors pay attention to such things as worldview and spirituality. In addition, research by a domestic scientist Nassimov, who considers the problems of political thought in

the Medieval East and the European Middle Ages [3], the Renaissance and the political ideas of the European Enlightenment [4], gives some ideas for this study.

Methods. It is argued that a deep study of the spiritual worldview will make the importance clear for future teachers. The methodological basis of the study is the scientific works of researchers, their main provisions for the study of spirituality and worldview. The methods of system analysis, comparison of foreign and Russian works on the problem of the spiritual worldview of future teachers in modern society are used in the work.

Results and Discussion. There is a lack of scientific literature on the problems as the authors have already noted. The majority of the research is related to religious education and attitudes [5-9]. In his work Wilson [10] explains that the meaning of education is related to religious initiatives. Education indicates that the curriculum is based on the teacher's worldview. However, the pedagogical and psychological aspects of the problem are topical taking into account the fact that the spiritual worldview of future teachers is not formed solely by religious views.

It is possible to find a comprehensive study of the concept of worldview among the Russian scientists on pedagogical sciences. For example, in her article Belyankova [11] argues that the need to prepare students in the field of national relations leads to the fact that scientific research on this issue leads to a change in the attitude of the people, not only to the national relations. Krushelnitskaya and Tret'yakova [12] believe that the student's subjective significance of increasing the level of his / her cultural identity increases, and his / her own personal vision is formed at the university in the course of study. As defined in Edneral and Safieva's [13] writings, the sequence of practical lessons and their relationship with the theoretical knowledge allows them to develop self-esteem, social competence and self-confidence in professional activities. Naumtsev and Lebedev's [14] interest in the research is that they developed a methodological framework for the development of nature-compatible worldview and enhancing the level of environmental culture of the population. Bezkodov, Vologin and Shilova [15] describe the important role of philosophy in the study and perception of the personality philosophy. Philosophy as a subject of education not only promotes personal development of pupils, but also promotes a level of self-realization through world-wide self-knowledge.

According to Nurymova, Yessentay, Khalitova, Jumabayev, Zainal [16,131]: "The spiritual sphere of society is that sphere of human activity and society, which embraces the wealth of human feelings and achievements of the mind, combines both the assimilation of accumulated spiritual values and the creation of new ones. At the same time, the spiritual life of society encompasses various forms and levels of social consciousness: moral, scientific, aesthetic, religious consciousness. Accordingly, its elements are morality, science, art, religion and law. In the spiritual sphere of society, various cultural, artistic, and moral needs of people appear and become realized. At the same time, many ideas that are created in it are intended for practical use. For example, information technologies and computer programs are created due to mental work, that is, in the spiritual sphere, but they are consumed in the economy, political, social and other fields. From this perspective it seems to us that development of any country in high-tech, highly industrial economy requires the unity of the economic and socio-spiritual spheres of society".

Atayeva, Ciptaningrum, Hidayah, Kassymova, Dossayeva, Akmal where are cultivating junior high school students' critical thinking skills by using a short-video in English language classroom, they write [17, 59]: "Learners with critical thinking skills are capable of thinking critically and creatively; capable of making decisions and solving problems; capable of using their thinking skills, and of understanding language or its contents; capable of treating thinking skills as lifelong learning; and finally they are intellectually, physically, emotionally and spiritually wellbalanced".

The article where is investigated the influence of religion on the formation of tolerated consciousness and social consent Saporov, Tashkyn said [18, 120]: "Religion has the different spiritual and moral ideals and cultural traditions in the Republic of Kazakhstan. The power of religious ethics is actively used to form the moral and spiritual world of the young generation".

Komarova [19] demonstrates that the level of information world does not depend on the number of disciplines responsible for informational training. It was written in her work about comparative analysis of the level of formation of the informational worldview in the different directions of students preparation of the pedagogical university. The author sees that the process of development of the student's informational worldview is continuous and will continue throughout the study period.

Therefore, following the concept of human as spiritual alive body, human thinking is spiritual activity of our brain – brainwork. Today we accept that thinking means processing of information what is important for management of human body life [20].

Khutornaya and Barkalova [21] study the conclusions on the integrated concept of worldview. The notion of worldview is analyzed as the highest level of person's self-awareness and the emotionally colored attitude to the environment. The following authors point out that disciplines of spiritual and moral orientation have a positive effect on pupils and their parents on the axiological foundations of the worldview [22].

Ivanov [23] proves the necessity of the complex approach to development of ecocentric ecological consciousness and formation of noospheric worldviews among school students on the basis of the philosophical and psychological-pedagogical analysis of concept “view of the world” and estimations of prospects of development of a human civilisation. In addition, it was presented the structure of the view of the world, defined the principles including moral basis and ethical standards which are required to be mastered by pupils of educational institutions. In addition, under the threat of the ecology catastrophe, concern for physical and spiritual health care is felt. All our relations with nature turn out to be problematic. The establishment of a harmonious correlation between nature and society becomes an important task [24].

In her research Androsova [25] considers approaches to the formation of the professional and pedagogical worldview of students, future teachers. She identified the following approaches to solve the tasks: value-semantic, systemic, personality-oriented and contextual. According to the authors, the above approaches make it possible to form a professional-pedagogical system of values of students, future teachers, which (a system of values), being a system-forming component of the professional worldview of a future teacher, in turn, will allow to form this system.

Edlin [26] considers the role of teachers as the initiator of spirituality strengthens the integration of teachers and students' worldview taking into account the importance of teacher's role as a mentor. In this case, the teacher becomes a model person and the ideal source of knowledge and wisdom.

It is necessary to study the subject matter in depth in examining the role of spirituality in management practice and pedagogy. Spirituality is related to the understanding that influences on it. Different metaphysical and epistemological assumptions form predominantly world-wide priorities. That is why every viewer understands spirituality differently [27].

Different scientific directions interpret the phenomenon of spirituality ambiguously. The concepts of “spirit” and “spirituality” are ancient by their origin and have rich traditions in history, science and culture. The scientific interpretation of these phenomena has changed since the 1990s of the 20th century. These categories were deprived of their independent status due to the high degree of emphasis of Russian science on secular humanism and scientific methodology in the understanding of human development during the existence of the USSR [28, 147]. In addition, Sagardinova [29] analyzes the genesis of the phenomenon of spirituality in the philosophical and pedagogical aspects of upbringing in another project. She relies on the concepts of Plato, I.A. Ilyin, B.T. Likhachev, E.I. Rerikh, Sh.A. Amonashvili and N.M. Romanenko for argumentation of the problem.

Conti [30] describes the relationship between spirituality and pedagogy by offering a deeper understanding of holistic education in the study. The following conclusions were made in the study: (1) Holistic education emphasizes the idea of connectedness; (2) Participants' spiritual wisdom is used as source of insight in pedagogy; (3) Participants demonstrate a holistic view of education that is grounded in their own holistic growth; (4) Participants view teaching as both sacred and a calling; (5) Participants believe that much of their success is dependent on their own authenticity as whole persons. Consequently, wisdom is a kind of creativity that is formed in the work of students and in individual pedagogical activities. The authors believe that the education of the future teacher will become a wise educational process if the knowledge gained is wise and that the wisdom cannot be demonstrated by the teacher himself.

Henderson, Deckard and DeWitt [31] are trying to determine the impact of teacher's worldview on students'. The researchers have concluded that the teacher's views play a crucial role in the development of their students' worldview. In the authors' opinion, the development of the spiritual vision of future teachers not only demonstrates their high professional efficiency, but also creates the principles of personal-oriented teaching in pedagogical interaction with schoolchildren.

Danesh [32] believes that all of humanity is defined by worldview, sincerity, human nature, purpose of life, and human relationships. The researcher analyzes four prerequisites of peace education: unity-based worldview, culture of healing, culture of peace and peace-oriented curriculum. Thus, the spiritual paradigm of education promotes the formation of spiritual foundations and the spiritual values of future teachers in teaching and learning. Formation of spiritual enlightenment at higher education institution not only enhances the creative potential of students, but also influences the moral qualities of future professional and social activities.

Miedema [33] describes the strength of a transformative pedagogical paradigm that has been transformed in the work of studying the ways to move from religious knowledge to world-wide education. The author believes that the purpose of education in transformative paradigm is to form a personality. That is, educational institutions help the students in socialization and individuation processes and form a competent society. Instead of the term “religious worldview”, he uses the concept of “worldview”. In the authors’ view, this worldly education is the foundation of spiritual enlightenment and the basis of future self-determination of future teachers.

Natsis [34] pays special attention to the importance of studying spirituality in the state education through political discourse. The teacher takes into account the spiritual, context and worldview issues that arise from the inner spiritual perception of students. The phenomenological perspective offers a study of spiritual life experiences. Indeed, the teacher has a special mission of keeping and spreading the spiritual and life experience of mankind. The future teacher must understand this mission.

Conclusion. According to the statements above, spiritual worldview is a phenomenon based on the knowledge of human beings from the world’s viewpoint, the educational institutions of all levels and the environment. Therefore, the higher education institution should be able to demonstrate to the student what he already knows and that his spiritual worldview should educate a broader future teacher. The spiritual vision of teachers in future depends on his personal qualities and moral responsibility. Personal qualities are reflected in the inner world of man. Its stability is manifested by the spiritual state, knowledge, ability and flexibility of the individual. In turn, the author thinks that such a person will be fully aware of the moral responsibility of the society.

In general, the author thinks that the category of “Spiritual worldview” is important for society and its institutions. In the context of this problem, the author believes that future teachers are important aspects of the spiritual worldview of higher education, future teachers, secondary schools and pupils:

For higher education: Prepare future teachers who will take into account moral, intellectual, volunteering, communicative skills, and educate future teachers who can answer questions such as “Who am I?” and “Who are we?”. He trains future teachers who have cognitive, value-normative, emotional-voluntary, practical components of worldview. He teaches methodological, theoretical and worldview axiological connections of social and human sciences, etc.

For a future teacher: The students’ views and perspectives expand their thinking. Students can behave in the classroom in a manner and culture. They understand the environment and society as a whole. They feel the practical experience of the modern teacher. They are formed as professionals who can combine science with education as well and etc.

For school: Students who have a spiritual worldview on life will be taught. There will be more prospective students. Pupils who are not adapted to the values of the society will be formed. Learners who are susceptible to fraud and truthfulness will be raised. Crime and suicide among high school students will be diminished and etc.

For pupils: Child abuse will be prohibited. He understands moral values and creates moral views. He will have moral. He will understand the meaning of environment, nature, and humanity. The class will create a favorable moral-psychological climate and so on.

For these reasons, the author believes that the pedagogical goals of the future development of the spiritual worldview are as follows: understanding the world, the environment, others, and yourself; lack of personal thoughts and conflicts of interest; real acceptance of the situation, not giving in to various fantasies; constant monitoring of current situation, personal thoughts and feelings; constant preservation of spiritual harmony with psychic phenomena; trust in mysterious forces and awareness of the laws of nature.

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БОЛАШАҚ МҰҒАЛІМДЕРГЕ РУХАНИ ДҮНИЕТАНЫМНЫҢ МАҢЫЗДЫЛЫҒЫ

Аннотация. Дүниетаным адамның рухани болмысының қажетті компоненті болып табылады. Сонымен бірге дүниетаным адам болмысының рухани бөлігі ретінде адамның шығармашылық қызметі мен оның танымын айқындайды. Сондықтан адамның рухани әлемінің негізі дүниетаным болып саналады. Болашақ мұғалімдер үшін рухани дүниетанымның маңыздылығы қоғам дамуының барлық салаларында өзекті болып саналады. Мұғалімдердің рухани дүниетанымын сипаттайтын барлық сапалық белгілер мемлекеттің әлеуметтік құрылысы мен оның идеологиясы, діни және зайырлы көзқарастары, педагогикалық ғылымның дамуы деңгейіне сәйкес өзгеріп отырды. Мұғалімдердің рухани дүниетанымы тұлғаның педагогикалық дайындығының маңызды сипаттамалық белгісі болып табылады. Рухани дүниетанымның қалыптасуы мен дамуы жақсылық пен гуманизмнің моральды таңдауы, болашақ мұғалімдердің адамгершілік тұрғысынан дамуы мәселелерімен өзара байланысты. Білім саласындағы соңғы жылдардағы өзгерістер мұғалім тұлғасын қайта қарауды талап етіп отыр. Жүргізетін пәнін өз деңгейінде өткізу, оқу пәндері бағдарламаларын әзірлеу мен жүзеге асыру – мұғалімнің басты міндеті. Сонымен қатар мұғалімдердің шәкірттерді оқуға ынталандыруды қалыптастыру, патриотизмге тәрбиелеу, білім алу барысында ізгі ниетті іс-әрекеттер құру сынды міндеттері бар. Тұлға мен азаматты тәрбиелеуді басты міндет етіп қойып отырған білім беруге, ең алдымен, оқушылардың бойында рухани дүниетанымды қалыптастыру қажет. Рухани дүниетанымды қалыптастыру тек кәсіби, өз ісінің шебері, рухани дүниетанымы қалыптасқан мұғалімге тән. Сондықтан болашақ мұғалімдердің рухани дүниетанымын қалыптастыру мәселесі өзекті деп ойлаймыз.

Болашақ мұғалімдердің рухани дүниетанымы – мәселесі тек әлеуметтік мәселе ғана емес, ол педагогикалық мәселе. Қазіргі заманда туындап отырған көптеген өзгерістер мұғалімнің адамгершілік қасиеттердің иеленуін, рухани дамуын талап етіп отыр. Заманауи ғылыми теорияда «Рухани дүниетаным» ұғымына байланысты түрлі көзқарастар қалыптасқан. Осы бағытта үлкен және маңызды жұмыстар жүргізілгенімен, ғылыми әдебиеттерден терең, фундаменталды, тұжырымдалған жұмыстар табу қиынға соғады. Болашақ мұғалімдердің рухани дүниетанымы, оның генезисі мен тарихына арналған зерттеулер аз жүргізілген. Жоғарыда айтылған пікірлерге сәйкес, рухани дүниетаным – адамның дүниеге көзқарасынан туындайтын, барлық деңгейдегі білім беру мекемелері мен қоршаған орта ықпалында қалыптасқан білім негіздеріне сүйенетін құбылыс. Сондықтан жоғары оқу орындары барлығын білетін студенттен бұрын, сол білгенін тәжірибе жүзінде көрсете алатын, қолынан іс келетін, рухани дүниетанымы кең болашақ мұғалімді тәрбиелеуге тиіс. Болашақ мұғалімдердің рухани дүниетанымы оның тұлғалық қасиеттері мен адамгершілік жауапкершілігімен байланысты. Тұлғалық қасиеттер адамның ішкі дүниесіндегі ерекшеліктерде көрініс табады. Оның тұрақты болуы тұлғаның рухани ахуалы, білімі, қабілеті және икемділігінен көрінеді. Өз кезегінде, мұндай тұлға қоғамдағы адамгершілік жауапкершілігін толықтай сезінеді деп ойлаймыз.

Жұмыста болашақ мұғалімдердің рухани дүниетанымының педагогикалық мәселелері қарастырылады. Мақалада «Рухани дүниетаным» түсінігіне анықтама беріледі. Берілген жұмыстың мақсатына аталмыш мәселені жиынтықтау мен жүйелендіру, болашақ мұғалімдердің рухани дүниетанымының рөлі мен орнын анықтау жатады. Мақсатқа жету үшін берілген зерттеуде педагогикадағы дүниетаным мен руханилық мәселелеріне байланысты ғалымдардың кейбір қорытындылары қарастырылады. Рухани дүниетаным мәселесіне байланысты дамытудың негізгі қағидалары мен қолданыстағы ғылыми жұмыстар талданады. Болашақ мұғалімдердің рухани дүниетанымының жоғары оқу орындары, болашақ мұғалімдер, мектеп пен оқушылар үшін маңызды сипаттамалық жақтары ұсынылды. Рухани дүниетанымды терең зерттеу болашақ мұғалімдер үшін маңызды екендігі бекітіледі. Зерттеудің әдістемелік негізін отандық, ресейлік және шетелдік зерттеушілердің ғылыми еңбектері, олардың руханилық пен дүниетанымды зерттеудегі негізгі ұсыныстары құрайды. Жұмыста жүйелік талдаудың әдістері қолданылып, заманауи қоғамдағы болашақ мұғалімдердің рухани дүниетанымы мәселесіне байланысты шетелдік, отандық және ресейлік жұмыстар салыстырылды.

Түйін сөздер: дүниетаным; руханилық; білім; қоғам; мұғалім.

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ВАЖНОСТЬ ДУХОВНОГО МИРОВОЗЗРЕНИЯ ДЛЯ БУДУЩИХ УЧИТЕЛЕЙ

Аннотация. Мироззрение является необходимым компонентом духовного бытия человека. Кроме того, мироззрение как духовная часть человеческого бытия определяет творческую деятельность человека и его познание. Поэтому основой духовного мира человека является мироззрение. Важность духовного мироззрения для будущих учителей являлась актуальной на всех этапах развития общества. Все качества, характеризующие духовное мироззрение учителей, менялись в зависимости от социального строя государства и ее идеологии, религиозных и светских взглядов, уровня развития педагогической науки. Духовное мироззрение учителей является одной из важнейших характеристик педагогической подготовки личности. Становление и развитие духовного мироззрения взаимосвязано с проблемами морального выбора идеала добра и гуманизма, нравственным развитием будущих учителей. Изменения, которые произошли за последние годы в сфере образования, требуют пересмотра личности учителя. Основной задачей учителя является изучение предмета, разработка и реализация программ учебных дисциплин. Кроме того, перед учителями стоят задачи формирования мотивации учащихся к обучению, воспитания патриотизма, создания доброжелательных действий при получении образования. Для образования, ставшего главной задачей воспитания личности и гражданина, необходимо, прежде всего, формировать у учащихся духовное мироззрение. Формирование духовного мироззрения характерно только для педагога, который является профессионалом, мастером своего дела, у которого сформировалось духовное мироззрение. Поэтому мы считаем, что проблема формирования духовного мироззрения будущих учителей очень актуальна.

Проблема духовного мироззрения будущих учителей – это не только социальная, но и педагогическая проблема. В связи со многими изменениями, происходящими в мире в настоящее время, требуется, чтобы учитель приобрел нравственные качества и духовное развитие. В современной научной теории существуют различные взгляды на понятие «Духовное мироззрение». Хотя в этом направлении ведутся большие и важные исследования, но в научной литературе трудно найти глубокие, фундаментальные работы. Меньше исследований посвящено духовному мироззрению будущих учителей, его генезису и истории. Согласно приведенным выше мнениям, духовное мироззрение – это явление, основанное на взглядах людей к миру, которое формируется в образовательных учреждениях всех уровней окружающей среды. Поэтому высшие учебные заведения должны воспитывать будущего учителя с широким духовным мироззрением, умеющим на практике демонстрировать это знание. Духовное мироззрение будущего учителя зависит от его личных качеств и моральной ответственности. Личные качества отражаются во внутреннем мире человека. Его стабильность проявляется в духовном состоянии, знаниях, способностях и гибкости личности. В свою очередь, авторы считают, что каждая личность будет в полной мере осознавать моральную ответственность общества.

В работе рассматриваются педагогические проблемы духовного мироззрения будущих учителей. В статье дано определение понятию «Духовное мироззрение». Целью настоящей работы являются обобщение и систематизирование данной проблемы, определение роли и места духовного мироззрения будущих учителей. Для достижения цели в данном исследовании рассматриваются некоторые выводы ученых по проблеме мироззрения и духовности в образовании. Обсуждаются основополагающие принципы развития и существующие научные работы по проблеме духовного мироззрения. Представлена характеристика важных сторон духовного мироззрения будущих учителей для вузов, будущих учителей, школ и учеников. Утверждается, что глубокое изучение духовного мироззрения позволит понять важность для будущих учителей. Методологическую основу исследования составляют научные труды отечественных, российских и зарубежных исследователей, их основные положения по изучению духовности и мироззрения. В работе использованы методы системного анализа, сопоставления зарубежных, отечественных и российских работ по проблеме духовного мироззрения будущих учителей в современном обществе.

Ключевые слова: мироззрение; духовность; образование; общество; учитель.

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THE EFFECTIVENESS OF THE USE OF CRITICAL THINKING TECHNOLOGY

Abstract. The article is devoted to the effectiveness of the use of critical thinking technology in the formation of the competence of future professionals.

Future professionals must be able to analyze the ever-changing socio-economic processes, make and implement decisions appropriate to *the conditions of market competition*.

The process of reforming the education system of the Republic of Kazakhstan is living in a new information technology era, associated with improving its content and quality, improving the *National Model* of education, the introduction of pedagogical technologies. Therefore, the training of specialists who have mastered new technologies is one of the *most pressing problems* today.

In managing the educational process, the implementation of the professional and pedagogical culture of teachers and specialists requires that they be directed to special pedagogical, spiritual, highly humane, valuable goals. Each member of the teaching staff is a special organizer and implementer in a particular area of the educational process. Being a key figure in the educational process, if a specialist does not show his experience, knowledge, skills in fulfilling spiritual and cognitive needs, does not focus all his efforts on high goals, does not activate the organization of classes with intelligence, professionalism, everything will remain the same.

Therefore, the introduction of critical thinking technology into the vocational training of future specialists through psychological reflective analysis and the identification of theoretical foundations justified in pedagogical practice makes the process of organizing education in a higher educational institution more effective. *As a result, a future specialist who has mastered the technology of critical thinking:*

- be able to demonstrate the ability to professionally use critical thinking technology in his work;
- be able to discuss the characteristic features of pedagogy and the shortcomings of teaching aids;
- must form teaching methods based on critical thinking.

Key words: Critical Thinking Technology, Higher educational institution, Integration. Spiritual, Cognitive.

Modern higher education provides several systems of meeting the needs of society.

That is, the creation of scientific training and production complexes as a form of integration of science, education and production;

- humanization of education; setting high standards for teacher training, raising the foundations of new pedagogical technologies in the training of future specialists in higher education and raising their professional level.

This process is reflected in different countries of the world at different levels, depending on their national characteristics, economic situation, traditions of the education system.

The effectiveness of the use of educational technology in higher education depends on the ability of the future specialist to properly organize the professional activity. Extensive research work has been done in various fields, which covers various aspects of pedagogical activity.

Reforms in the education system and the current school's focus on personality-oriented learning place new demands on the training of future professionals. The current stage of development of the education system is associated with the search for ways to move to a new paradigm, that is, the achievement of a new goal of education.

In managing the educational process, the implementation of the professional and pedagogical culture of teachers and specialists requires that they be directed to special pedagogical, spiritual, highly humane, valuable goals. Each member of the teaching staff is a special organizer and implementer in a particular area of the educational process. Being a key figure in the educational process, if a specialist does not show his experience, knowledge, skills in fulfilling spiritual and cognitive needs, does not focus all his efforts on high goals, does not activate the organization of classes with intelligence, professionalism, everything will remain the same.

Therefore, the introduction of critical thinking technology into the vocational training of future specialists through psychological reflective analysis and the identification of theoretical foundations justified in pedagogical practice makes the process of organizing education in a higher educational institution more effective.

Current training processes require updated qualitative changes in the training of highly qualified specialists. In order to improve the quality of higher education, it is important for students to improve their knowledge in different areas and using new methods.

The education system should be focused on the formation of a new generation of qualified professionals who are responsible for their work in accordance with the goals of society, who have a worldview culture for creative thinking, and who have a lot of goodness.

The formation of technology of professional critical thinking in the process of vocational training is not only a goal, but also a prerequisite for the effectiveness of the process. Mastering the educational program depends on what the student is like as a person.

One of the new directions of the education system in the training of future professionals is the cultural formation of professional activity of future professionals in accordance with the peculiarities of the technology of professional critical thinking.

By linking the processes of teaching and education in higher education, it is important to form in students a scientific worldview, moral, political qualities, diligence and related professional business skills, as well as professional critical thinking.

Also, the formation of the technology of professional critical thinking requires communication in society and modernity. This is the main pedagogical task of every teacher, pedagogue.

The importance of vocational training of future specialists is characterized by the requirements for the personality and activity of the specialist. This increases the need for a general and professional culture in the pedagogical process of the university, a culture of self-control in creative communication.

At present, to work under the conditions of market relations requires the training of highly specialized professionals. The rapid development of modern social changes requires the training of highly qualified specialists in accordance with modern requirements.

Future professionals must be able to analyze the ever-changing socio-economic processes, make and implement decisions appropriate to the conditions of market competition.

The process of reforming the education system of the Republic of Kazakhstan is living in a new information technology era, associated with improving its content and quality, improving the National Model of education, the introduction of pedagogical technologies. Therefore, the training of specialists who have mastered new technologies is one of the most pressing problems today.

On the way to the transition to market relations in the current situation, issues such as professional training, the formation of professionalism of teachers, their impact, quality, place in society, their role in the education system are rising.

To carry out this training, future professionals *must have professional critical thinking* on the program to meet the requirements.

The use of critical thinking technology is a mandatory component in improving the vocational training of future professionals in the educational process.

Therefore, in order to train professionals in any level of education, it is important to form critical thinking in their future careers.

Training with the use of professional critical thinking, the creation, development and implementation of the necessary conditions for their improvement, the search for ways to connect new areas by the traditional method requires solving a number of psychological, pedagogical, educational and methodological issues. The following *directions* can be distinguished:

- the creation of a single scientific and methodological complex to solve the problem of introducing the use of critical thinking technology into the educational process;
- development of the methodologies for the formation of critical thinking technology in practice;
- improving the training of future professionals on the basis of critical thinking technology and the introduction of new methodologies in the educational process;
- development of sources of information resources, logistics in higher education institutions to improve vocational training;
- necessary methodological support, search, development and creation.
- as a prerequisite for the development of knowledge and psychological and pedagogical skills of future specialists needed to use new technologies - teaching students the technology of critical thinking;
- scientifically and theoretically substantiate the content, structure and level of training of future specialists for the use of critical thinking technology in the educational process.

In this regard, summing up the results of world pedagogical research, which examines ways to improve the skills of future specialists, the scientist Sh. Taubaeva says: "Professional interest arises from the need to be able to navigate pedagogical activities, and such high professionalism is realized only through the desire of the teacher himself". [1].

In his works, K.K. Shalgynbaeva shows uniform methodological requirements for teachers.

- raising the level of pedagogical and psychological education;
- to study and master the latest pedagogical technologies in teaching and education, methodological approaches and the ability to use it in their professional work;
- the achievement of the formation of positive pedagogical professional attitudes and values and their sustainable development;
- motivation to improve their knowledge, engage in creative work;
- creation of necessary conditions, provision of information conditions of teachers;
- be able to master and apply modern methods of monitoring and diagnosing student achievement;
- aspiration, interest, motivation and comprehensive support of author's programs, courses, tools, article search;
- the introduction of the scientific organization of labor in the work of pedagogues in the daily work of every teacher [2].

Technological progress and the increase in the amount of scientific information, the reorganization of the content of school education and the principles of action in the educational process leads to an inevitable increase in the requirements for professional qualifications and personality of the teacher, personal orientation of the whole pedagogical process.

Today, practice itself proves the effectiveness of the use of new pedagogical methods to improve the educational process in any educational institution. This in itself creates the need for a theoretical justification for this problem.

S.G. Gubasheva and A.Zh. Otarbay say that "the formation of the individual is a continuous and complex process" [3]. The conclusions of L.S. Vygotsky, who deeply studied the nature of the human soul, the so-called cultural-historical "immediate zone of child development" of human psychology, deserve special mention.

His theory, which occupies a special place in the science of psychology, is the level of the child's natural development, his upbringing, his education and the formation of his worldview. Such a requirement develops and improves the child's psyche, the development of his soul, the level of intelligence [4]. Given that the improvement of teaching methods is a key issue today, pedagogical research emphasizes the need to master new types and methods of teaching that increase the effectiveness of teaching.

However, today the introduction of new methodology in the educational process, including the formation of professional pedagogical skills - is one of the most difficult processes. S.Babaev: "... emphasizes the psychological qualities of teachers, which play a very important role in pedagogical activity: education (erudition), determination, pedagogical thinking, intuition and improvisation. At the same time, it is possible to note additional professional business qualities of the teacher in teaching students. They are: pedagogical observation, optimism, ingenuity, foresight". "One-sided exaggeration should be avoided in the use of some new teaching methods" [5].

Even when teaching each subject, it is necessary to improve the teaching methodology, requiring unique approaches and methods.

In accordance with the general goals and objectives of pedagogical mastery, the content and volume of educational materials, the level of preparedness of students, the structure of the lesson and the constant replenishment of teaching methods should be a process for the teacher or educator.

It is necessary to pay individual attention to each student, using the teaching methodology in accordance with its goals and objectives, the characteristics of tastes in cognitive activity. This is the goal of professional pedagogical skills. The formation of a teacher's practice in a creative way, his masterful lectures in combination with pedagogical skills - a requirement of critical thinking technology.

Critical thinking technology, of course, is the basis for effective teaching in the educational process.

However, in education, when forming the technology of professional critical thinking, it is necessary first of all to determine its purpose. This is because in the presentation of the teaching materials, it is not possible to determine the purpose of the additional material that must be kept in mind, that is, its purpose, which focuses on its main idea.

Methodology is a key component of didactics in teaching. This is because the educational process is the unity of its purpose and content, methodology and types of organization. Our scientists gave their own different definitions to teaching methods. A brief pedagogical-psychological dictionary defines a "method" - as a way to achieve a goal, an approach, an action disciplined in a certain way.

The method is derived from the Greek word "metodos". The concept of method means the way to achieve a certain truth, reality, purpose.

Teaching methods are a way for teachers and students to work together to educate and develop students. In particular, knowledge, business skills, technology of professional critical thinking of students will be formed and their abilities will increase.

Teaching methods are the result of the joint work of a teacher and pupil, student and teacher.

Through teaching methods, students focus on the ways of learning as a result of their interaction. Improving the creative cognitive activity of teachers and students in education based on the technology of professional critical thinking.

Improving students' knowledge in teaching methods based on the technology of critical thinking is a set of methods and tools used in the study of its content by the student in accordance with the objectives of teaching.

In the organization of their practical activities in the education of students with the help of critical thinking technology is associated with the management of the cognitive activity of students. [6].

In psychology, the concept of action has two meanings. Firstly, it is used as a position of worldview, and secondly, as the basis for various social sciences. In everyday life, the word "action" means a simple concept of work, action. And in science, this is considered in connection with the nature of man, which is engaged in several branches of science. It refers to a psychological phenomenon (in this case, a relationship) that is close to each other on the basis of creative activity, the content of the service, the process of service, purpose, conditions of implementation, as well as the requirements for the personality of the creator.

In order to improve new pedagogical practices in vocational education, using advanced psychological and pedagogical ideas, rational methods, the formation of pedagogical skills, and also in vocational training, the formation of the critical thinking technology of a future specialist plays an important role. [7].

In our opinion, *the main skills* necessary for the formation of the characteristic features of future specialists while improving their professional knowledge are:

- must be creative in education, have their own peculiarities, improvising in any situation, and should gradually get used to it.

- the technology of critical thinking for the training of future professionals should be, in principle, a feature of professional knowledge and skills.

- the proposed critical thinking technology is a common problem in the vocational training of specialists in the methodological complex, ensuring continuous improvement of knowledge and skills.

As a result, the future specialist who has mastered the technology of critical thinking:

- can demonstrate the ability to professionally use critical thinking technology in his work;

- can discuss the characteristic features of pedagogy and the shortcomings of teaching aids;

- develops teaching methods based on critical thinking.

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СЫНИ ОЙЛАУ ТЕХНОЛОГИЯСЫН ПАЙДАЛАНУДЫҢ ТИІМДІЛІГІ

Аннотация. Мақала болашақ мамандардың құзыреттілігін қалыптастыруда сыни ойлау технологиясын пайдаланудың тиімді мәселелеріне арналған.

Болашақ мамандар үнемі өзгеріп отыратын әлеуметтік-экономикалық үдерістерді талдай білуге, нарықтық бәсеке жағдайына лайықты шешімдер қабылдап, жүзеге асыра алуы тиіс.

Қазақстан Республикасы білім беру жүйесіндегі реформалау үдерісі оның мазмұны мен сапасын арттыру, білім берудің ұлттық моделін жетілдіру, педагогикалық технологияларды ендіруге байланысты жаңаша ақпараттық технологиялық дәуірде өмір сүруде. Сондықтан да жаңа технологияларды меңгерген мамандарды кәсіби даярлау бүгінгі күннің өзектілігі жоғары мәселесінің бірі болып отыр.

Білім беру үдерісін басқаруда оқытушы-мамандардың кәсіби және педагогикалық мәдениеттілікпен жүзеге асыруы, оларды арнайы педагогикалық, рухани, жоғары гуманды, құнды мақсатқа бағытталуын қажет етеді. Педагогикалық ұжымның әрбір мүшесі білім беру үдерісінің белгілі аймағында арнайы ұйымдастырушы және жүзеге асырушы болып саналады. Оқыту үдерісінің басты тұлғасы бола отырып, маман рухани танымдық қажеттіліктерді жүзеге асыруда тәжірибесін, білімін, қабілетін көрсетпесе, өзінің бар жігерін жоғары мақсатқа жұмылдырмаса, сабақты ұйымдастыруда интеллектісімен, кәсіби әрекеттерімен жандандырмаса барлығы жай ғана сөз күйінде қала бермек.

Сондықтан, болашақ мамандарды кәсіби даярлауда сыни ойлау технологиясын енгізу психологиялық тұрғыда рефлексиялық талдаудан өткізіліп, педагогикалық іс-тәжірибеде дәйектелген теориялық тұғырының анықталуы жоғары оқу орнында маман даярлауды ұйымдастыру үдерісін тиімді етеді. Сыни ойлау технологиясын жетік меңгерген болашақ маман нәтижесінде:

- жұмысында сыни ойлау технологиясын кәсіби пайдалану мүмкіндігін көрсете алу;
- педагогикалық өзіндік ерекшеліктері мен оқу әдістемелік құралдарының кемшіліктерін талқылай білу;
- сыни тұрғыдан ойлау негізінде дәріс берудің әдіс-тәсілдерін қалыптастыруы тиіс.

Түйін сөздер: критикалық ойлау технологиясы, жоғары оқу орны, интеграция, рухани, танымдық.

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ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ ТЕХНОЛОГИИ КРИТИЧЕСКОГО МЫШЛЕНИЯ

Аннотация. Статья посвящена вопросам эффективности использования технологий критического мышления в формировании компетенций будущих специалистов.

Будущие специалисты должны уметь анализировать постоянно меняющиеся социально-экономические процессы, принимать и реализовывать решения, соответствующие условиям рыночной конкуренции.

Процесс реформирования системы образования Республики Казахстан переживает новую эру информационных технологий, связанную с улучшением ее содержания и качества, совершенствованием национальной модели образования, внедрением педагогических технологий. Поэтому профессиональная подготовка специалистов по новым технологиям является сегодня одной из самых актуальных проблем.

Управление образовательным процессом требует профессиональной и педагогической культуры педагогов и специалистов, их особых педагогических, духовных, очень гуманных, важных целей. Каждый член преподавательского состава является специальным организатором и исполнителем в определенной области образовательного процесса. Будучи ключевой фигурой в учебном процессе, если специалист не проявит свой опыт, знания, умения в реализации духовных и познавательных потребностей, не сосредоточит все свои усилия на высоких целях, не активизирует организацию занятий с интеллектом и профессионализмом, все останется прежним.

Поэтому внедрение технологии критического мышления в профессиональную подготовку будущих специалистов путем психологического рефлексивного анализа и выявления теоретических основ, обоснованных в педагогической практике, делает процесс организации обучения в высшем учебном заведении более эффективным. В результате будущий специалист с глубоким знанием технологии критического мышления должен:

- уметь демонстрировать умение профессионально использовать технологию критического мышления в своей работе;
- уметь обсуждать специфику педагогики и недостатки учебно-методических пособий;
- сформировать методы обучения на основе критического мышления.

Ключевые слова: технология критического мышления, университет, интеграция, духовная, когнитивная.

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RESEARCH OF INFLUENCE OF ETHNOPSYCHOLOGICAL CONCEPTS ON INTELLECTUAL DEVELOPMENT

Abstract. Intellect and ethnic values are formulated as adaptation to the environment. Intellectual development and ethnic views of children are closely interconnected, and this conclusion is mathematically proven in our experimental section.

Intellectual indicators, based on development of ethnocultural values, are the basis of our research.

As a result of studying the interrelations of intellectual development and ethnic views in children, it was shown that there are differences in motivation of behavior and human actions based on ethnocultural features.

The purpose of the research: study of the relationship between intellectual development and ethnic views and their impact on the personal development of children.

Research hypothesis: Ethnopsychological ideas have a positive effect on intellectual development.

During the study, it was revealed that ethnic views of subjects of different ethnic groups positively influences the development of both intellectual and personal development of children.

In the psychological science of Kazakhstan for the first time it has been determined that the interrelation of intellectual development and ethnic views positively affects the development of personality.

Ethnocultural values are very close to ethnic consciousness and can be the basis of intellectual development.

At the present stage of modern ethnic revival, special attention is paid to ethnicity. It was revealed that at an early age, respect for its features, knowledge of other ethnocultural values of people are the basis for intellectual and personal development.

Key words: ethno psychology; intellectual development; interrelation of ethnic views and intellectual development; influence of ethno psychological views on intellectual development, ethnic values.

Introduction. Intellect and ethnic values are formulated as adaptation to the environment. Intellectual development and ethnic views of children are closely interconnected, and this conclusion is mathematically proven in our experimental section.

Understanding the nature of ethnicity through the development of ethnic consciousness through the culture, language, folklore, music, art, traditions of ethnic groups affects the intellectual development of children.

The study of the intellectual mentality in Kazakh psychology based on historical ethno psychological aspects originates from M.M. Mukanov's research (Mukanov, 1975, 1980) [1,2]. In the works of Kazakhstan scientists, such as S. Nurgaliyev (Mukanov& Nurgaliyev, 1978; Nurgaliyev 1983) [3,4], S.M. Dzhakupov (Dzhakupov, 2002) [5], V.K. Shabel'nikov (Shabel'nikov, 1994) [6], S.K. Berdibayeva (Berdibayeva, 2012) [7] , the ethnic features in the structure of personality were investigated. In addition, it may be noted the research of S.K. Berdibayeva, where the ethnopsychological features of creative activity related to the intellect were studied (Berdibayeva, 2012) [7].

The thinking of junior schoolchildren was studied in 60-80 years of the twentieth century by the Soviet psychologists as Z.I. Kalmykova (Kalmykova, 1981) [8], N.A. Menchinskaya (Menchinskaya, 1989) [9], A.L. Wenger (Wenger, 1969) [10], A.Z. Zak (Zack, 1992) [11].

In the studies of J. Piaget, the development of intellect was considered as a continuous process (Piaget, 1969) [12].

Thus, intellectual development and ethno psychological concepts are differentiated in the process of person's adaptation to the environment and depend on the environment.

Methods. Subjects. We decided to investigate children of primary school age that this age is a period of intense organizational intellectual development and the formation of ethnic views.

The study was in the form of comparison of intellectual indicators and ethnic views of children of I and III grades, and influence of ethnic views on intellectual development were examined in general terms for different ethnic groups (Russian, Kazakh).

The study was carried out in Kyzylorda city among the children of I and III grades in the Kabylov Kazakh secondary school № 12 (N = 60), the Nurseitov Kazakh-Russian school № 233 (N = 60), the gymnasium school № 3 (N = 60). The total number of respondents: N = 180.

The methods were adapted taking into account the psychological features of children of primary school age.

1. Methods for determining person's intellectual development:

– J. Raven's "Gradual Complication Test" for determining the peculiarities of the logical formation of thinking operations in children of I and III grades;

– "Classification" technique for determining the features of generalization based on the analysis of functional relationships in the real world in children of primary school age.

2. The method of M. Kuhn and T. McPartland "Who am I?" was used for determining the attitude of a person to an ethnos.

3. The questionnaire method was used for determining the ethnic views.

4. Methods of mathematical and statistical processing of the received data. Pearson's tetra choric correlation coefficient was used for dichotomist data to determine the relationship between intellectual development and ethnic views.

Our study consisted of 3 experiments. The purpose of the first experiment was to study the peculiarities of intellectual development of primary school children. Two methods have been used for this purpose, and this experiment was carried out in two stages. At the first stage the peculiarities of intellectual development of children were studied. At this stage, the first method was J. Raven's "Gradual Complication Test". It is useful for measuring the non-verbal capacity of intellect. Here we used J. Raven's technique "Patch the mat" in a modified form for carrying out work with suitable patches for children of primary school age.

At the second stage there were two variants of "Classification" technique, which determine children's vocabulary and logic. The "Classification" technique focuses on the study of children's thinking. The purpose of the method "Who am I" is to determine the attitude of young children to their nationality.

At the second stage the questionnaire was used to determine the development of ethno psychological concepts. The questionnaire consisted of questions related to the traditions, customs, proverbs and sayings of the ethnic groups (Kazakh, Russian children). The questionnaire provided us with an understanding of the extent to which ethnic views of children were formed. After that, mathematical and statistical relationships between intellectual development and ethnic views were determined.

Tasks. The well-known J. Raven's technique for study of logical thinking "Gradual Complication Test" is intended to measure the non-verbal capabilities of intellect (Court & Raven, 1995) [13].

During the study of primary school children, we have made important changes to the method. We called the task "Patch the mat". Before showing the table, the child will be shown a mat in a picture, as well as pieces of cloth. The task is to find the most suitable part from all the proposed pieces that could patch up a hole in the mat.

In our research, various test variants were used. Children are given three series A, B, C with different levels of difficulty. Difficulties are complicated from group A to group B and from group B to group C. Each set contains 12 matrices, depending on the level of complexity.

At the next stage of mathematical processing, the correct score is calculated. The second experiment was divided into two stages. At the first stage, we carried out the methods for studying the "Ethnic-I" and

ethnic tolerance of children. The study used the method "Who am I?", proposed by M. Kuhn and T. Mc Partland.

Participants were asked "Who am I?", so we were able to study their attitude to their ethnicity. That is, the levels of "Ethnic-I" and ethnic tolerance were revealed [14]. The degree of visibility of Ethnic-I, ethnic tolerance in combination with all, includes ethnic views that form the ethnic world of children. Method of study of Ethnic-I test (20 statements) by M. Kuhn and T. Mc Partland.

In our study, we decided to take 10 statements, modifying the test with taking into account the peculiarities of children of primary school age and the lack of formation of ethnic consciousness at a sufficient level.

One of the most important issues is the study of visibility of Ethnic-I, based on person's identification on empirical ethno psychological and ethno social levels. The participants were given the following instructions: answer 10 statements "Who am I?" Since the question is exclusively for you, you must answer for yourself, not for others. Participants are given about 12 minutes to express their opinion. In this method, we divided the questions that reveal the degree of visibility of Ethnic-I, which determines one's nationality "I-Kazakh" ("I-Russian").

On this basis, we can find out how important is an ethnic status for the respondent and to which place of 10 statements he will put his status (1-5 is a high accentuation of ethnic status, 6-8 is the average accentuation of ethnic status, if ethnic status is shown from 9-10, 1 point is given when performing digital mathematical processing of the results).

Taking into account the age characteristics of the participants, the second part of test "Who am I?" was not performed.

The following are the results obtained by diagnostic tests and methods of quantitative treatments:

If the participant will answer the question "Who am I?" as "I am Kazakh", "I am Russian" in the interval from №1 to №5 out of 10, then it means that he puts his ethnos higher. And if he does not write even one question out of ten, it means that it does not matter for him to which nationality he belongs.

Quantitative processing of the results obtained during the study: The first ethno psychological index (10 opinions), i.e. (№1), is that if the participant points out the opinion "I am Kazakh" in one of the opinions, the position in which he puts it will be determined.

For example, if the opinion of the participant "I'm Kazakh" is on the 2nd place among 10 opinions, then $x = 2$, where x is the order of 10 opinions. Thus, if $x = 2$, then $a = 2$ or the ethno psychological index of the position "I – Kazakh" or the indicator "a" or № 1 is 9. The reason is that we have $N = 10$.

Similarly, the results of other ethno psychological indicators processed identically: 3; 4; ... 10.

This stage of experiment has a special significance in addressing the issue of ethno psychological aspects of intellect.

Knowledge of the person in the ethnic world, especially the identification of ethno psychological concepts of primary school children, increases the value of our work.

The table 1 presents empirical data on ethno psychological features.

Table 1 – Empirical indicators of ethnopsychological features

| Constructs | Empirical Indicators | Units of Measurement | Notes |
|--|--|----------------------|---|
| Study of "Ethnic-I" | 1. 10 opinions (M. Kuhn's method) – I-Kazakh (I-Russian) | 1-10 points | The statements were made I-Kazakh (I-Russian) |
| <i>Note.</i> Not all participants were involved in this ethno psychological research, only those who showed high intellectual development. | | | |

Results. Let's analyze the results of the first experiment, obtained on the basis of J. Raven's technique. The execution of tasks by J. Raven's technique led to a positive emotional relationship in children of I-III grades. Some children asked for another task. During the tasks, it was noted that not all children were able to find effective ways to complete the task.

For example, they could not find the pattern of drawing, could not use this pattern in the little cards.

Thus, table 2 shows the results of performance of tasks for children of I-III grades.

As can be seen from table 2, 35.1 % of the I grade children and 22.1 % of the III grade children have shown low levels.

The average level of logical development of thinking was 45.3 % for the I grade and 45 % for the children of the III grade. This justifies the average index of intellectual development.

The percentage of children who show high rates is minimal. Among the I grade – 19.6 and 32.9 % in the III grade. Of these, 9 points were shown only by children of the III grade – 10.8 %.

They demonstrated the ability to identify horizontal and vertical transformation of figures in J. Raven's technique. In the next stage, we show the results of tasks performed by the Russian children participating in the experiment.

It allowed us to determine the specifics of performing tasks by representatives of various ethnic groups.

In table 3 we analyzed the index of intellect of children in the Russian group, 34.3 % of the I grade children and 20.5 % of the III grade children showed low levels.

The average level of logical formation of children's thinking in the Russian group was 46 % for the I grade and 44.8 % for the children of the III grade. A high level – 19.7 % of children of the I grade, 34.7 % of children of the III grade.

In both groups there was a small percentage of the highest 9 points. The main difficulties in performing tasks using J. Raven's method were to find an analogy between pair figures on the basis of part differentiation.

It is well known that the successful completion of this task is possible with differentiation of the child's perception and with the full development of attention.

As indicated in tables 2-4, the percentage of children with high rates is minimal. Among the I grade children of two groups (Kazakh, Russian) – 19.6 and 33.8 % among the III grade. Of these, 11.3 % of children showed 9 points. They demonstrated the ability to identify horizontal and vertical transformation of forms, which are the most complex of the 36 tasks in J. Raven's technique.

Analyzing the results of J. Raven's method, we came to conclusion that:

I. Depending on the logic of cognitive ability, three groups of children of I and III grades were identified.

1. A low level is characterized by the ability to identify the same and different, identical and unusual forms, as well as the ability to identify figures in the reception field and in other objects.

2. On the average level of logical thinking, children compare similar changes in patterns that establish the logic of their thinking. However, this logic does not apply to the child's ability, but it is used in performing complex types of tasks.

3. A high level is characterized by the ability to distinguish between integral components and symbols, including the skills that are encountered on the first two levels.

II. The main difficulties in performing the tasks of J. Raven's method are typical for many children, which are connected with the search for analogies between pair figures, based on the differentiation of details.

This can be explained by the fact that the differentiation of attention and perception from the point of view of logical thinking is not sufficiently developed.

This led to difficulties that arise in the performance of tasks. Raven's method were to find an analogy between pair figures on the basis of part differentiation.

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Table 2 – The results of performance of tasks by the Kazakh group children of I and III grades by J. Raven's method – (%), (N = 120)

| Level | Low | | | Medium | | | High | | |
|-----------|-----|------|------|--------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| I grade | 2,8 | 19,2 | 13,1 | 22,7 | 9,0 | 13,6 | – | 19,6 | – |
| III grade | – | 7,2 | 14,9 | 10,5 | 16,5 | 18,0 | 11,7 | 10,4 | 10,8 |

Table 3 – The results of performance of tasks by the Russian group children of I and III grades by J. Raven's method – (%), (N = 60)

| Level | Low | | | Medium | | | High | | |
|-----------|-----|-----|------|--------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| I grade | 2,4 | 19 | 12,9 | 22,9 | 9,3 | 13,8 | – | 19,7 | – |
| III grade | – | 6,2 | 14,3 | 11,5 | 16,1 | 17,2 | 12 | 10,8 | 11,9 |

Table 4 – The results of performance of tasks by Kazakh and Russian groups children of I and III grades by J. Raven's method – (%), (N=120)

| Level | Kazakh group | | | Russian group | | |
|-----------|--------------|--------|------|---------------|--------|------|
| | Low | Medium | High | Low | Medium | High |
| I grade | 35,1 | 45,3 | 19,6 | 34,3 | 46 | 19,7 |
| III grade | 22,1 | 45 | 32,9 | 20,5 | 44,8 | 34,7 |

III. J. Raven's method showed that the level of intellectual development in accordance with ethnicity is insignificant, since it allows us to identify non-verbal intellect. And this is similar to the role of ethnocultural values in personal development. The second experiment. Analyzing and processing the data at the sample size – 120 children (60 in Russian group, 60 in Kazakh group).

Ethno psychological indicators include five variables for measuring Ethnic-I and ethnic tolerance. If we give a brief overview of some results of diagnostic tests for children, we will see the following features:

1. Russian children (60 participants) showed the highest level in the question "Who am I?" – 22 respondents (37 %); neutral level – 21 respondents (34 %); the average level – 17 participants (29 %) (see figure 1).

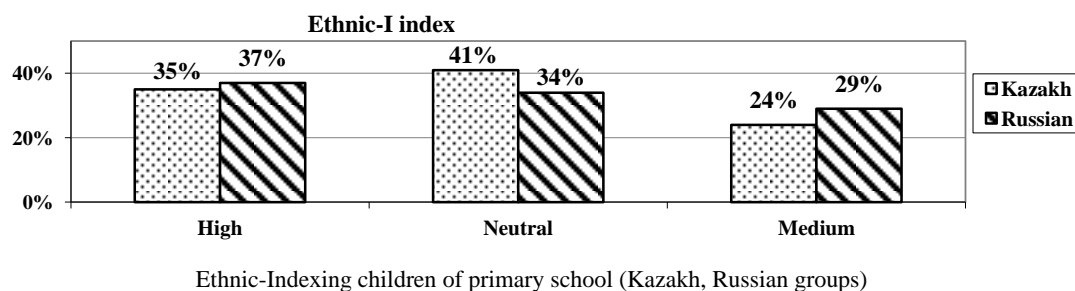
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1. Russian children (60 participants) showed the highest level in the question "Who am I?" – 22 respondents (37 %); neutral level – 21 respondents (34 %); the average level – 17 participants (29%) (see figure).

Thus, based on the results of the above indicators, it can be said that children of primary school did not have negative opinions about other people. When it comes to them, national separation is less important.

In addition, since our state is independent and of a polytechnic nature, it does not adversely affect the development of children's mental health. Merging with the Russian people from Soviet times for several years has become a testament to ethnic tolerance.



At the second stage of the second experiment, mutual influence of ethnic views and intellectual development was determined by questionnaires developed by us. A special idea of this research is that more developed ethnic views of children are associated with higher intellect.

In table 6 we present the comparative indicators of formation of Ethnic-I and intellect, which is the basis of our research.

As shown in table 6, in comparison with the Russian group, the Kazakh children are more tolerant and have higher intellect. And in the Russian group of children, Ethnic-I is more developed.

Thus, we see significant ethnic differences between the intellectual and personal qualities of respondents.

If we justify these differences, we can say that the Kazakh ethnos is a titular nation in Kazakhstan, therefore their sense of tolerance prevails.

Because they feel that they live in their country at a high level. In this regard, children also have a high intellectual level

Meanwhile, in the Russian group, a strong sense of their own "Ethnic-I" is explained by the fact that they put their nation above all else and that all the representatives of ethnic views in the Kazakh and Russian groups has no significant difference.

In addition, comparing the average arithmetic values of levels of intellect and children in Kazakh and Russian groups, we note that in both ethnic groups a high levels of intellect and ethnic views are among tolerant pupils.

Intolerant respondents showed lower than average intelligence.

It confirms the basic assumption of our research and confirms the dependence of intellectual development and ethnic views of primary school children on their ethnic values.

Table 5 – The results of the diagnostics of the value sphere of different age groups of the titular ethnos of Kazakhstan by the Schwartz method (average points / U-criterion of Mann Whitney)

| Index | Kazakh children | Russian children |
|----------------|-----------------|------------------|
| High intellect | 47,4 % | 46,6 % |
| Ethnic views | 31,8 % | 35,7 % |
| Ethnic-I | 45 % | 55 % |

We present the following conclusions:

1. Ethnic-I is directly correlated with the self-determination of school-age children.
2. Ethnic-I in children is determined by obvious ethnic tolerance and ethnic stereotypes.
3. High ethnic tolerance and ethnic index have a positive effect on intellectual and personal development.
4. It was revealed that the understanding of different ethnic groups (Russian, Kazakh) about their ethnicity has a positive effect on the development of intellect and personal development.

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2. Ethnic-I in children is determined by obvious ethnic tolerance and ethnic stereotypes.
3. High ethnic tolerance and ethnic index have a positive effect on intellectual and personal development.

According to the results of the study, the influence of ethnic views on the development of intellect was mathematically justified by Pearson's tetra choric correlation coefficient.

Using Pearson's correlation coefficient, we have the following results:

In the group №1 $R = -0,74$.

In the group №2 $R = 0,14$.

Thus, intellectual development is closely related ethnic views.

In the second phase of the third experiment, the effects of ethno-psychological insights on intellectual development were identified through a questionnaire we created.

The idea of this study is to show that the higher the ethno-psychological understanding of children, the higher their mental performance.

In the study we asked 15 children of Kazakh language and ethnicity, 5 questions with representatives of other nationalities (Kazakh, Russian).

The table size for significance level U_{kr} is as follows:

114 ($p \leq 0,01$).

138 ($p \leq 0,05$).

Table 6 – Reliability of features of development of ethno psychological concepts in two groups

| Ethnopsychological concepts Kazakh-Russian | Ethnopsychological concepts Russian-Kazakh |
|--|--|
| Positive $U_{\text{эмп}} = 58,9$ ($p \leq 0,05$) | Positive $U_{\text{эмп}} = 57,9$ ($p \leq 0,01$) |

By comparing U_{mp} and U_{cr} , we determined the level of ethnicity formation in children.

Conclusion. Thus, based on the results of the study, we came to the following conclusion:

1. At the level of formation of classification thinking, five groups of children of I and III grades were identified.

– Children who have shown very low and low results, classify distributions based on external forms or functional relationships, rather than on the important attributes.

– At the average level, a child can perform tasks, his initial decision is not based on an important attribute, but after experimenter's help he performs the task correctly. On the second type of classification the child identifies and applies the important features of things, but the functional relationships between the things are not always taken into account.

– High and very high classification thinking are characterized by easy and quick understanding of the principles of classification cards in groups. When performing tasks, children rely on basic functions and important attributes of things.

– The difficulties of primary school children in the performance of tasks are directly related to the absence of the main external signs of features of classification of cards. This problem is correctly solved with the help of teachers.

– Errors of children of the I grade are characterized by complexity of transition from one type of classification to another, that is, from the principle of generalization to the principle of functional communication.

The intellectual development of person is positively influenced by formation of ethnic views (ethnocultural values).

3. High level of tolerance has a positive impact on the intellectual development of the individual.

4. A mathematical and statistical justification of the relationship between intellectual development and ethnic views is established.

At present, radical social transformations require a psychologically new character of structure of personality. Intellect develops in the social environment in which a person lives [15].

Ethnic values have a positive impact on intellectual development. It is also believed that ethnic views, formed in every nation, has a positive impact on in intellectual development. Influence of ethno psychological notions on intellectual development is revealed.

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ИНТЕЛЛЕКТУАЛДЫ ДАМУҒА ЭТНОПСИХОЛОГИЯЛЫҚ ТҮСІНІКТЕРДІҢ ӘСЕРІН ЗЕРТТЕУ

Аннотация. Қазіргі таңда қоғам талаптарының бірі – жан-жақты үйлесімді дамыған тұлғаны қалыптастыру. Еліміздегі түбегейлі өзгерістер тұлға құрылымына психологиялық тұрғыдан жаңа сипатта қарауды қажет етеді.

Интеллекттің дамуы мен этнопсихологиялық түсініктердің өзара байланысын зерттеу бүгінгі таңдағы этнопсихология ғылымының басты мәселелері қатарынан орын алады.

Интеллекттік әлеует – тұлғаның, кез-келген іс-әрекетті нәтижелі орындауының басты шарттарының бірі. Интеллект деңгейі – тұлғаның жинақтаған білімдерінің, тәжірибесінің негізінде қаланатын күрделі құрылым екені анық. Бертін келе интеллект мәдениеті тұлғаның даму деңгейіне әсер етеді деген көзқарастар туындады (А.Р. Лурия). Осы орайда, интеллект тұлғаның тұстамай даму деңгейіне әсер ететіндіктен, оны этнопсихологиялық ерекшеліктермен өзара байланыста зерттеу қажеттігі айқын көрінеді.

Тұлғаның интеллекттік дамуы мәселесі көптеген ғылыми-психологиялық зерттеулерге негіз болды. Шетелдік зерттеулерде, атап айтқанда, К. Спирменнің интеллектінің екі факторлы теориясы, Р.Б. Кеттелдің және Дж. Равеннің интеллектінің факторлық талдауы, Дж. Гилфордтың интеллектінің құрылымдық моделі, Р. Стернбергтің эмпирикалық зерттеулерінде тұлға интеллектісінің дамуы қарастырылды.

Ж. Пиажениң интеллектіні ассимиляция және аккомодация процесінің бірлігін білдіретін ағзаның ортаға бейімделуінің формасы ретінде тұжырымдауы кең қарастырылған.

Интеллектіні этнопсихологиялық аспектіде зерттеу – жаңа бағыттардың бірі, интеллекттік іс-әрекет құрылымдары және оның этностық тұрғыдан талдануы, интеллект және этностылық болып табылады.

Ұлттық тілді, салт-дәстүрді, ұлттық мәдениетті қалыптастырудың негізі болып табылатын этностық сана-сезімдердің даму ерекшеліктері – негізгі сұрақтардың бірі. Этнопсихологияда интеллектіні зерттеуде этносаралық мәдени байланыстар балалардың тұлғалық дамуына белсенді түрде әсер етеді.

Зерттеуде әртүрлі этносты құрайтын сыналұшылардың интеллектісінің дамуына этнопсихологиялық түсініктердің әсері болатыны эксперимент барысында анықталды.

Қазақстан психология ғылымында алғаш рет тұлғаның интеллекттік дамуына этнопсихологиялық түсініктердің жағымды әсері анықталды. «Этностық Меннің» көріну деңгейі этностық түсініктердің қалыптасу сипатымен байланысты болатыны зерттелді.

Тұлға интеллектісінің дамуына этнопсихологиялық түсініктердің (этномәдени құндылықтар) қалыптасқан деңгейі жағымды әсер етеді. Өзіне деген сенімділігі артқан сайын, интеллекттік даму құрылымының күрделі жүйесімен байланысты интеллекттік даму соғұрлым жоғарылайды екен.

Зерттеу барысында алынған нәтижелер интеллектінің дамуына этнопсихологиялық түсініктердің әсері жайлы қазіргі жаңа психологияда анықталып жатқан ғылыми білімдерді толықтырады. Сонымен қатар интеллекттік даму көрсеткіштері этнопсихологиялық аспектіде қарастырылды. Тұлға интеллектісінің дамуына қалыптасқан этнопсихологиялық түсініктер жағымды әсер бере алады.

Түйін сөздер: этнопсихология, интеллекттік даму, этностық түсініктер мен интеллекттік дамудың өзара байланысы, интеллекттік дамуға этнопсихологиялық түсініктердің позитивті әсері, этностық құндылықтар.

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ИССЛЕДОВАНИЕ ВЛИЯНИЯ ЭТНОПСИХОЛОГИЧЕСКИХ ПРЕДСТАВЛЕНИЙ НА ИНТЕЛЛЕКТУАЛЬНОЕ РАЗВИТИЕ

Аннотация. Сегодня одним из требований общества является формирование гармонично развитой личности. Радикальные изменения в нашей стране требуют нового, психологического нового подхода в структуре личности.

Изучение взаимосвязи между интеллектуальным развитием и этнопсихологическим пониманием является сегодня одним из ключевых вопросов в этнопсихологической науке.

Интеллектуальный потенциал является одним из главных условий успешного выполнения любой деятельности. Понятно, что уровень интеллекта представляет собой сложную структуру, основанную на знаниях и опыте, полученных человеком. Выяснилось, что культура интеллекта влияет на уровень развития личности (А.Р. Лурия). Ввиду того, что интеллект влияет на уровень развития личности в целом становится очевидной необходимостью его изучения с учетом этнопсихологических особенностей.

Проблема развития личности легла в основу многих научных и психологических исследований. В зарубежных исследованиях развитие интеллекта личности рассматривают: двухфакторная теория интеллекта Спирмена, факторный анализ интеллекта Р.Б. Кеттелла и Дж. Равена, структурная модель интеллекта Дж. Гильфорда, эмпирическое исследование Р. Стернберга. Особенно широко рассматривается концепция Ж. Пиаже, рассматривающая интеллект как форму адаптации организма к окружающей среде, которая представляет собой единство процесса ассимиляции и акклиматизации.

Одним из новых направлений в изучении интеллекта в этнопсихологических аспектах является структура интеллектуальной деятельности и ее этнический анализ, интеллект и этничность. Одним из ключевых вопросов являются особенности развития этнического самосознания, которое является основой формирования обычаев, традиций и национальной культуры. В исследованиях интеллекта в этнопсихологии межэтнические культурные связи активно влияют на развитие личности детей.

В ходе эксперимента выяснилось, что установлено влияние этнопсихологических представлений на интеллектуальное развитие испытуемых разных национальностей. Впервые в психологии Казахстана выявлено положительное влияние этнопсихологического представления на интеллектуальное развитие личности.

Было изучено, что уровень выражения "Этническое-Я" связано с характером формирования этнических представлений. На интеллектуальное развитие личности оказывают позитивные влияния сформированность этнопсихологических представлений (этнокультурных ценностей). Чем выше уверенность в себе, тем выше интеллектуальное развитие личности в связи со сложным системным характером структуры интеллектуального развития.

Полученные в ходе исследования данные дополнили имеющиеся в современной психологической науке знания о влиянии этнопсихологических представлений на интеллектуальное развитие. Наряду с этим показатели интеллектуального развития рассматриваются в этнопсихологическом аспекте. На интеллектуальное развитие личности оказывают позитивные влияния сформированность этнопсихологических представлений (этнокультурных ценностей).

Ключевые слова: этнопсихология, интеллектуальное развитие, взаимосвязь этнических представлений и интеллектуального развития, позитивное влияние этнопсихологических представлений на интеллектуальное развитие, этнические ценности.

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FEATURES OF SELF-ESTEEM OF A MODERN TEENAGER

Abstract. Socio-economic changes in modern society have a significant impact on the formation of the personality of the future generation and the level of their socio-psychological adaptation. This occurs in adolescence, characterized by contraindications. Adolescence includes such complex changes as the formation of self-awareness and behavior, self-esteem and the development of an independent, independent system of self-esteem and self-esteem. Such conditions provided the basis for a broad discussion of evaluation at this stage of development. At the same time, along with various psychological and social factors, self-esteem contributes to the normal implementation of the socialization of the child and the norms of social behavior. The article reveals the essence of the concept of “self-esteem” of psychological characteristics of a modern teenager in the personal development of a modern teenager, forms a structural model of self-esteem on the basis of this theoretical knowledge and defines the characteristics of self-esteem of adolescents in modern conditions of training and education. On its basis, the features of self-assessment of students in grades 7-10. It is also important to apply this scientific work to improve the interaction and understanding of adolescents in the family and to train teachers working with adolescents.

Key words: adolescence, self-knowledge, self-esteem, image I', autonomy of behavior, relationships with peers.

Introduction. Socio-economic changes in modern society have a significant impact on the process of formation of the personality of future generations and the level of their socio-psychological adaptation. This especially holds a special place in adolescence, characterized by internal contradictions.

Adolescence includes such complex changes as the active formation of self-consciousness, the development of an Autonomous independent system of self-esteem and self-esteem, orientation to external evaluation, respectively, the formation of their own behavior. Such conditions served as a basis for studying the issue of self-assessment at this stage of development. At the same time, along with negative psychobiological and social factors, self-esteem is one of the main psychological mechanisms that contribute to the normal implementation of the socialization of the individual and the norms of social behavior [1].

In modern socio-economic conditions, it is particularly important to achieve a high level of development of the personality of a teenager, taking measures of responsibility, their implementation in life and mastering such qualities as self-confidence and independence. Modern teenagers find it very difficult to navigate rapidly changing life situations [2]. Therefore, the study of the features of self-esteem of the younger generation, along with modern social changes, is one of the urgent problems.

Along with physical development in adolescence, there is an intensive implementation of cognitive processes in the child. The development of psycho-cognitive processes is bilateral in nature: quantitative and qualitative. According to quantitative changes, a child can solve intellectual tasks more quickly, easily and effectively compared to a child of early school age. Qualitative changes are reflected in the structure of the thought process [3]. Therefore, changes in the structure of psycho-cognitive processes can be noticed, especially in the intellectual sphere. In adolescence, the theoretical thinking of the child develops. The operations acquired in early school age, this period move on to the formal-logical operation (period of

formal operations according to Piazhе J.). Characteristic features, such as the development of the child's thinking at this stage, are:

1. The ability to navigate in solving mental problems;
2. The ability to analyze generalized ideas, to look for logical contradictions and errors of thought [4];

In adolescence, the child's mood fluctuates. However, a teenager can independently control the manifestation of his feelings compared to junior school. He tries to hide various situations in school (bad grade, hearing for bad behavior) with feelings such as anxiety, excitement. But certain circumstances (conflicts with teachers, parents, friends) contribute to the emergence of sociality (impulsivity) in the behavior of the child T.B. Dragunov, D.B. Elkonin). In severe cases, affecting the child, with strong discontent and resentment, maybe escape from home, even suicide. The role of communication with peers in this case is very important for the child. Communication with peers is the main source of new interests that form norms of behavior. This is due to the emergence of certain needs for friendship, understanding each other, support, and preservation of color.

Communication with peers is one of the important factors contributing to the formation of the personality of a teenager. This need originates from about 4-5 years and reaches the takeoff limit in adolescence. M. Chauvin believes that relationships with peers are a special form of communication and interaction of adolescents, which has been and will occur at all stages of human society.

In adolescence, the child seeks autonomy, is, there is a need to achieve their independence, independence and begins to assume the responsibilities and rights of an adult. There are two types of autonomy:

1. Behavioral autonomy is the achievement of independence, freedom in making their own decisions without controlling the external environment.
2. Emotional autonomy-getting rid of emotional dependence on parents [5].

Changes in behavior of adolescents, is widely described in the writings of R. Havighurst. Such changes include the adaptation of the adolescent to their physical condition, the achievement of an adult sexual role, ability to establish adult interaction with people of the opposite sex, the development of the brain, the formation of values that promote behavior, social responsibility, career choices and preparation for professional careers, achieve economic independence, preparation for family life. The effective solution of these problems is provided by the development of the mental sphere of the teenager, the expansion of self-consciousness. The development of the mental sphere of the teenager is the Central core of mental development and plays an important role in the formation of personality. According to Jean Piaget, a teenager, firstly, perceives himself as an adult, and secondly, begins to think about his future and make life plans. That is, Piaget is of the opinion that in adolescence a personality is formed and a life program is created [6].

In adolescence, the "I" of the child develops, self-esteem is formed as a basis for regulating behavior. Self-esteem of the child at this stage significantly affects such processes as self-education, self-education and personal development in general. The child is accustomed to his appearance, forms a stable image of the body, takes the appearance and in accordance with it stabilizes the level of attraction. Gradually, new qualities of the image " and " begin to appear in the first place – mental abilities, volitional and moral qualities that affect the effectiveness of communication with the environment and activities.

Many foreign and domestic scientists were interested in such issues as physiological and psychological changes in adolescence, the way of life of a teenager, the formation of self-consciousness. Thus, according to M. Mead, adolescence covers different times in ordinary civilization, sometimes it can be limited to several months [7]. As L. I. Bozhovich noted, all teenagers are characterized by reflection, which causes the need to understand themselves and get the desired image. Failure to meet these needs leads to a teenage crisis [8]. I.S. Kon In one of the words, Kon tried to reveal the image of a teenager: "a teenager is a project of a future personality, a sketch, a drawing that will always occur in a completed portrait."K. Levin connects the crisis of adolescence with society, in his opinion, there are two groups living in society: a children's group and an adult group. The teenager remains among these two groups, does not want to join the group of children, and the older group is not ready to accept it [9].

One of the important problems in the personal development of the younger generation is the formation of self-consciousness. It manifests itself as a complex quality of mental activity and shows the process of continuous development of personality [10]. And self-esteem, which is the main component of self-consciousness, is a specific stage in personal development [11].

Self-assessment is an assessment of the person, their abilities, capabilities, qualities and their place among other people. Self-esteem to a certain extent determines the activity of the individual, the attitude to themselves and other people [12].

The scientific literature presents three levels of self-esteem:

1. a high level is different from self-esteem and can lead to conflicts with the environment. It breeds qualities such as doubt, guilt, even aggressiveness.

2. normal (adequate) assessment is the ability to educate yourself, to adhere to a normal attitude to others. This is a real assessment of the person himself, his abilities and actions, human qualities. A normal assessment allows a person to take a critical look at himself, to properly direct his efforts in various difficulties, to meet the requirements of the environment.

3. low level-forms feelings such as self-distrust, anxiety, anxiety. Low self-esteem of the child has a negative impact not only on themselves, but also on the lives of others. To make a child feel happy, it is necessary to have a positive feedback about yourself [13].

1. Self-esteem has a regulatory and defensive activities, contributing to the behavior of adolescents, activities and communication with the environment, the development of the child's personality. Showing self-respect, the level of feelings of satisfaction or dissatisfaction, self-esteem can serve as a basis for accepting achievements and failures, setting goals to a certain extent [14]. I.S. Kon, A.I. Lipkina, E.A. Svonko, S.M. Prihodzhan, E.A. According to Serebryakova, adolescence is suitable for the formation of self-esteem.

Self-esteem of adolescents in modern psychology is considered in the framework of 2 directions:

1. the direction linking self-esteem with the search for its formation;

2. the direction providing structure of self-assessment and their interrelation [15].

Self-esteem in adolescence is one of the new internal structures and changes aggressive behavior.

Self-assessment at this stage consists of the following structural components:

– Self-respect;

– Emotional attitude to yourself;

– Awareness of your achievements;

– Operational self-assessment [16];

– The process of self-assessment of a child in adolescence consists of the following features:

– Deepens the content area of self-esteem from early adolescence to adult adolescence and the child pays more attention to their physical qualities, relationships with peers than educational activities.;

– Because of the increase in the ability of a teenager to experience self-esteem, his self-esteem will be at a more normal level, the teenager is able, along with his positive qualities, to find negative qualities.

– In self-esteem begin to be clearly traced moral qualities, abilities and will.;

– There is a process of transition of the child from external assessment to internal assessment;

– Self-esteem affects the success of the teenager and the socio-psychological level in the team, regulates the process of communication;

– Lack of a normal level of self-esteem can lead to delinquent behavior in the child;

Thus, in adolescence, the child's self-esteem is actively formed, an independent system of self-esteem and attitude is created, the ability to join the inner world develops. During this period, the child learns his abilities and understands the uniqueness. In the consciousness of the child, the process of orientation to internal evaluation from external evaluation increases. As a result, it forms its own concept of "I", providing further formation of behavior.

The level of cognitive activity of adolescents is closely related to their self-esteem. Adolescents who show low activity in the field of cognitive relations rarely associate success and interests in educational activities with their opportunities, efforts focused on external assistance and support [17].

Social activity and life plans of a teenager directly depend on self-esteem. According to psychologists, for the normal development of personality is very important to have a normal level of self-esteem, ie the ability to really see their capabilities, the level of achievement of their goals and evaluate themselves-one of the conditions for the correct orientation of the child in life [18]. Modern teenagers rely on certain rights, try to impose duties on themselves. The formation of a teenager as a person causes the need for detachment and is manifested in this negativism. Negativism is an initiative of active search of own independence of the teenager. However, teenagers are not yet ready to be truly alone with their "me", so they tend to peer group. During this period, the child begins to evaluate relationships with their peers, friends become very important people [19].

Results of discussions and research. Self-esteem is a complex component of self-consciousness, the structure that regulates human behavior and adaptation to the environment. According to the scientific literature, self-esteem is a certain indicator of the quality and level of mental development of the individual, the level of self-determination [20]. In psychology, there are various methods aimed at the study of personal qualities, mental States, self-esteem. In order to study the self-esteem of modern adolescents, we are guided by the methodology of S.A. Budassi 60 children from 7-10 grades of secondary school took part in the study. Among them: 15 children-oralmans (respondent), 15 children-local, 15 children-from incomplete families, 15 children-from incomplete families. We processed the answer sheets of all subjects and conducted a comparative analysis of the results. S.A. Budassi. The technique of research of personal qualities of S.A. Budassi allows to carry out quantitative research of self-assessment of teenagers, that is to measure it. The main purpose of processing the result is to determine the relationship in the assessment of personal qualities inherent in the concepts of "ideal Self" and «true self". The methodology includes 48 personality traits that are taken into account and is carried out in three stages (table 1). Among these qualities, the teenager chooses 20 shrines that the ideal person should have. Now evaluating these selected qualities by the degree of unfavorability and estimating the price of 1, 2, 3, 4 on column d1... it should be noted in numbers. Next, the assessment of the selected qualities of the teenager on the level of their manifestation. This is 1, 2, 3, 4 to column d2... is performed with the notation of numbers [21]. Need to have a value if one number is not repeated multiple times.

Table 1 – Is to determine the relationship between personal qualities (quality 48 in the job)

| | | | |
|----------------|------------------|----------------------------|-----------------------------|
| 1. accuracy | 13. anger | 25. composition | 37. criticism to themselves |
| 2. illiteracy | 14. revenge | 26. insomnia | 38. restraint |
| 3. deep though | 15. truthfulness | 27. attractiveness | 39. honesty |
| 4. vigilance | 16. persistence | 28. ease | 40. compassion |
| 5. compassion | 17. illusion | 29. caution | 41. shame |
| 6. takats | 18. slowdown | 30. attention | 42. business |
| 7. rudeness | 19. fantasy | 31. doubt | 43. industry |
| 8. morality | 20. doubt | 32. the positional feature | 44. cowardice |
| 9. charity | 21. hatred | 33. spotted | 45. reliability |
| 10. modesty | 22. reliability | 34. goodwill | 46. passion |
| 11. caring | 23. flexibility | 35. incorrectness | 47. stoniness |
| 12. jealousy | 24. tenderness | 36. judgments | 48. egoistic |

The main purpose of processing the result is to determine the relationship between personal qualities. The value of the relationship is determined by the coefficient of rank correlation. To determine the coefficient, it is necessary to first determine the difference of ranks $d_1 - d_2$ for each quality and enter the result in column d of the study Protocol. Find the square of each resulting value $(d_1 - d_2)^2$ that you want to write in the graph d^2 . At the same time, calculated the total squared difference of ranks ($\sum d^2$), which is included in the formula: $r = 1 - 0,00075 \times \sum d^2$ (1), where r - is the correlation coefficient (an indicator of the level of self-identity).

In addition, the results of this technique can be calculated by the formula: $r = 1 - (6\sum d^2 / (n^3 - n))$ (2), where n – considered qualities (in our case $n=20$). Given that in this version of the method $n=20$, we performed the calculation by the Formula (1).

Standards:

1. If, aspires to $r + 1$, it means a high level of self-esteem, a favorable relationship between "true" and "ideal" and "ideal". if r is from 0.9 to +1, this is an excessively high level of self-esteem.

2. If, aspires to $r - 1$, it is a low level of self-esteem. It is an indicator of an unpleasant connection or incompatibility between the "ideal" and the "real." when approaching the $r - 1$, the amount of incompatibility increases.

3. at $-0,5 < r < + 0,5$, self-esteem is normal. Adolescent response sheet (Protocol analyzed as a sample) (table 2).

Table 2 – Adolescent response sheet (Protocol analyzed as a sample)

| d ₁ | The individual quality | d ₂ | The difference of rank- d =(d ₁ - d ₂) | d ² |
|----------------|----------------------------|----------------|---|------------------------|
| 6 | 1. accuracy | 1 | 5 | 25 |
| 9 | 17. illusion | 7 | 2 | 4 |
| 7 | 22. reliability | 2 | 5 | 25 |
| 8 | 27. attractiveness | 6 | 2 | 4 |
| 10 | 32. the positional feature | 8 | 2 | 4 |
| 11 | 34. goodwill | 20 | -9 | 81 |
| 1 | 38. restraint | 9 | -8 | 64 |
| 12 | 39. honesty | 19 | -7 | 49 |
| 14 | 40. compassion | 10 | 4 | 16 |
| 5 | 41. Shame | 18 | -13 | 169 |
| 13 | 42. business | 4 | 9 | 81 |
| 15 | 43. industry | 3 | 12 | 144 |
| 17 | 45. reliability | 11 | 6 | 36 |
| 2 | 3. deep thinking | 5 | -3 | 9 |
| 16 | 8. morality | 14 | 2 | 4 |
| 3 | 9. charity | 12 | -9 | 81 |
| 18 | 11. care | 13 | 5 | 25 |
| 19 | 15. honesty | 15 | 4 | 16 |
| 20 | 24. tenderness | 17 | 3 | 9 |
| 4 | 18. slowdown | 16 | -12 | 144 |
| | | | | Σ d ² = 990 |

Now the result is applied to the formula: $r = 1 - 0,00075 \times 990 = 1 - 0,7425 = 0,2575$ therefore, the indicator showed that the self-esteem of the subject is at a normal level.

At the next stage, to determine the features of self-esteem of the modern teenager, we divided 60 children taken for the study, according to family and social status, processed the answer sheet of each teenager, compiled a survey Protocol. We analyzed the results of studies from single-parent and single-parent families, as well as oralmans and local children, determined the percentage value of each of them.

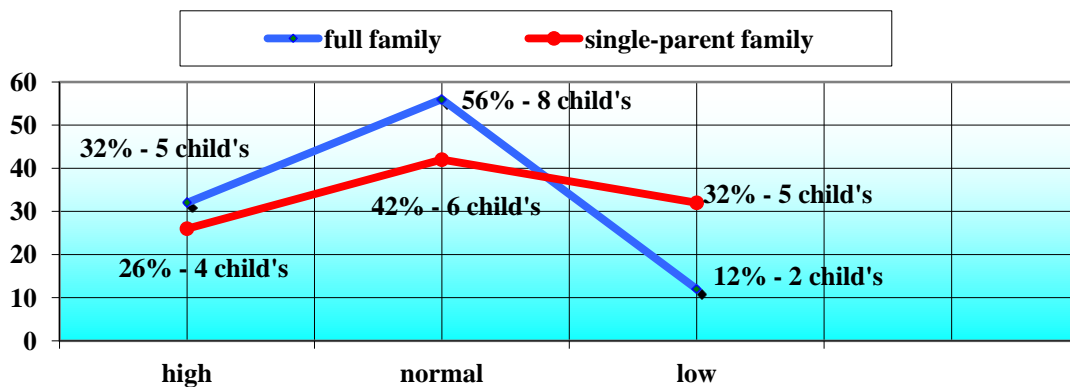


Figure 1 – Features of self-esteem of adolescents from incomplete and incomplete families (%)

According to the results of the study, most children from single-parent families showed a low level of self-esteem (figure 1). In our opinion, this is due to the financial situation of the child in the family, education and communication of parents, insufficient love of the father or mother, incompatibility with other peers. Therefore, the teacher should pay special attention to such students. After all, a low level of self-esteem can hinder the development of a child's personality and create a "teenage complex" in it.

In the social situation, we have identified several features of self-esteem of adolescents (figure 2).

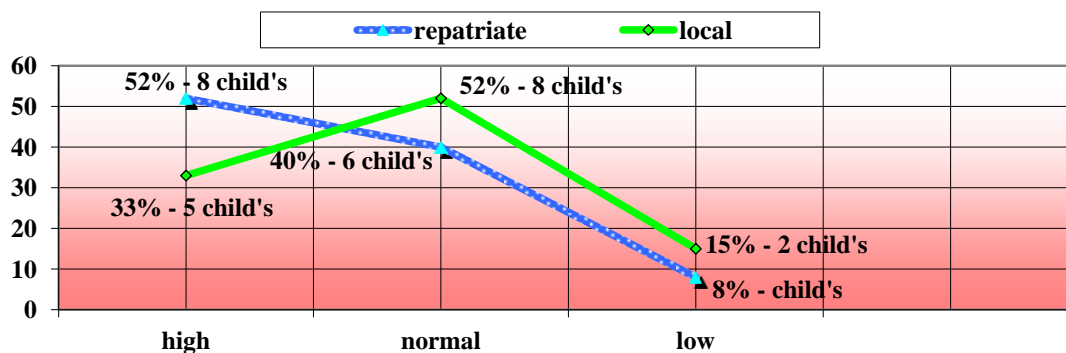


Figure 2 – Features of self-assessment of local and oralman teenagers (%)

According to the results of the study, the majority of oralman showed high self-esteem compared to local children (figure 2). This shows that they are confident in themselves, that they should set goals for themselves and work towards achieving this goal.

As we saw in the results of the study, children from single-parent families showed a relatively low level of self-esteem compared to adolescents from a full family. In our opinion, this is due to the financial situation, education and relationships of parents, lack of love of the father or mother. Therefore, we believe that the teacher should pay special attention to such students. After all, low self-esteem can hinder the personal growth of the child and create a "teenage complex" in him.

In order to determine the level of self-esteem of oralman and adolescents from local families, we analyzed their results, calculated the interest rate, focused on tables and charts. Only one feature is that in the study of children's self-esteem, we covered the ages of 15 and 16. That is, in the study of children from incomplete and single-parent families, we pay attention to 13 and 14 ages, oralman and local adolescents-15-16 years.

The adequacy of self-assessment indicates that it is of the right nature, that is, a person really appreciates his place, opportunities and qualities in life. Adequate self-esteem allows a person to make effective plans based on their capabilities.

Adequacy-compliance with the requirements of people and conditions. Adequacy-this means compliance. Self-esteem of the child depends on the assessment of the environment at an early age. With increasing age the self-esteem becomes more normal and independent [21].

With an excessively high level of self-esteem, a person does not think that failures are the result of their mistakes, laziness and improper behavior. "They arise only from random situations that occur now and here" [22]. To date, this technique Budasi widely used in the assessment of self-identity. This method determines the level and adequacy of self-esteem.

Conclusion. The conducted research work allowed us to draw the following conclusions:

- The self-esteem of a person in adolescence is influenced by the quantitative and qualitative composition of the family, social level, gender characteristics.
- Features of self-esteem of adolescents in a full and incomplete family according to the composition of the family are characterized by different levels.
- Unlike local children, oralman evaluate themselves, their personal qualities at a certain level.
- The age dynamics of self-esteem was determined: maximum self-esteem - in grade 9, minimum self-esteem - in grades 7-8, normal self-esteem - in grade 10.

Summing up the results of our research work, I would like to emphasize that adolescence is a period of intensive development of personality. In accordance with the current level of development of the country, new living conditions are created that contribute to the structure of self-esteem of adolescents. The financial situation in the family, the upbringing of parents, the nature of communication with the child plays an important role in the formation of the personality of a teenager. All such cases affect the intrapersonal world of the child and form the features of his self-esteem.

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ҚАЗІРГІ ЗАМАНҒЫ ЖАСӨСПІМДЕРДІҢ ӨЗІН-ӨЗІ БАҒАЛАУ ЕРЕКШЕЛІКТЕРІ

Аннотация. Қазіргі қоғамдағы әлеуметтік-экономикалық өзгерістер келешек ұрпақтың тұлғалық қалыптасу процесі мен олардың әлеуметтік-психологиялық бейімделу деңгейіне айтарлықпай ықпал етіп отыр. Бұл, әсіресе, ішкі қарама-қайшылықтармен сипатталатын жеткіншектік кезеңде орын алады.

Жеткіншектік кезең – өзіндік сана мен мінез-құлықтың қалыптасуы, өзіндік бағалау мен өзіндік қатынастың дербес, тәуелсіз жүйесінің өңделуі. Осындай жағдайлар дамудың осы кезеңіндегі өзіндік бағалау мәселесіне кеңінен тоқталуға негіз болды. Сондай-ақ түрлі психологиялық және әлеуметтік факторлармен қатар, өзіндік бағалау баланың әлеуметтенуі мен қоғамдық мінез-құлық нормаларының қалыпты жүзеге асуына зор ықпал етеді.

Қай елден келген оралман болмасын, олар – осы уақытқа дейін туып-өскен жеріне, тіліне, салт-дәстүріне, халқына, климатына икемделіп, бейімделген халықтар. Өз елім, жерім деп келгенімен, жаңа ортада көптеген қиыншылықтар кездеседі. Сондай қиыншылықтардың бірі – жана ортаға, қоғамға, адамдар көзқарасына, өзге заңдылықтарға, яғни жана климаттық жағдайға, әлеуметтік ортаға икемделу, бейімделу. Ал адамның бейімделу процесінің табысты жүзеге асуына ықпал ететіні – оның өзіндік бағалауы. Сондықтан оралман жеткіншектердің өзіндік бағалауы қазіргі жергілікті жеткіншектердің өзіндік бағалауларынан қаншалықты деңгейде ершеленеді, олар өздерін қалай бағалайды деген сұрақ біз үшін қызығушылық тудырды.

Оралмандар мен жергілікті отбасынан шыққан жеткіншектердің өзіндік бағалау деңгейлерін анықтау мақсатында олардың нәтижелерін саралап, пайыздық мөлшерін есептеп, кесте мен диаграммаға түсірдік. Тек бір ерекшелігі, бұл балалардың өзіндік бағалауын зерттеуде 15 және 16 жас аралығын қамтыдық. Яғни толық және толық емес отбасының балаларын зерттеуде 13 және 14 жас аралығына мән берсек, оралмандар мен жергілікті жеткіншектерде 15-16 жас аралығына мән бердік.

Оралмандар мен жергілікті жеткіншектердің өзіндік бағалауы кейбір ерекшеліктермен айқындалады. Оралман балалардың өзіндік бағалауы жергілікті жеткіншектермен салыстырғанда 20 %-ға жоғары шықты. Бұл олардың өзіне деген өз сенімділігін, жан-жақтылығын, өз алдына қол жеткізе алатын мақсат қойып, сол мақсатқа жету жолында аянбай еңбек ететіндерін байқатады. Жергілікті жеткіншектердің өзіндік бағалаулары қалыпты деген қорытынды жасауға болады.

С.А. Буддасидің тұлғаның өзіндік бағалау әдістемесі бүгінгі таңда осы мәселе аясында кең қолданысқа ие. Бұл әдістеме бойынша өзіндік бағалаудың деңгейі мен адекваттылығы анықталады.

Мақалада қазіргі заман жеткіншектерінің тұлғалық дамуындағы психологиялық ерекшеліктеріне, «өзіндік бағалау» түсінігінің мәні, құрылымы мен қызметтеріне теориялық талдау жасалып, сол теориялық білімнің негізінде өзіндік бағалаудың құрылымдық үлгісі құрылды және оқыту мен тәрбиелеудің қазіргі жағдайындағы жеткіншектердің өзіндік бағалау ерекшеліктерін анықтау көзделді. Соның негізінде 7-10 сынып оқушыларының өзіндік бағалау ерекшеліктері қарастырылды. Сонымен қатар бұл ғылыми жұмыстың отбасында жеткіншектердің өзара қатынасы мен өзара түсіністігін жақсарту мақсатында және жеткіншек-термен жұмыс істейтін педагогикалық кадрларды даярлау ісінде қолданылу қажеттілігі зор болып табылады.

Түйін сөздер: жеткіншектік кезең, өзіндік сана, өзіндік бағалау, «Мен» бейнесі, мінез-құлықтық автономия, құрбылармен қарым-қатынас.

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ОСОБЕННОСТИ САМООЦЕНКИ СОВРЕМЕННЫХ ПОДРОСТКОВ

Аннотация. Социально-экономические изменения в современном обществе оказывают существенное влияние на формирование личности будущего поколения и уровня их социально-психологической адаптации. Это происходит в подростковом возрасте, характеризующимися противопоказаниями.

Подростковый возраст включает в себя такие комплексные изменения, как формирование самосознания, поведения, развитие самостоятельной системы самоотношений и самооценки. Такие условия послужили

основой для широкого обсуждения оценки на данном этапе развития. Вместе с тем, наряду с различными психологическими и социальными факторами, самооценка способствует нормальному осуществлению социализации ребенка и норм общественного поведения.

Независимо от того, из какой страны прибыли оралманы, это люди различных возрастных групп, которые адаптировались к языку, традициям и обычаям, людям и климату той страны. Несмотря на то, что они с большой тоской возвращаются на свою родину, в новой среде они встречают много проблем. Одной из проблем является привыкание и адаптация к другим законам, к обществу, к новым климатическим условиям и социальной среде со своим мировоззрением и отношениями людей. И способствует успешной реализации процесса адаптации самооценка человека. Поэтому мы были заинтригованы тем, насколько самооценка оралманов отличается от самооценки людей, проживающих здесь, и нас заинтересовал вопрос, как они оценивают себя, насколько они себя ценят.

Чтобы сравнить уровень самооценки оралманов и местных подростков, были получены результаты, которые в процентном соотношении были отражены в таблицах, в графиках и диаграммах. Значимым моментом является то, что в исследовании по самооценке были охвачены подростки в возрасте от 15 до 16 лет. То есть при исследовании детей из полных и неполных семей мы учитывали возраст 13-14 лет, тогда как у оралманов и местных подростков – 15-16 лет.

В ходе исследования было установлено, что самооценка оралманов и местной молодежи определяется значимыми различиями. Самооценка детей оралманов была на 20 % выше, чем у местных подростков. Были отмечены следующие особенности в самооценке оралманов: их уверенность в себе, гибкость, умение ставить перед собой цель и упорно работать для достижения этой цели. Был сделан вывод, что самооценка у местных подростков более адекватна.

Это в свою очередь порождает надежность и универсальность методики самооценки С.А. Буддаси, который сегодня используется широко. Этот метод дает возможность определять уровень и адекватность самооценки.

В статье раскрывается сущность понятия "самооценка", ее структура и функций, психологические характеристики современных подростков в личностном развитии, на основе этих теоретических знаний формируется структурная модель самооценки и определяется особенность самооценки подростков в современных условиях обучения и воспитания. На ее основе рассмотрены особенности самооценки учащихся 7-10 классов. Кроме того, важно применять эту научную работу в целях улучшения, взаимодействия и понимания подростков в семье и подготовки педагогических кадров, работающих с подростками.

Ключевые слова: подростковый возраст, самопознание, самооценка, образ "я", автономия поведения, отношения со сверстниками.

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ETHNIC CONSCIOUSNESS AND REINTERPRETATION OF HERITAGE OF THE KAZAKH MUSICAL CULTURE IN 1970-1990-IES

Abstract. Various disparate phenomena of musical life, discoveries and changes in the paradigm of musicology in the 1970-1990s add up to a single picture of the growth of ethnic self-awareness and reappraisal of the cultural heritage of all historical periods, which prepared the latest stage in the history of musical culture of Kazakhstan. A return to the roots is understood both as a revival of disappearing genres (for example, *aitys* is a contest of *akyns* in poetic eloquence), as propaganda of original, traditional art, and as a creative rethinking of cultural heritage. In Kazakhstan, interest in the past was naturally reflected in musicology and in composer creativity. By the 1980s, a school of Kazakh musical folklore was formed. Two trends appeared in composer creativity: the “modernization” of folklore through the complication of the musical language of its transcriptions on the one hand and the development of folklore elements within the framework of new composer techniques of the 20th century on the other. A key factor in the process of reinterpreting the heritage of Kazakh musical culture in the 1970-1990s is ethnic identity. It is expressed in composers’ creativity, in ethnomusicology, and in understanding the role of Kazakh musical culture in the world. All these processes have prepared a paradigm shift in the culture of the post-Soviet period.

Key words: ethnic identity, reinterpretation, paradigm shift of culture, musical culture of Kazakhstan.

Introduction. In Kazakhstani musicology, as well as in the history of the republic, it is customary to distinguish the Soviet and post-Soviet periods with a border in 1991. However, a closer look at the historical and cultural processes in Kazakhstan indicates that the factual independence was prepared by the dynamic process of re-interpretation of the cultural heritage that took place in the creative and scholar circles in the 1970-1990s. Various disparate phenomena of musical life, discoveries and changes in the scientific paradigm of musicology add up to a single picture of the growth of ethnic identity and reappraisal of the cultural heritage of all historical periods.

Research methods. The music culture of Kazakhstan is considered as an integrated system. This explains the application of the systemic and historical method. In addition, the subject of the study involves reliance on the specific musicological and interdisciplinary methods: musical-historical, source study, analytical, stylistic, comparative, cultural and sociological.

Results and discussion. New changes in the structure of the text of national culture occurred in the 1970s. After a concert of symphonic music of Kazakhstan, held in March 1976 at the All-Union House of Composers, G. A. Zhubanova wrote the following lines: “The concert was a success. The demanding Moscow audience warmly welcomed our music... But a certain time passed and I thought about this: are we too keen on direct quoting of folklore, and even more so, of the one genre – *domyra kuis*. Indeed, some authors were simply obscured by folk material. Isn’t it time for us to seek our own, personal,

individual approach to folklore? Indeed, quoting a folk theme often restrains the composer's will and imagination”.

The aspirations for a renewed implementation of folklore through its deep study, which embraced both composers and musicologists, are consistent with the all-Union trend noted in the famous article by I. I. Zemtsovsky “Folklore and composer” [1].

Two trends were outlined: “modernization” of a folklore through the complication of the musical language of its transcriptions on the one hand, and the development of folklore elements within the framework of new composer techniques of the 20th century, on the other. Composers representing a particular phenomenon of national culture gravitated toward the first: “a *folk type of professional musician who has adopted the achievements of a qualitatively different artistic system and at the same time retained the integrity of traditional musical thinking*” [2, p.42]. Among them a number of names could be mentioned: N. Tlendiev (1925-1998), M. Koyshibaev (1926-1986), K. Kumysbekov (1927-1997), D. Botbaev (b. 1927), M. Mangitaev (b. 1937), K. Duisekeev (born 1946), J. Tursunbaev (born 1947), A. Zhayimov (born 1947), E. Usenov (born 1952), E. Umirov (born 1954), to some extent E. Rakhmadiev (1930-2013), T. Bazarbaev (1935-2006), B. Daldenbaev (born 1955), K. Shildebaev (born 1957), E. Khusainov (born 1955). The second is traced to a greater extent among composers of the younger generation, often musicians in the second generation, representatives of urban culture. These include, first of all, G. Zhubanova (1927-1993), B. Bayakhunov (b. 1933) V. Novikov (1937-2012), M. Sagatov (1939-2002), V. Minenko (1941-2003), V. Strigotsky-Pak (b. 1947), A. Serkebaev (b. 1948), T. Mukhamedzhanov (b. 1948), B. Amanzhol (b. 1952), J. Tezekbaev (1954-2004), A. Meirbekov (1955-2008), B. Kydyrbek (p. 1955), S. Erkimbekov (p. 1958), A. Toksanbay (b. 1958) A. Bestybaev (b. 1959), A. Mambetov (b. 1961), S. Abdinurov (b. 1962), A. Raimkulova (b. 1964), G. Uzenbaeva (b. 1964). Both trends are in line with the transformation of attitudes towards folklore in society and the deep inclusion of traditional values in the system of national identity (which is the subject of a number of recent studies – see [3,4,5]).

Almost all composers of the republic were involved in the search for new ways of the composer school. One of the most influential figures of this period is Gaziza Zhubanova: a composer with an active creative position, a graduate of the Moscow State Conservatory named after P. I. Tchaikovsky (class of Yu. Shaporin), connoisseur of modern art. In different years, being the head of the Union of Composers of the Kazakh SSR (1962-1968), the Almaty Conservatory named after Kurmangazy (1975-1987)¹, she consistently implemented the “*program for the renewal of creative life*” [6, p.76]. Her literary heritage (autobiographical notes, publications in periodicals) is especially valuable as a unique document of the era. I will quote the statements of G. Zhubanova, in which the ideas of updating the musical language of Kazakh composers are expressed:

“The conservatory listened to the new Sixth Symphony by E. G. Brusilovsky “Kurmangazy” (in 1965). It provoked a big protest from me. Such a topic required a corresponding deep relationship, an innovative approach to the implementation of the plan. The finished themes of the *kuis* by Kurmangazy presented in the symphony sounded superficial. The author’s brilliant possession of the orchestra did not save – everything sounded empty, loud, but not saturated, the music did not excite...” [7, p.64].

“Traditions of world instrumental music had ever more profound effect on our composers, leading to the realization of complex patterns of musical language of *kuis*. If in the works of the first stage the influence of instrumental music was more significant in the field of creating thematism and often did not affect other aspects of form, then the new stage is characterized by a desire for an inclusive reflection of the characteristics of traditional musical thinking. This method of development of *kuis* already implements the very system of intonational formation of the integral form of a *kui*, as well as its timbre and texture enrichment” [8, p.31].

Through familiarization with the achievements of composers of the 20th century, the development of new compositional techniques, modernization of the form and content of music, not only the text of the national culture is updated, but also the rethinking of the role of Kazakh culture in the world cultural space takes place [9].

¹In the interval between these occupations, G. Zhubanova was elected as a delegate to the XXIII Congress of the CPSU and a member of the Central Committee of the Communist Party of Kazakhstan.

V. Nedlina explores this process as a reinterpretation of the cultural heritage in Kazakhstan, which took place in the 1980-2000s [10, p.47]. She highlighted the most important consequences of the reinterpretation:

- two main layers of Kazakh traditional music (folklore and professionalism of oral tradition) are identified;

- the traditions of *aitys* and East Kazakhstan *dombyra* school *shertpe* almost lost to the 1980s have found a second life; *baqsylyk* (shamanism) and *dhikr*, which existed in the Soviet Union secretly became an object of the study;

- a whole range of stylistic trends appeared in composer's work (nearchaics, neoclassicism in its western, national and eastern refractions, polystylistics), the subject of creativity expanded, works of an experimental plan began to appear;

- in mass genres, the role of traditional culture as an ideological and thematic basis increased, mixed “ethno-genres” appeared (ethno-jazz, ethno-rock, ethno-pop);

- the musical culture of Kazakhstan appeared on the world stage in a new quality – as an independent phenomenon [10, p.51-52].

All these transformations had a significant impact on composer's work, the appearance of which changed significantly after 1980. Let's consider the changes that have occurred. The Kazakh media often voiced the idea that gaining independence on December 16, 1991 gave an impetus to the *growth of ethnic identity*. However, this process began much earlier and has a long history. The moment of unity of the nation in the face of danger – the invasion of the Jungars (1723-1731) – was widely reflected in the poetic memory of the people, gave a new meaning to heroic-epic legends. It was at this time that the role of the steppe intelligentsia, the spokesmen of advanced political and historical thought, was played by the famous Zhyrau Tati-Kare, Umbetei, Bukhar [11, p. 487-489], Aktamberdy, Kozhabergen and others. One of the common motives in their poems is the theme of the unity of the people. In the works of Kazakh enlighteners of the 19th century, Ibrai Altynsarin, Abay Kunanbaev, calls are made to the Kazakhs to raise the greatness of the nation through education, familiarization with world culture.

The most important milestone in the history of culture of modern Kazakhstan, which determined the direction of artistic and philosophical thought, the theme of creativity of artists of the late 20th century, was the novel by Ch. Aitmatov “And the day lasts longer than a century...” (1980). The legend of *mankurt*, a man forcibly deprived of the memory around which the ideological concept of this work takes shape, is recognized by readers as a peculiar idea of the time. It is no accident that many cultural figures of Kazakhstan creatively responded to this work. Already in 1984 in Moscow at the Theater. Vakhtangov hosted the premiere of the play of the same name directed by A. A. Mambetov with music by composer G. A. Zhubanova. In 1991, she completed the libretto of the opera *Burannoy Edige* or *Aitmatov Legends* (the opera has not yet been staged) based on the novel and the novel *White Cloud of Genghis Khan* by the writer [12]. The images of a Kyrgyz writer are used by musicologists to describe their attitude to cultural heritage in the 1990-2000s (see works by A. Kunanbaeva [13], U. Jumakova [14], Zh. Toshchenko [15] – in the form of “mankurtism” meaning “Separation from the roots”).

A return to the roots is understood both as a revival of disappearing genres (for example, *aitys* is a contest of *akyns* in poetic eloquence), and as propaganda of the original, traditional art, and as a creative rethinking of cultural heritage. All these processes begin even before the collapse of the Soviet Union.

Another important milestone that influenced the ideological installation in the works of national composers were the events of December 1986, when the Alma-Ata student youth strongly opposed appointed from Moscow First Secretary of the Communist Party of the Kazakh SSR G. V. Kolbin. The significance of this event for culture consists, first of all, in the open voice of nationalist slogans, in a call to increase the role of the Kazakh language (and mentality) in the republic. In the discourse of the second half of the 20th century, a transformation of meanings takes place, giving the word “nationalism” a negative connotation. Thus, in the 1986–87 newspaper publications, the concept of “nationalism” was given an extremely negative connotation. In fact, there was a substitution of concepts (nationalism - Nazism - fascist ideology). But precisely which gained while forms of nationalism to counter one-sided Westernization of culture of Kazakhstan, became the driving force of cultural renewal through a return to the roots, followed in 1990-2000-ies. In the context of our study, I by nationalism, we increasingly understand mounting on the preservation of ethnic culture, in no way does not preclude integration with the global cultural community. December performances influenced many composers. The search for ways

to renew the means of musical expressiveness through «return to the roots» one way or another is manifested in the work of a whole galaxy of composers who began their career in the 1980-1990s: T. Mukhametzhanov, E. Khusainov, B. Kadyrbek, A. Zhayimov, A. Meirbekov, B. Daldenbaev, K. Shildebaev, A. Toksanbaev, A. Bestybaev, A. Raimkulova, G. Uzenbaeva, A. Sagatov and others.

In the second half of the 1980s, and especially in the 1990-2000s, there is a reinterpretation of the heritage of the Kazakh musical culture, as a result of which the structure of the text of the national culture is updated. This process has a close relationship with similar processes in all the former republics of the USSR and is caused by objective external and internal reasons. “The first include the changes in the political climate of the country that occurred in the 80-90s, and the internal ones – their consequences in culture, including musical historiography,” writes M. Aranovsky about changes in the study of Russian music. He also notes two directions for expanding the research field: “in the depths of centuries” and “in modern times, in the 20th century” [16, p.7].

In Kazakhstan, interest in the past was naturally reflected in musicology and in composer creativity. By the 1980s, a school of Kazakh musical folklore was formed, represented by young scientists B. Amanov, A. Mukhambetova, S. Elemanova, A. Kunanbaeva, S. Utegalieva, B. Karakulov, A. Baygaskina, I. Kozhabekov and their students [17, p. 42].

A kind of marker for a change in the scientific paradigm was the conflict of the already recognized school of Kazakh musicology and the “new wave”. Talking about the professional debut of A. I. Mukhambetova – the article “National and International in the Music of Soviet Kazakhstan: on the Kui Problem” [18] – her students G. Omarova and L. Izmailova write: “In Alma-Ata, these thoughts caused such a strong rejection that prompted local masters from musicology to writing angry letters to the highest authorities of Moscow and Leningrad with demands to take measures against ideological sedition” [19, p.4]². The presentation of the claims and arguments of the parties is beyond the scope of this study, but already from the current historical distance one can regard the situation in folklore as a conflict of generations and as a kind of revolution that prepared the reinterpretation of the text of national culture during the period of independence.

The main ideas of this article by A. Mukhambetova in many respects anticipated the changes in the field of musical culture that occurred in the 1980-1990s. In addition to the new postulate for that time about the existence of an oral form of professionalism in many traditional cultures (not only Kazakh, but also practically all Central Asian), the researcher was one of the first to note the change in attitude to folklore that occurred in the 1960s and reveals changes in the cultural paradigm. It is worth emphasizing the importance of thinking about the differences in the formation of bilingual national literature (Kazakh writers writing in Kazakh and Russian, as well as only in Russian) and also bilingual musical culture. The first was formed under conditions of historical continuity and continuity, preserving, primarily through language, a connection with the traditions of the ancestors, which supported the “ability to reflect the national character in its dynamics” [18, p.35]. In music, “a new professional art of the European type, the understanding of which requires special preparation, finds listeners mainly in the urban intelligentsia” [18, p.36].

The bright opuses created in the spirit of the “non-folklore wave” that encompassed many composers of the Soviet Union in the 1960s and 1980s include cues and arrangements of folk songs by B. Amanzhol for various compositions, programmatic symphonic and chamber works by A. Bestybaev, works for Orchestra of Kazakh folk instruments E. Khusainova, cantata «Kokzhal» A. Raimkulova and works by other composers. S. Abdinurov, the author of many program works (Eternal Kyu, Arystanbab, Ataturk, Korkyt, Beit Symphony, etc.) noted the influence of G. Kancheli, T. Shahidi, aesthetic attitudes on his work, R. Shchedrin – prominent representatives of national Soviet composer schools, known for their innovative attitude to folk music [20, p.322].

The issues of the revival of ethnic self-awareness naturally lead to attempts to *realize the place of the Kazakh ethnos in the Goethe-Schumann “great fugue of peoples”*. This refers to two similar quotes that have become winged expressions. Goethe: “The history of science – a great fugue, in which little by little

²The opinion of the students of A. I. Mukhambetova reflects only one point of view. The author does not in any way pretend to present this opinion as the only true one.

come the voices of peoples» (The Die Geschichte der Wissenschaften ist eine große Fuge, in der die Stimmen der Völker nach und nach zum Vorschein kommen). Schumann: “Art is a great fugue, the voices in which – the nations,, (Die Kunst wird die große Fuge sein, in der sich die Völker abhören im Singen). This process is characterized through the opposition “I am the Other” (or “We are the Others”) – one of the central categories of 20th-century philosophy (from E. Husserl to M. Buber). The process of worldwide representation of Kazakhstani musicians is consistent with globalization trends (for more details, see T. Gafurbekov, A. Omarova, A. Kaztuganova [21; 22]). Representing Kazakh culture on the world stage in the 1980-1990s naturally formed two vectors of this opposition: “Kazakhs – the eastern world”, “Kazakhs – the western world”. Within the framework of the first, the musical heritage of Kazakhstan is recognized, first of all, as part of the nomadic culture of Eurasia (along with such cultures as the Kyrgyz, Karakalpak, Turkmen, Tuva, Khakass, Mongolian and others), as well as part of the Turkic world (akin to the Uighur, Uzbek, Azerbaijani, Turkish - see an example of a study [23]).

Conclusion. Thus, a key factor in the process of reinterpreting the heritage of Kazakh musical culture in the 1970-1990s is ethnic identity. It finds expression in neo-folklore trends in composer creativity, in the formation of Kazakhstan’s ethnomusicology, in understanding the role of Kazakh musical culture in the world, in reviving the genres of traditional music (*aitys*, *baqsylyq*, etc.) considered to be disappeared, in the formation of new directions in mass music. All these processes have prepared a paradigm shift in culture in the post-Soviet period.

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1970-1990 ЖЫЛДАРДАҒЫ ҚАЗАҚ МУЗЫКАЛЫҚ МӘДЕНИЕТІ МҰРАСЫНЫҢ ЭТНИКАЛЫҚ САНА-СЕЗІМІ МЕН РЕИНТЕРПРЕТАЦИЯСЫ

Аннотация. Қазақстан музыкатануында да республика тарихындағы секілді 1991 жылы кеңес және посткеңестік кезеңдердің шекарасын бөліп көрсету мәселесі белгіленген. Алайда, Қазақстандағы тарихи-мәдени үдерістерге аса терең көзқарас 1970-1990 жылдары шығармашылық және ғылыми ортада орын алған мәдени мұраны реинтерпретациялаудың серпінді үдерісімен тәуелсіздікке нақты ие болуға дайындалғанын дәлелдейді. Музыкалық өмірдің әртүрлі шашыраңқы құбылыстары, музыка санасының ғылыми парадигмасындағы жаңалықтар мен өзгерістер этникалық сана өсуінің және барлық тарихи кезеңдердің мәдени мұрасын қайта бағалаудың бірыңғай көрінісіне негізделеді. Тамырға оралу, жойылып бара жатқан жанрларды қайта жаңғырту (мысалы, айтыс), көне, дәстүрлі өнерді насихаттау және мәдени мұраны шығармашылық тұрғыда қайта пайымдау деп түсіндіріледі. Бұл үдерістердің барлығы Кеңес одағының ыдырауына дейін басталды.

Зерттеуде жүйелі және тарихи тәсілдер қолданылды. Сонымен қатар, арнайы-ғылыми музыкатану және пәнаралық: музыкалық-тарихи, деректану, салыстырмалы талдау әдісі, музыкалық-мәдениеттану және музыкалық-әлеуметтік әдістер қолданылды.

Ұлттық мәдениет мәтіні құрылымындағы жаңа өзгерістер 1970 жылдары болды. Екі бетбұрыс байқалды: бір жағынан музыка тілін күрделендіре өңдеу арқылы фольклорды «қазіргі заманға лайықты ету» және екінші жағынан ХХ ғасырдың жаңа композиторлық техникалары аясында фольклор элементтерін игеру. Республиканың барлық композиторлары композиторлық мектептің жаңа жолдарын іздеуге жұмылдырылды. ХХ ғасыр композиторларының жетістіктеріне баулу, композицияның жаңа техникаларын игеру, музыканың нысаны мен мазмұнын қазіргі заманға лайықты ету арқылы ұлттық мәдениет мәтінінің жанаруы ғана емес, сонымен қатар әлемдік мәдени кеңістіктегі қазақ мәдениетінің ролін қайта қарастыру да жүзеге асырылады. Бұл үдерісті В. Недлина Қазақстанда 1980-2000 жылдары орын алған мәдени мұраның реинтерпретациясы ретінде зерттейді [10, 47 б.]. Аталған өзгерістер 1980 жылдан кейін елеулі өзгеріске ұшыраған композиторлық шығармашылыққа елеулі әсер етті.

Ұлттық композиторлар шығармашылығындағы идеялық ұстанымдарға әсер еткен тағы бір маңызды кезең 1986 жылғы желтоқсан оқиғасы болды. Олар көптеген композиторлардың шығармаларына әсер етті. «Түп тамырға оралу» арқылы музыкалық мәнерлілік құралдарын жаңарту жолдарын іздеу 1980-1990 жылдары шығармашылық жолын бастаған композиторлардың тұтас тобы шығармашылығында көрініс тапты: Т. Мұхаметжанов, Е. Хусаинова, Б. Қадырбек, А. Жайымов, А. Мейірбеков, Б. Дальденбаев, К. Шілдебаев, А. Токсанбаев, А. Бестібаев, А. Райымқұлова, Г. Өзенбаева, А. Сағатов және т.б.

1980 жылдардың екінші жартысында, әсіресе, 1990-2000 жылдары қазақ музыкалық мәдениетінің мұрасына қайта түзету жүргізіледі, соның салдарынан ұлттық мәдениет мәтінінің құрылымы жаңартылады. Бұл үдеріс КСРО-ның барлық бұрынғы республикаларындағы ұқсас үдерістермен тығыз байланыста және объективті сыртқы және ішкі себептерге байланысты. Қазақстанда өткен күндерге деген қызығушылық музыка білімі мен композиторлық шығармашылықта заңды көрініс тапты. 1980 жылдары қазақ музыкалық фольклористикасының мектебі қалыптаса бастады [17, 42 б.].

Қазақ музыкасы мен «жаңа толқын» мектебінің қақтығысы ғылыми парадигманың ауысуының өзіндік белгісіне айналды. Қазіргі тарихи қашықтықтан фольклористикадағы жағдайды ұрпақтар қақтығысы ретінде және Тәуелсіздік кезеңінде ұлттық мәдениет мәтінінің реинтерпретациясын дайындаған төңкеріс ретінде бағалауға болады.

1960-1980 жылдары Кеңес Одағының көптеген композиторларын қамтыған «неофольклорлық толқын» рухында дүниеге келген жарқын шығармаларға Б. Аманжолдың түрлі құрамдарға арналған күйлерін және өңделген халық әндерін, А. Бестібаевтың бағдарламалық симфониялық және камералық шығармаларын, қазақ халық аспаптары оркестріне арналған Е. Хусаиновтың шығармаларын, А. Райымқұованың «Көкжал» кантатын және басқа композиторлардың шығармаларын жатқызуға болады. Көптеген бағдарламалық шығармалардың («Мәңгілік күй», «Арыстан баб», «Ата түрік», «Қорқыт», «Бейт-симфония» және т. б.) авторы С. Әбдінұров ұлттық кеңес композиторларының көрнекті өкілдері, халық музыкасына жаңашыл көзқарасымен танымал Г. Канчели, Т. Шахиди, Р. Щедрина сынды тұлғалардың эстетикалық нұсқауларының өз шығармашылығына әсерін атап өтті [20].

Этникалық сана-сезімді жаңғырту мәселелері табиғи түрде Гете-Шуманның «халықтардың үлкен фугасында» қазақ этносының орнын түсінуге ұмтылдырады. Бұл үдеріс «Мен – Басқамын» (немесе «Біз – Басқамыз») оппозициясы – XX ғасырдың философиясының орталық санаттарының бірі арқылы сипатталады (Э. Гуссерльден М. Буберге дейін). 1980-1990 жылдары әлемдік сахнада қазақ мәдениетінің репрезентациясында осы оппозицияның екі векторы: «қазақтар-шығыс әлемі», «қазақтар – батыс әлемі» қалыптасты.

Осылайша, 1970-1990 жылдары қазақ музыкалық мәдениетінің мұраларын реинтерпретациялау үдерісінде этникалық сана-сезім негізгі факторға айналды. Ол композиторлық шығармашылықта неофольклорлық үрдістерде, қазақстандық этномызыкатынудың қалыптасуында, жоғалып кеткен дәстүрлі музыканың жанрларын (айтыс, баксылық және т.б.) қайта жаңғыртуда, көпшілікке арналған музыкадағы жаңа бағыттарды қалыптастыруда көрініс табады. Осы үдерістердің барлығы посткеңестік кезеңдегі мәдениет парадигмасының ауысуына негіз болды.

Түйін сөздер: этникалық сана-сезім, реинтерпретация, мәдениет парадигмасының ауысуы, Қазақстанның музыкалық мәдениеті.

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ЭТНИЧЕСКОЕ САМОСОЗНАНИЕ И РЕИНТЕРПРЕТАЦИЯ НАСЛЕДИЯ КАЗАХСКОЙ МУЗЫКАЛЬНОЙ КУЛЬТУРЫ В 1970-1990-х ГОДАХ

Аннотация. В казахстанском музыкознании, как и в истории республики, принято выделять советский и постсоветский периоды с границей в 1991 году. Однако более пристальный взгляд на историко-культурные процессы в Казахстане свидетельствует о том, что фактическое обретение независимости было подготовлено динамичным процессом реинтерпретации культурного наследия, имевшем место в творческих и научных кругах в 1970-1990-х годах. Различные разрозненные явления музыкальной жизни, открытия и изменения в научной парадигме музыкознания складываются в единую картину роста этнического самосознания и переоценки культурного наследия всех исторических периодов. Возвращение к корням понимается и как возрождение исчезающих жанров (например, *айтыс*), и как пропаганда исконного, традиционного искусства, и как творческое переосмысление культурного наследия. Все эти процессы начинаются ещё до распада Советского Союза.

В исследовании применены системный и исторический подходы. Кроме того, привлекаются специально-научные музыковедческие и междисциплинарные методы: музыкально-исторический, источниковедческий, метод сравнительного анализа, музыкально-культурологический и музыкально-социологический.

Новые изменения в структуре текста национальной культуры произошли в 1970-е годы. Намечились две тенденции: «осовременивание» фольклора через усложнение музыкального языка его обработок с одной стороны и освоение элементов фольклора в рамках новых композиторских техник XX века – с другой. Практически все композиторы республики оказались вовлечены в поиск новых путей композиторской школы. Через приобщение к достижениям композиторов XX века, освоение новых техник композиции,

осовременивание формы и содержания музыки происходит не только обновление текста национальной культуры, но и переосмысление роли казахской культуры в мировом культурном пространстве. Этот процесс В. Недлина исследует как реинтерпретацию культурного наследия в Казахстане, имевшую место в 1980-2000-х годах [10, с.47]. Все эти трансформации оказали значительное влияние на композиторское творчество, облик которого существенно изменился после 1980 года.

Ещё одной важной вехой, повлиявшей на идейные установки в творчестве национальных композиторов, стали события декабря 1986 года. Они оказали влияние на многих композиторов. Поиск путей обновления средств музыкальной выразительности через «возвращение к корням» проявляется в творчестве целой плеяды композиторов, начавших творческий путь в 1980-1990-е годы: Т. Мухаметжанова, Е. Хусаинова, Б. Кадырбек, А. Жайымова, А. Меирбекова, Б. Дальденбаева, К. Шильдебаева, А. Токсанбаева, А. Бестыбаева, А. Раимкуловой, Г. Узенбаевой, А. Сагатова и других.

Во второй половине 1980-х и особенно в 1990-2000-е годы происходит реинтерпретация наследия казахской музыкальной культуры, вследствие которой обновляется структура текста национальной культуры. Этот процесс имеет тесную связь с аналогичными процессами во всех бывших республиках СССР и вызван объективными внешними и внутренними причинами. В Казахстане интерес к прошлому нашёл закономерное отражение в музыкознании и в композиторском творчестве. К 1980-м годам сформировалась школа казахской музыкальной фольклористики [17, с. 42].

Своеобразным маркером смены научной парадигмы стал конфликт уже признанной состоявшейся школы казахского музыкознания и «новой волны» [19]. С нынешней исторической дистанции можно расценивать ситуацию в фольклористике как конфликт поколений и как своего рода революцию, подготовившую реинтерпретацию текста национальной культуры в период независимости.

К ярким опусам, созданным в духе «неофольклорной волны», охватившей в 1960-1980-х годах многих композиторов Советского Союза, можно отнести кюи и обработки народных песен Б. Аманжолы для различных составов, программные симфонические и камерные произведения А. Бестыбаева, произведения для оркестра казахских народных инструментов Е. Хусаинова, кантату «Кокжал» А. Раимкуловой и сочинения других композиторов. С. Абдинуров, автор многих программных произведений («Вечный кюи», «Арыстанбаб», «Ататюрк», «Коркыт», «Бейт-симфония» и др.), отмечал влияние на своё творчество эстетических установок Г. Канчели, Т. Шахиди, Р. Щедрина – ярких представителей национальных советских композиторских школ, известных новаторским отношением к народной музыке [20].

Вопросы возрождения этнического самосознания естественным образом приводят к попыткам *осознать место казахского этноса в «большой фуге народов»* Гёте-Шумана. Этот процесс характеризуется через оппозицию «Я – Другой» (или «Мы – Другие») – одну из центральных категорий философии XX века (от Э. Гуссерля до М. Бубера). В репрезентации казахской культуры на мировой сцене в 1980-1990-е годы складываются два вектора этой оппозиции: «казахи – восточный мир», «казахи – западный мир».

Таким образом, ключевым фактором в процессе реинтерпретации наследия казахской музыкальной культуры в 1970-1990-е годы становится этническое самосознание. Оно находит выражение в неофольклорных тенденциях в композиторском творчестве, в формировании казахстанского этномузыковедения, в возрождении считавшихся исчезнувшими жанров традиционной музыки (айтыс, баксылык и др.), в формировании новых направлений в массовой музыке. Все эти процессы подготовили смену парадигмы культуры в постсоветский период.

Ключевые слова: этническое самосознание, реинтерпретация, смена парадигмы культуры, музыкальная культура Казахстана.

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COGNITIVE-COMMUNICATIVE STRATEGIES OF KAZAKHSTANI LITERATURE: SPECIFICITY OF FORMATION AND FUNCTIONING

Abstract. The article discusses the problem of the formation of the main cognitive-communicative strategies of the literary discourse of Kazakhstan. In the implementation of these strategies, a large role is played by cultural codes. The latter, as significant semiotic units of the text, are included in its conceptual core. Such concepts of the theory of cultural code as philosophical, ideological, conceptual core, ethnostereotype, heterotopic markers, detailed multicultural landscape and others receive terminological design. Cognition of the world and understanding of history, modernity, the possible future is often realized in a work through the universalization of the art world, multiculturalism, and the construction of complex narrative structures. The specificity of a historical narrative is analyzed with its characteristic capacious referential mode, involving the reader in the active communicative process of decoding narrated events and images. The heterotopic markers of myth-folklore units in the structure of a literary text are studied, the stability and iteration of traditional ethnocultural codes are noted.

The bipolar tendency of ethnostereotyping and multicultural landscape of the art world is determined as an important cognitive-aesthetic strategy of literature in Kazakhstan. A multidimensional dialogical space of one or another cultural code is formed, an extension of its referential and epistemological connotations. The issues of sacralization, universalization and profanation of the artistic space and time, various topos, realities, and personalities are considered. The specificity of the narrative structure of the historical novel, diffusion methanarrative, is investigated.

The content and functioning of such universal frequency codes as philosophemes and ideologemes are substantiated. By their dialogical and cognitive-communicative nature, philosophemes, like mythologemes and folkloremes, in a literary text come closer to the universals of culture. An additional result of such an immanent presence and subsequent development in the text of these philosophemes (universals) is the complication of its genre, style nature. In connection with the implementation of the strategy of maximum metaphorization and universalization of the art world, the emergence of hybrid genres is justified: a novel-myth, a novel-requiem, a novel-revelation, and others.

The inclusion in the literary text of a large amount of metatexts (diaries, notes, poems, translations) becomes an additional tool for constructing a complex system of coding and recoding information, specific translation of knowledge about the political, historical, cultural, legal, economic, systems, social stratification of the presented world spaces. A change in stereotype also finds a place in the paradigm of literary discourse. Some distinguished cultural codes (path, caravan), showing a strong attraction to each other, reinforce the philosophical and worldview depth of the narrative.

Key words: literature, strategy, discourse, cultural code, philosophy, ethnostereotype, narrative.

Introduction. The active processes of multilevel modeling, the functioning of cultural codes in the literature of modern Kazakhstan show the presence and dynamics of a number of cognitive-communicative strategies (ethnostereotyping, multiculturalism, intertextualization, universalization of meanings, creation of diffusive narratives, meta-narratives and mega-narratives). By maximizing the content of the cultural code as a specific semiotic unit of the text, we can talk about its polysemantic and polystylistic functional orientation. The referential orientation of the code varies in close connection with

the general concept and philosophy of the work, extratext environment. This thesis explains the significant epistemological and phenomenological status inherent in the code, the peculiarities of the formation of its semantics and structure in specific texts. A comprehensive analysis of a number of the most frequent cultural codes (philosopher, ideologist, folklore, historiosophist, mythologem and others) shows their unlimited aesthetic potential in the aspect of modeling and forecasting a certain narrative and communicative-informative situation in the literature of Kazakhstan.

Methods. In the study, the authors use several scientific methods: a comparative typological method, a comprehensive literary analysis, narrative, motivational, semiotic, structuralist text analysis. The basic principle of the study is an interdisciplinary approach to the study of the cultural code phenomenon.

Results. The contextual environment of Russian literature is distinguished by its great relief, the coexistence of various artistic and worldview approaches, and a significant experimental mode. The synthesis of ethnic and foreign stylistics, plots determines the development of complex mega-and metanarratives. Actualization of primordial ethno-cultural content in the form of recognizable historical images, folklore, sacronyms, many reminiscences, allusions referring to national symbols and history (*Zher-Yiyk*, *Zher-Ana*, *Zhelmaya*, *Samruk*, *Aruak*, *balbal*, *Desht-i-Kipchak*), and motives of other traditions (European, Latin American, Indian, Japanese, Chinese) creates a unique panoramic stereoscopic vision of the problems of our time.

This structures a particular, often overloaded with details, narrative, emotive frame, the referential diversity of the work. Unlike a multipolar media discourse with its ambiguous communicative-value, blurred ethical attitudes, the literature of Kazakhstan is a mature aesthetic phenomenon that has a strong traditional lyrical-epic charge, intertextual conjugation with foreign cultural aesthetic complexes. This quality is clearly manifested in the *Book of Doomsday* by S. Elubay, replete with references to various sacronyms (names of gods, iconic personalities) of world spiritual traditions, detailed quotes from the scriptures (the Koran, the Bible, the Rig-Veda, the Torah) and the author's commentaries on them.

In other words, an important cognitive and aesthetic strategy of modern literary discourse is the bipolar *tendency towards ethnostereotyping* of the art world and at the same time the formation of its *multicultural landscape*, the end result of which is the multidimensional dialogical space of a cultural code, the expansion of its referential and epistemological connotations.

It is established that in the development of the plot-shaped basis in these texts, the so-called *ethnostereotypes*, which include various stable ideas about the mental, emotional, sensual, worldview and other characteristics of a particular ethnic group. Ethnocultural codes such as *zher-ana*, *khan*, *kagan*, *batyr*, *biy*, *dala*, *argymak*, *dombra*, *kyushi*, *zhyrau*, *baibesh*, *sacred mountain*, *balbal*, mythological and folklore images of *Kok-Tengri*, *Umai*, *Samruk*, *Zheztyrnak*, *Karakus* and many others are distinguished by their great length and preservation in time, stability and iteration in various literary texts.

Historical personalities - biys, khans, batyrs, zhyrau, sal-seri (Abylay khan, Abulkhair khan, Bukhar zhyrau, Tole bi, Kabanbai batyr, Bogenbai batyr) are subject to a distinct ethnostereotypical connotation. A great historical time with steep zigzags of the difficult fate of the Kazakh people formed the basis of the dilogy *Daraboz* (in Russian translation - *Kabanbay batyr*) of K. Zhumadilov [1], where the volume of famous historical personalities is about 40% of the total number of book images. A.F. Koffman defines the process of forming a stereotype in literature as follows: "if the repetition of the same images and motives cannot be explained either by chance or imitation, then they should be understood as stereotypes of artistic thinking (the concept of "stereotype" in our case does not contain not the slightest negative shade). They are formed unconsciously, spontaneously - on a common perception of the world and themselves in it. In contrast to folklore stereotypes, literary ones are much more mobile, blurred, varied ... Artistic stereotype is something external, in other words a form; the study of genesis and symbolic meaning leads to its content - namely, to the archetype of artistic thinking. The totality of the archetypes of artistic thinking makes up the artistic code of this culture" [2, p.8-9].

Universal spatial codes such as *mountain*, *steppe*, *sky*, as sacred substrates of a nomadic world space marked with symbols of eternity, transcendence, universality, are the most frequent codes of Kazakh culture and literature. Their fictitious and functional assignment, a large extent in time and space is obvious, but in each case, the filling of these images varies depending on the narrative situation in which they are placed. Such are the Karaspan mountains in *the Death of Otrar* of H. Adibaev, the Saki steppe in the *Kipshyk Aruy* of M. Magauin, *Saki* of B. Zhandarbekov, *Karavan* of A. A. Tynibekov, *Tengri in the Dreams of the Cursed* of A. Zhaksylykov. These symbolic images simultaneously acquire the significance

of heteropic (qualitatively different, according to Foucault) spaces as special sign systems of a specific, namely, syncretic nomadic world order and worldview. For example, S.Sh. Ayazbekova indicates this quality of the *Tengri* code in the following: “In the image of *Tengri* for the Kazakh nomads, the different hypostases of the World-building of the Kazakhs were united: the World as the Absolute and as a visible, tangible reality, including Heaven, Sun, Moon and Earth; The world as a divine-cosmic formation with its hierarchical levels; finally, the World as perfect Harmony is an ideal. This cult, quite stable for many centuries, turned out to be the fundamental and historically stabilizing factor that was not lost during many other religious influences, since it was preserved in the unconscious archetypes of human memory ” (*Translated into English by S.Altbayeva*) [3, p. 6].

At the same time, as a result of the superethnostereotyping of the art world, a loss of transcendence as the dominant of the sacronym, myth image, mythotonym and other universal codes is possible. This can lead to the destruction of their semantics, as José Manuel Losada Goya writes:

“Transcendental subversion is also often called mythic subversion or demythologization, insofar as a transcendent and etiologial character are elements unique to myth in literature. The loss of one expositive style or another might be innocuous to a mythic narrative, but the loss of its transcendent character would prove lethal” [4, p.7].

Such destruction of the sacred semantics of topos (sacred mountain peak) we find in the story of *Karaly tobe* of R. Mukanova [5]. The disappearance of transcendence, a turn towards the absolute profaneness of art space and time (otherwise - inner emptiness, timelessness), the infantilization of images appears in the story as a necessary device for a contrasting presentation of the crisis state of the modern village and its inhabitants. The destruction of shrines, primarily on the mental level, leads to total profanization. As M.Z. Musin notes: “Profanity in culture is inevitable, since the sacred is always oriented towards the absolute, embodies a certain ideal, and when its unreachability becomes obvious, *disappointment* arises in it, triggering the processes of desacralizing certain meanings, values, norms and symbols. Any phenomenon also becomes profound as a result of its *routinization*, that is, an ever greater involvement in the circle of everyday existence, in the life of people. Life is the main sphere of concentration of profane meanings, the realm of common sense, in which sacred objects, signs, symbols, meanings, norms and values gradually lose their transcendental dimension ” (*Translated into English by S.Altbayeva*) [6, p.122].

On the contrary, in the *Giants* of A. Tynibekov [7], the other national cultural *pyramid* code included in the heterotopical set of the novel - the abode of mystical blue creatures - is most sacred, connotated by the sacrament of initiation, transcendental connection with other worlds. Here, this sacred topos, in everyday consciousness, due to the centuries-old “routinization” (M.Z. Musin) associated with crowds of tourists from all over the world, “regains” the semantics of the sacred place, its unprecedented timeless value.

The artistic implementation of such cognitive-communicative strategies - the *maximum sacralization* and universalization of topos, realities, personalities included in the ethno-stereopic series of Kazakh (and not only) literature, is, for example, the *caravan* code. This cognition is deeply connected with a larger philosopheme *path*. The latter is clearly correlated in the Kazakh ethnographic picture of the world with the historical philosophies of nomads, *Saks*, *Turks*, *Polovtsy*, *Desht-i-Kipchak*, culture gave, folklore of *Koblandy*, *Zhelmay* and others. In the system of cultural codes of Kazakh literature and art, the universal concept of the path takes on the attributes of a voluminous philosophical concept associated with another concept of *cognition*. In the broad context of nomadic culture, this philosophy is laid in the foundation, the foundation of ethnic mentality, the national picture of the world.

The integral nature of this concept is clearly manifested in the literature, not only Kazakh literature, but in almost all the literature of the world. Among contemporary authors, one can name the Brazilian Paulo Coelho, whose books are distinguished by a combination of a developed philosophical plan of narration with a mystical modus, deep symbols, and well-known archetypes. The path crystallizes in him into the *Path of knowledge*, on which all his heroes are located (*Alchemist*, *Zaire*, *Book of the Warrior of Light*, etc.). Genetically peculiar to myth (it is enough to recall the theory of the monomith J. Campbell), and then folklore, the end-to-end motive of the road, is clearly manifested in fiction, where it becomes the leitmotif and leading image. The *road* construct with the concept creates a synonymous, though not absolute, semantic-stylistic pair, take, saturating the text with the necessary and corresponding to a particular genre associative, referential attributions. If we consider this motive through the prism of the

theory of cultural code, then the concept of the *path* is a philosophical, placed in a specific artistic time and space.

The concept *path* in a direct nominative function can be considered in an intercultural aspect. A.S. Kolesnikov, updating the term interculturalism, remarks: “What is the essence of interculturalism? ... firstly, *interculturalism* is a bet on the gradual process of universalization of the world ... Secondly, interculturalism connects the emergence of reality with the narrative of cultures, i.e. the possibilities of the real are determined by “myths” and “legends”, in which cultures narrate their secrets, offering to *preserve what justifies the meaning* and spreads balance. The basis of equilibrium is communication as a versatile dialogue of the cultures of mankind” (*Ttranslated into English by S.Altbayeva*) [8, p. 59].

It is the trade routes in the novel *Caravan* that become the bridge of intercultural communications, the focus of trade, political, economic, legal, military ties between different peoples, states, civilizations. The formation and development of a detailed multicultural landscape in the literary discourse of Kazakhstan also acts as one of its significant and fairly new cognitive-communicative strategies (*Caravan, Giants, Saki, Otrar Death, Kabanbai Batyr, Tamga Issyk-Kul and others*). *The detailed multicultural landscape of literary discourse is understood to be subordinate to the idea of a large-format narration about historical (or conceivable as such) events, the inclusion in the literary text of many foreign cultural details - descriptions of culture, history, geography, everyday life, economics, ethno-mentality, significant personalities and narratives (mythologemes, folkloremes, ritualemes, historiosophemes)*. The main purpose of the multicultural landscape in the literary text is to fulfill the traditional (word “additional” from the English is - supplementary) function of constructing a developed background discourse determined by the very specifics of the historical novel genre.

In the novel *Caravan* [9], the inclusion in the text of many historical, cultural, ethnocultural, universal multicultural codes (historical onomasticon, personals, mythologemes, rituals, realities, folklore and others) also allows you to recreate the special atmosphere of the ancient world of powerful nomadic and sedentary civilizations, constructing an extensive and heterogeneous mega-narrative. Earlier, we identified a multicode “semantic field of the caravan code ... At the same time, an ambivalent sign epistem appears:

Way → knowledge of the world

↓

Caravan → knowledge of the world

The caravan as a basic cultural code also acquires an additional meaning: a caravan as a means of reconnaissance, obtaining secret information about neighboring states. The multifaceted principle of the novel narrative allows us to build the corresponding multilinear plot, heterotopies of alien spaces (deserts, mountains, ponds, caravanserai, abandoned huts), in which events also unfold” [10, p.153].

At the same time, in the literary text, these constructs are also present in their direct nominative meaning. *Road, path, journey* - a certain spatial movement of someone from one point to another. In the historical prose of Kazakhstan, saturated with numerous plot twists, all the heroes and characters are constantly in motion. B.U. Azibaeva defines dynamic as one of the main functions of epic motifs: “An epic plot, in turn, consists of a combination of different types of motifs that perform constructive, dynamic, and semantic functions” (*Ttranslated into English by S.Altbayeva*) [11, p. 260]. The *khan* (king, emperor) visits his possessions, goes to headquarters, foot troops and cavalry move, messengers rush, soldiers go for reconnaissance, etc. History is unthinkable without movement. Panoramic reproduction of large-scale battle scenes, fights, preparation for battle, siege, assault of the fortress, crossing the river, inclusion of a mass of other related descriptive elements (description of hunting, weapons, uniforms and combat arms, life, food of rulers and ordinary warriors, signals, tribal differences in clothes, etc.) also serve to create a complete picture of a historical event. Such referential aspects of historical narrative contribute to the formation of a holistic, aesthetically multidimensional impression of the reader / recipient about the events that are narrated, and his involvement in the active communication process.

A special place in historical novels is occupied by the narrative of the power structures of a nomadic society. In the local nomadic societies, in the presence of a clear hierarchy, there were initially democratic institutions for the election of mid-level generals and seniors. The direct inclusion of many descriptive elements (a description of the ruler’s rate, insignia, class hierarchy, relationships between members of

society, the specifics of electiveness and others) in the narration of specific historical events makes it possible to recreate by art means the authentic atmosphere of the steppe of the region. As noted in modern Kazakhstani historiography, “According to written sources of authentic and external nature, nomad societies have left the original and local forms of political organization with inherent tribal relations as the most stable structure of social relations” [12, p.172].

As a result of such a construction of the text, the reader gets the impression of the maximum credibility of the events being narrated. This narrative strategy is successfully implemented in almost all major Kazakh historical works, starting with *Nomads* of I. Esenberlin and up to the present, for example, the books *Caravan*, *Gigantic* of Abai and Auez Tynibekov.

A special place in the structure of the polycode space of literature in Kazakhstan is occupied by philosophemes and ideologemes. A *diffusive narrative* is being developed in which traditional techniques for creating eventfulness, rhythm, and temporality of narration coexist with innovative intentions of creating hypercyclical, including voluminous allusive, referential multicultural elements, a metanarrative, “connecting different languages, as well as cultural and semantic discourses” [13].

In this context, philosophemes as one of the most frequent cultural codes of literature in Kazakhstan form the conceptual sphere of the work (*Caravan*, *Century of the Last Judgment*, *Dreams of the Cursed*, *Last Duty*, *Ayaz bi*, etc.). According to V. Kartavtsev, “the core of the philosopheme is a certain amount of meaningfully important information, which is a formulated question regarding the essence of the basic constants of natural or human reality. At the same time, with the advent of attempts to answer this question, the integration of the philosopheme into the cultural field also takes place” [14].

We offer the following interpretation of this concept as one of the most frequent codes of literature in Kazakhstan: *philosopheme* - a cultural code that has a stable semantic-structural and multifunctional content, mostly abstract, extended in artistic time and space. By their dialogical and cognitive-communicative nature, philosophemes, like mythologemes and folklore, in a literary text come closer to the universals of culture. The latter are understood as “everything that by its nature is capable of affecting single things (substances), namely, their properties or relationships. Thus, a term is considered a universal (universal) when its *referential correlation* with any abstract entity is affirmed, regardless of whether this term is general or single ” (*Translated into English by S.Altbayeva*) [15]. The core, substrate of the given definition, in our opinion, is the interpretation of “referential correlation with one or another abstract entity,” for example, the search for the Absolute, Truth in the novels *the Constellation of the twins* of H. Adibaev, *Wind Dance* of D. Nakipov, *Dreams of the Cursed* of A. Zhaksylykov, *Caravan* of A. A. Tynibekovs. L.A. Mikeschin refers “universal representations of cultural experience and activity (happiness, honor, justice, cognition)” to “universalies of culture” (*Translated into English by S.Altbayeva*) [16, p.23], which are also widely represented in the literary discourse of Kazakhstan.

An additional result of such an immanent presence and subsequent development in the text of these philosophers (universals) is the complication of its genre, style nature. The emergence of hybrid genres - the novel of intentions, the novel-tragedy, the novel-revelation, the novel-myth, the novel-document, the novel-song, the novel-requiem, the transformation of the text into hyperintertext and other qualitative changes in the poetics of the work are associated with the artists' desire for maximum philosophization and metaphorization problems raised, their translation from the category of a purely aesthetic phenomenon into the category of predominantly ontological order (novel-requiem *Songy pariz*, novel-revelation *the Constellation of the twins*, novel-myth *Altai ballads*, *Book for people in doubt* *Age of Judgment*). In addition, in these and other texts, the philosophical interpretation of universal metaphors acts as a determinant of their poetics. The positioning of this code in a literary text can be interpreted as a “mediator” between philosophy and literature as a specific form of social consciousness. “Speaking about the fact that philosopheme acts as a mediator between different branches of science and philosophy, one should not lose sight of the fact that it plays a similar role in the interaction between philosophy and literature, and more broadly - between philosophy and other types of cognition of the world ” (*Translated into English by S.Altbayeva*) [17]. In ideological practice, compared with the media, ideologemes (power, party, people (*el*), leader (*elbasy*), which we understand as philosophemes, placed in a specific ideological and political-legal context, are less frequent. Bipolar interpretation and subsequent broadcast are noted: on the one hand, a tendency toward universalization of the code, access to its critical discourse-analytical understanding, and on the other hand, an intentional decrease in the value of basic constructs, especially ideological ones.

An analysis of a number of works of modern literature of Kazakhstan, the predominantly novel genre, (*The Last Judgment, Caravan, Saki, Twin Constellations, Last Duty, Ayaz bi, Giants, Circle of Ash*), shows that philosophemes and universals perform there a number of functions which are essential for understanding and disclosure of the conception of the product: in the aspect of expanding the conceptual sphere - ontological, cognitive, axiological. In compositional terms, the inclusion of cultural codes of universal semantics (primarily philosopher, mythologist, folklore, historiosophist) contributes to the creation of a multi-faceted metanarrative structure. Genetically characteristic of their universal meaning allows us to attribute these concepts to implicit cultural codes.

In the course of the study of the functioning of universal cultural codes, the constancy of their presence in the conceptual core of the text was established. The latter is characterized as a sub-semiotic unit centering the text space. At the same time, the archisem of this or that concept (philosophemes, mythologemes, folkloremes, historioshemes) can transform into the opposite or similar in meaning, but having a significant difference from the original, concept. For example, mythonyms, mythopersonyms, and especially sacronyms (sacred names) acquire ironic content and sound that is different from traditional ones. This seems to be Croesus, the king of the powerful Lydia, who, due to a strange attachment to mystical and magical rituals, the predictions of the Delphic oracle, lost his kingdom, became the servant of the Persian king Cyrus (*Saki B. Zhandarbekov*). Heterotopic markers (specific pointers to "other" places) of the mythic-folklore narrative plan are sacronyms and pseudo-sacronyms. They show sufficient activity in the "sense generation" of the three-dimensional spatial codes of modern historical and postmodern literature of Kazakhstan.

The transformation of the stereotypical approach to the representation and development of a figurative, motivational system of text also finds its place in the paradigm of both discourses. Some distinguished and analyzed cultural codes (path, caravan), showing a strong attraction to each other, enhance the emotional charge, the depth of the worldview of the narrative. Change in the source semantics of the subject code towards metaphorization and universalization of meaning (caravan ↔ life - *Caravan*) and the reverse process of demetaphorization and sometimes profanation, "routine" (the term by M.Z.Musin) (in *Saki –Croesus and the Delphic oracle*) known by the mythologist, universals of world culture (Hanging gardens, the Tower of Babel, the Delphic Oracle - *Saki*) are also articulated as productive cognitive-communicative strategies of literature in Kazakhstan.

Conclusion. The models of the interaction of cultural tradition and artistic practice, building their spiritual relationships are invariant, mobile, express the creative personality of the writer, his concept of the world and man. In the literary process of Kazakhstan, at least two important trends interact: the use of traditional folklore, mythopoietic complexes that underlie any national literature, and the authors actively search for new opportunities for artistic generalization and expression of an increasingly complex picture of the world. In this aspect, research has been continued by such philosophers as *freedom, honor, justice, path, knowledge / knowledge, happiness, faith / unbelief, peace, man, time, space, Absolute, truth* and others. In some cases, these concepts are revealed in heterotopic dimensions (the term *heterotopy* is M. Foucault [18]), in others they are deliberately sacralized, passing into the category of mythologies, sacronyms, in third cases they are profaned, forming additional connotations of reduced meaning in their semantics.

As a result of a comprehensive interdisciplinary study of cultural codes, several interrelated cognitive-aesthetic, communicative strategies and corresponding models in the literature and media discourse of Kazakhstan have been established and justified. These are, but are not limited to, the strategies of ethnostereotyping, universalization of the art world, and the formation of its detailed multicultural landscape.

The inclusion in the literary text of a large amount of metatexts (diaries, notes, poems, translations) becomes an additional tool for constructing a complex system of coding and recoding information, specific translation of knowledge about the political, historical, cultural, legal, economic, systems, social stratification of the presented world spaces. A change in stereotype also finds a place in the paradigm of both discourses. Some distinguished cultural codes (*path, caravan*), showing a strong attraction to each other, reinforce the philosophical and philosophical depth of the narrative.

Multicultural landscapes of modern literature are formed due to the inclusion, development of foreign cultures and, more broadly, foreign civilization codes that create a certain background space of a literary text given by the author's concept. The multicultural paradoxes of predominantly modern postmodern

literature (*Parasat maidany, Dreams of the Cursed, Circle of Ash, Shadow of the Wind, Kypsha Aruy, Centaur, Purusha* and others) are also determined at the level of poetics of the work and deep understanding of the depicted events.

The special situation of encoding a literary text through the codes and other codes discussed here requires the recipient to have quite serious experience in interpreting and subsequently comprehending the conceptual sphere of the work, its semantic, stylistic and narrative core. Such a multi-level approach to choosing a narrative strategy is currently demonstrated by many Kazakhstani authors: B. Zhandarbekov (*Saki*), S. Elubay (*Ak boz ui*), S. Elubay (*Century of the Last Judgment*), J. Shashtayuly (*Ayaz bi*), H. Adibaev (*Death of Otrar*), A. Altai (*Altai ballads; Centaur*), A. Egeubay (*Zhusip Balasagun*), A. Tynibekov (*Giants*), Abay and Auez Tynibekovs (*Caravan*), I. Odegov (*Purusha*) and others.

The phenomenological status of the cultural code is largely determined by its predominant synthetic cognitive, informative and communicative nature. Being a phenomenon of public, including artistic, consciousness, it involves the design of broad intermedial cognitive-associative connotations, narrative models. The article was prepared and published in the framework of the project "Cultural Codes of modern Kazakhstan (literary and media discourses)" (grant AP05133019 funded by the CS of the MES RK).

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ҚАЗАҚСТАН ӘДЕБИЕТІНІҢ КОГНИТИВТІК-КОММУНИКАЦИЯЛЫҚ СТРАТЕГИЯЛАРЫ: ҚҰРЫЛЫМЫ ЖӘНЕ ФУНКЦИЯЛЫҚ МӘНІ

Аннотация. Мақалада Қазақстанның әдеби дискурсының негізгі танымдық-коммуникативтік стратегиясын қалыптастыру мәселесі қарастырылған. Осы стратегияларды жүзеге асыруда мәдени кодтар үлкен рөл атқарады. Соңғысы мәтіннің маңызды семиотикалық бірліктері ретінде оның концептуалды өзегіне енеді. Мәдени код теориясының философиялық, идеологиялық, концептуалды өзегі, этностереотип, гетеротопиялық маркерлер, егжей-тегжейлі көп мәдениетті ландшафт және басқалары терминологиялық дизайнға ие. Дүниені тану және тарихты, қазіргі заманғы жағдайды, мүмкін болашақты түсіну көбінесе шығармада көркем әлемді әмбебаптандыру, көп мәдениеттілік және күрделі баяндау құрылымдарын құру арқылы жүзеге асырылады. Оқырманды баянды оқиғаларды, образдарды декодтаудың белсенді коммуникативті процесіне қатыстыра отырып, оның сипаттамалық потенциалды анықтамалық режимі бар тарихи баяндаудың ерекшелігі талданады. Көркем мәтін құрылымындағы мифтік-фольклорлық бірліктердің гетеротопиялық маркерлері зерттелді, дәстүрлі этномәдени кодтардың тұрақтылығы мен итерациясы белгіленді.

Этностереотиптіліктің және көркем әлемнің көп мәдениетті ландшафтының биполярлық тенденциясы Қазақстандағы әдебиеттің маңызды танымдық-эстетикалық стратегиясы ретінде анықталған. Бір немесе басқа мәдени кодтың көп өлшемді диалогтық кеңістігі құрылады, оның анықтамалық және эпистемологиялық коннотациялары кеңейтіледі. Көркемдік кеңістік пен уақытты, әртүрлі топос, болмыс және жеке тұлғаны қасиеттеу, әртараптандыру және сіңіру мәселелері қарастырылады. Тарихи романның диффузиялық метанарративті баяндау құрылымының ерекшелігі зерттеледі.

Философиялық және идеологиялық сияқты әмбебап жиілік кодтарының мазмұны мен қызметін негіздейді. Диалогтық және танымдық-коммуникативті табиғаты бойынша, философия, мифологемалар мен фольклор сияқты, әдеби мәтін де әмбебап мәдениетке жақындады. Осындай философтардың (әмбебаптардың) мәтіндегі имманентті қатысу мен кейінгі дамудың қосымша нәтижесі оның жанрының, стиль табиғатының күрделенуімен байланысты. Өнер әлемін барынша метафоризациялау және әмбебаптандыру стратегиясын іске асырумен байланысты гибриді жанрлардың пайда болуы негізделеді: роман-миф, роман-реквием, роман-вахия және басқалар.

Метамәтіндердің үлкен көлемін (күнделіктер, ноталар, өлеңдер, аудармалар) көркем мәтінге енгізу, мәліметтерді кодтау мен кодтаудың күрделі жүйесін құрудың қосымша құралы – ұсынылған әлем кеңістігін саяси, тарихи, мәдени, құқықтық, экономикалық жүйелер, әлеуметтік стратификация туралы білімді нақты аудару. Стереотиптің өзгеруі әдеби дискурс парадигмасында да өз орнын табады. Кейбір ерекшеленген мәдени кодтар (жол, керуен) бір-біріне күшті тартымдылық танытып, баяндаудың философиялық тереңдігін нығайтады.

Түйін сөздер: әдебиет, стратегия, дискурс, мәдени код, философия, этностереотип, нарратив.

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КОГНИТИВНО-КОММУНИКАТИВНЫЕ СТРАТЕГИИ ЛИТЕРАТУРЫ КАЗАХСТАНА: СПЕЦИФИКА ФОРМИРОВАНИЯ И ФУНКЦИОНИРОВАНИЯ

Аннотация. В статье рассматривается проблема формирования основных когнитивно-коммуникативных стратегий литературного дискурса Казахстана. В реализации указанных стратегий большую роль играют культурные коды. Последние как значимые семиотические единицы текста включены в его концептуальное ядро. Терминологическое оформление получают такие понятия теории культурного кода, как философема, идеологема, концептуальное ядро, этностереотип, гетеротопические маркеры, детализированный мультикультурный ландшафт и другие. Познание мира и осмысление истории, современности, возможного будущего часто реализуется в произведении через универсализацию художественного мира, мультикультурализм, построение сложных нарративных структур. Анализируется специфика исторического нарратива со свойственным ему емким референциальным модусом, вовлекающим читателя в активный коммуникативный процесс декодирования повествуемых событий, образов. Исследуются гетеротопические маркеры мифо-фольклорных единиц в структуре художественного текста, отмечается устойчивость и итерация традиционных этнокультурных кодов.

В качестве важной когнитивно-эстетической стратегии литературы Казахстана определяется биполярная тенденция этностереотипизации и мультикультурному ландшафту художественного мира. Формируется многомерное диалогическое пространство того или иного культурного кода, расширение его референциальных и эпистемологических коннотаций. Рассматриваются вопросы сакрализации, универсализации и профанации художественного пространства и времени, различных топосов, реалем, персонимов. Исследуется специфика повествовательной структуры исторического романа, диффузийного метанарратива.

Обосновываются содержание и функционирование таких частотных универсальных кодов, как философемы и идеологемы. По своей диалогической и когнитивно-коммуникативной природе философемы, как мифологемы и фольклоремы, в художественном тексте сближаются с универсалиями культуры. Дополнительным результатом такого имманентного присутствия и последующей разработки в тексте указанных философов (универсалий) является усложнение его жанровой, стилиевой природы. В связи с реализацией стратегии максимальной метафоризации и универсализации художественного мира обосновывается появление гибридных жанров: роман-миф, роман-реквием, роман-откровение и другие.

Включение в литературный текст большого объема метатекстов (дневники, записи, стихи, переводы) становится дополнительным инструментом конструирования сложной системы кодирования и декодирования информации, специфической трансляции знаний о политической, историко-культурной, правовой, экономической, систем, социальной стратификации презентуемых миропространств. Изменение стереотипа также находит место в парадигматике литературного дискурса. Некоторые выделенные культурные коды (*путь, караван*), показывая сильное притяжение друг к другу, усиливают философско-мировоззренческую глубину повествования.

Ключевые слова: литература, стратегия, дискурс, культурный код, философема, этностереотип, нарратив.

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**THE FIELD OF NATIONAL AND RELIGIOUS VALUES IN THE
CONTEXT OF SPIRITUAL AND CULTURAL GLOBALIZATION**

Abstract. One of the powerful factors shaping the image of the nation is religion. Religion defines the basic ethical norms, as well as the system of relations within and outside the ethnic community. The specifics of religion will to some extent determine the development of national culture and stimulate or limit the development of certain genres of art. The national character and the ethical nature of the nation are largely related to the national religion.

One of the most important foundations in the life and development of a nation is language. Language reflects the whole history, culture, value system and worldview of the people.

The environment, religion and language all work together to create ethnic psychology. Ethnic psychology shapes the thinking, behavior and actions of members of a particular ethnic community, the whole way of life, in short, the image of the world. Parents pass it on to the next generation, and society supports it with its socio-ethical system.

Key words: national, religious, values, spiritual, cultural, globalization.

Introduction. The globalization of culture, which creates powerful flows of information, has a profound effect on the minds of adolescents and young people. After all, the world image of the older generation is more stable, more resistant to foreign cultural influences. As a result, the abyss of the world image between the generations will appear, and it will expand rapidly: the minds of teenagers and young people will become more and more distant from the minds of parents. It is natural that disagreements between generations are constantly repeated. This is the law of philosophical prosperity. However, today these laws have a special emphasis.

Decades of change are needed, but only a short time is enough. As a result, there is a generational transition not only between "father and child", but also between adjacent "generations".

Thus, the globalization of culture determines the growing conflict not only between parents and children, but also between children and youth subcultures.

The perception of the phenomena of a new culture depends on the cultural distance: the more similar the new culture to the traditional culture, the less difficult the process of adaptation. Researchers have even studied language, religion, family structure, education, comfort, climate, food, clothing, and so on. introduced the "Cultural Distance Index" [1].

Theoretically, four results can be achieved through interaction with a foreign culture:

- integration, preserving the culture of each interacting group, while at the same time establishing close intercultural ties;

- assimilation, loss of culture of a certain group;

- separatism, refusing to come into contact with foreign cultural groups, while preserving the culture of the group;

- marginalization, the group loses its culture, but does not establish close ties with foreign cultures [2].

In the latter case, a person becomes a kind of "intermediate person" - a marginal. Marginal man loses his original, natural moral and ethical scheme and is not replaced by a full-fledged system. This one

destructive and very dangerous process for society is subject to a powerful influx of endless innovations that are incompatible with national culture.

Thus, a person loses his national culture and history; Traditional culture is replaced by instinct, including, first of all, the instinct to survive, aggression, revenge for not having a chance. Today, global cultural processes that lead to the deterioration of human ties with the ethnic environment are the sources of this marginalization.

Globalization, which leads to identification, poses a threat not only to one person, but to society as a whole, because ethnocultural diversity plays many vital functions in today's world. Their most common task is to overcome social entropy, to prevent socio-cultural homogeneity. In this regard, researchers believe that "cultural diversity is a historical struggle ... which is rapidly disappearing as a result of the West-oriented Anglophone world-oriented expansion ..." [3].

The systematic method itself confirms the correctness of this conclusion. In fact, the viability of complex evolutionary systems depends on their internal classification and peculiarities.

One of the founders of information theory - UR Ashby called this conclusion "the necessary law of diversity". Accordingly, the system depends on its external classification in order to survive. History has proved this to be true. The weaker the internal structure of society, the less likely it is to survive. In order to withstand social cataclysms and external pressures, society must have a complex structure.

Here, a socially heterogeneous, asymmetrical, contradictory world is a normal and viable world. Past millennia, lost countries, peoples, states and civilizations are not the beginning of a hypothetical global idyll, but the true history of mankind. And internal homogeneity is formational, civilizational, cultural, ethnic homogeneity. In order to focus on the welfare, it is necessary to work with the elements of this system - states, blocs, alliances, etc. It is necessary to establish contacts with civilizations, cultures, ethnic groups. In particular, the diversity of the modern world gives it stability, forms its internal unity [4].

Each ethnic group solves its own problems in its own way. For example, in one culture, the desire for money may prevail, and in another, the desire for eternal life may prevail. In addition, in any culture there is a difference between behavior and mind, spirit and knowledge. Mind and knowledge are formed as a result of life experience, and behavior and spirit are inherited by tens of people.

The behavior of the people is rooted in tradition, tradition is the socio-cultural and national historical substance of human nature. Behavior can be strengthened, enriched, and strengthened by life experience. However, they cannot be passed from one nation to another, rather than intellect and knowledge. Much of what is done intelligently, such as technology, is multifaceted. There are no national or other political and geographical boundaries in its use. However, the fate of a nation is determined not only by its mind, but also by its behavior. There will be conservative, hard-to-change cultural traditions - an important anti-entropic factor in the process of globalization.

Peoples may also differ in their natural abilities. "Different ethnic groups", writes E. Gellner, "can be said to have different abilities by nature". To think that all peoples have the same talent is to declare that the Earth is flat" [5]. Therefore, in order to interact with the world, you need a whole set of complementary actions. The more diverse this set is, the timelier humanity will respond to the threats of the environment in which it lives. This also applies to the state structure chosen by ethnic groups. No social structure is independent - "progressive" or "reactionary", "left" or "right", "patriotic" or "cosmopolitan", "separatist" or "centralist" and so on. b. It cannot represent the interests of the whole of human society alone. These methods complement each other, and through compromise they will solve the problem of optimizing human development. If any of them is infinitely dominant, the natural pluralistic structure of human society will disintegrate, thereby destroying its viability, and therefore it will become anti-social [6]. No one can give a vision of the course of history, no one knows what specific, indisputable abilities and qualities are needed for mankind to survive in the future. Therefore, humanity must have in its resources a wealth of qualities that can respond to the social and natural threats of history.

Literature review. Nobel laureate Konrad Lorenz wrote: "In particular, this diversity of cultures is crucial to the high development of mankind. It has led to the competition of different cultures in different fields and by different means. They ate different foods, used different tools, and fought with different weapons. This form of competition between these cultures, which took place in the past, gives people intelligence, intelligence, ingenuity, and so on. was one of the most important factors in the formation of ..." [7].

In today's globalized world, "the boundaries between cultures are disappearing and disappearing, and ethnic groups around the world are trying to unite into a single human culture". At first glance, this process seems to be right, because it helps to reduce mutual hatred of nations. However, at the same time, the equality of all peoples leads to the destruction of humanity: if people of all cultures fight with one weapon, compete with one technique and try to do tricks on the world market, then intercultural selection loses its creative function "[8].

At one time, the philosopher K. Leontiev, developing a unique theory of cyclical development, introduced the poetic term "flourishing complexity" in science. According to him, this "peak of development is a celebration of the diversity of unity based on a common internal idea. In a prosperous state - it is multi-class, social multi-class, multi-corporate, multi-ethnic, even multi-tribal, "diversity of industries", complex "everyday patterns", diversity of morals, customs, tastes, the uniqueness of any local art".

Another philosopher V. As Soloviev noted, "Different nations must develop through their own peculiarities and live like living human organs, without which unity becomes empty and lifeless, and the inanimate world is even worse than war". The true unity and dream world of mankind should be based not on the weakness and oppression of peoples, but on their highly developed strength, complementary free will [9].

Nursultan Nazarbayev initiated the proclamation of 2010 as the International Year for the Rapprochement of Cultures. The support of this time-consuming initiative by the international community was confirmed by an official decision of the UN General Assembly. Thus, our multi-ethnic, multi-confessional homeland, which in its territory is a great example of interethnic peace and inter-religious harmony, offers new mechanisms to overcome the challenges and threats in the processes of modern civilization.

The year in which the Republic of Kazakhstan holds the chairmanship of the Organization for Security and Cooperation in Europe has also been declared the International Year for the Rapprochement of Cultures. So, this year will undoubtedly be a precondition for the world to appreciate and feel the eternal values in a new way.

At the same time, Mahatma Gandhi said, "I do not want to live in a house surrounded by walls and with sealed windows. I want the culture of all countries to be blowing near my house, but I would not want any of them to step on my feet," he said.

S. Huntington also said: "In today's world, the main source of conflict will no longer be ideology or economics ... The most important divisions and conflicts that divide mankind will now be determined by culture".

At the initiative of the First President Nursultan Nazarbayev, who is now recognized by the world community as a great reformer, the leader of the nation, the Government has developed a major state program in this direction, with government officials at all levels closely monitoring the country's industrial and innovative development, is often monitored. To the person who understands, at the root of this is the national interest, the national principle, which arises from the idea of the state. In his lecture "Kazakhstan in the post-crisis world: an intellectual leap into the future" [10], dedicated to the anniversary of the Kazakh National University named after Al-Farabi, the President gave a detailed analysis of this issue. He made it clear to us which way to go.

It is no coincidence that President Nursultan Nazarbayev, in his speech at the XV session of the Assembly of the People of Kazakhstan, focused on this issue. He stressed the need to develop civic unity, tolerance in Kazakhstani society, first of all, through the system of education and upbringing, through the media coverage of interethnic relations, by raising the legal culture of the people of Kazakhstan.

Discussions. National education is an integral part of spiritual national values. Through it, we can bring up a full-fledged, patriotic person with a national consciousness, who can contribute to the development of national interests, who can combine national values and universal values. The backbone of national education in the context of cultural and social change is the mother tongue. In this regard, we have before us the formation of the national intellectual behavior of young people in the spirit of respect for the Kazakh language and history, culture and mentality, traditions and religion; education of highly intelligent national activity, ensuring the development of the industrial-innovative system of today's Kazakhstan; ensuring educational and cultural and spiritual competitiveness with other civilizations; The

task is to form a sense of civilization in the national spirit of society and man, the relationship between man and nature.

In a lecture dedicated to the anniversary of Al-Farabi Kazakh National University, the President said: “We are attracting advanced technologies from developed countries, creating joint ventures, supporting innovative projects. But it is not enough to say that we will move to the club of countries with stable economies. Apart from that, no one simply gives us the most advanced technologies. Kazakhstan needs an intellectual revolution that will awaken and realize the potential of our nation”.

Abdullah An-Nadim, who lived from 1845 to 1896, wrote that European concepts influenced all the young and old in the East, but in six respects the East had its own appearance and direction. They:

1. Preservation of appearance;
2. Preservation of wealth in industry and trade;
3. Preservation of patriotism, attention to its rights and obligations of the people;
4. Preservation of citizenship, not to imitate the brilliance of others, to have their own conclusions in behavior and speech;
5. Preservation of language as a means of improving habitual skills and habits and improving behavior;
6. Preservation of religion, which guarantees the preservation of appearance, wealth, patriotism, language and all values.

It is considered as the foundation of religion, nationalism, patriotism, patriotic values. Following others and renouncing one's national values means bowing down to oneself without war.

Some habits may change, but they should not interfere with religious beliefs, national feelings, or patriotism. After all, if the state of religion is devalued, such a person will not lend a helping hand to his people at a time when wealth, patriotism, patriotism and the value of the language are declining, and he will not feel sorry for them.

Peter Beyer draws attention to this in his analysis of the impact of religion on globalization. It identifies two opposing factors in the field of religion. Religion influences the global world or opposes this trend. Beyer promotes religion and at the same time opposes globalization. This is because the system of globalization eats away the traditional similarity and stimulates or re-creates the new identity.

Roland Robertson, a well-known researcher on globalization, explains that “globalization regulates not only citizenship, but also the different forms of citizenship-based globalization”. For Robertson, globalization means, first and foremost, that universal choice is a “mechanism of similarity”.

He believes that fundamentalism and fundamentalist nationalism in the context of Islam, Christianity, and Hinduism are not the religions of the past, but rather a new ideological phenomenon that seeks to preserve the “old good ways” [11]. They create qualitatively new social forces, such as unarmed terrorism, to arm and revive the proposed history. However, as Beyer writes, their “fundamental” response, which seeks to change under the pressure of radicalism, does not really change anything radically”.

In our opinion, Roland Robertson was one of the first sociologists to use the term “globalization” in the most systematic context. He spoke of the dialogue between universality and the flesh. This context of globalization leads to a number of homogenizations of social structures and cultures around the world, providing new conditions for the formation of social and cultural differentiation. At the same time, globalization is an indivisible pluralism that supports the multiplicity of local similarities as a whole.

As Chandra Muzaffar noted, “a number of aspects of globalization through religion have facilitated the universal spread of religion. For the first time in history, we have the opportunity to declare to all mankind the universality of the nature of each of our religions. The homogeneity of society is declining and becoming more multiethnic. Social reality pushes us to get rid of our stereotypes and create a universal course that will reconcile with others as much as possible. The words of the famous poet Jalaluddin ar-Rumi, “Lamps are different, but the light is the same”, probably tell us this. From the point of view of dialectical categories, it means that the same content is given in many different forms.

At the same time, Amru Mahjub understands globalization only in terms of internationalism, and emphasizes that national culture is against it. Thus, he speaks of the cosmopolitan nature of nation-states and globalization, thus provoking opposition between the two. While nation-states are the custodians of national culture, cosmopolitan globalization does not pay much attention to it.

Contrary to Samuel Huntington's argument that nation-states remain key players in international affairs [12], Al-Jamil, in particular, argues that small and weak state structures are in constant conflict and tension instead of globalization. confirms the idea that by shaking their political foundations [13]. However, not all researchers in Muslim countries agree. For example, Amin Samir believes that globalization does not necessarily lead to the "explosion of the nation-state" by "opposing" or "supporting" in the interests of social forces [14]. According to some Arab scholars, globalization leads to a change in the function and content of the state only at a very low level [15].

The current situation of Islam being attacked by the West is reflected in the fact that Muhammad Ammara introduced the Muslim community to the struggle of the Arab tribes, the Jews, who preached the same deity, that is, Muhammad, peace be upon him, whom Muslim historians called "gazwat al-Ahzab", compares with the historical period of the prophet.

In this regard, Muhammad Ammara makes the following conclusion: even within the framework of Christian civilization, such and other directions and functions of religion are used to achieve their goals. For example, the United States believes that Latin America should be influenced by American policy. Despite the fact that Argentina is a Catholic state and the United States is a Protestant state, as a result of this struggle, more than 30% of Argentines have changed their religious identity. Muhammad Ammara points out that in the 21st century, the United States is seeking to extend its influence to Russia. However, the Russian Orthodox Church has insisted that parliament pass a law barring foreign religious sects from operating in Russia.

History has shown that the conquest of territory is impossible without the "occupation" of the mind, and as a mechanism for such "occupation", according to Ammara, Western forces are based on religion and religious consciousness. In order to conquer and ultimately defeat the Muslim world in their struggle against Islam, they seek, first and foremost, to undermine and weaken its powerful unifying potential.

Thus, Muhammad Ammara concludes that there is no struggle for interests in the world, there is a struggle for ideas and religions. The West is not just "fighting Islam, it is trying to bring Muslims to Christian paradise (al-jannat na-nasari) because the West is primarily defending its interests in the Muslim world. Of course, Islam, which defends the national and civilized interests of the Ummah, will act against them".

It considers two main pillars of the Western position on Islam. First of all, in his opinion, it is necessary to take into account the views and positions of Western people on this struggle, and secondly, this struggle, which is contrary to the interests of other peoples and countries, is a Western project. In this regard, Muhammad Ammara points out that "Westerners are victims of the media". Therefore, "our problem does not end with this and Western science, because education is of a national nature, we must strive for it in all cases and use its achievements". The essence of the problem is summed up in the nature of the "main system" adopted against Islam, its "religious" features. Thanks to the religious content of this project, churches are being built and a comprehensive program of Christianization is being implemented, which violates the foundations of Islam as a religious charter of civilization, religious doctrine and the rule of law. Therefore, as Muhammad Ammara points out, in the context of globalization, the West seeks to spread the norms and traditions of Christianity in the Protestant image in the Muslim world through Westernization (at-Tagrib).

The purpose of the replacement of religious theological values is the fulfillment of the Christian Church in the process of ideological struggle with the teachings of Islam. The Western government does not pay much attention to the American government, because the main thing for them is to oppose the interests of the West in the Muslim world and get rid of Islam, like the jihad of anti-Western ideology and practice, Muslim law (Sharia). To this end, in the era of globalization, the West is waging war against Muslim countries. They are deploying bases on their territory and deploying troops. In this regard, another Muslim author, Abdullah Musa, notes that globalization is mainly oriented to the East and that its first goal is Muslim countries [16].

Muhammad Ammara analyzes only the religious aspect of globalization. First of all, he notes that all three branches of Christianity do not agree with each other, and sometimes states that the interests of the state take precedence over this phenomenon.

At the same time, the West sees only a sharp rivalry between Christianity and Islam in the East. Thus, the confrontation between Christian denominations is more personal than the conflict between Islam and the West. And Western policy in general does not care about American hegemony, it is concluded that

they are only targeting the Muslim potential. Thus, globalization is interpreted as a struggle of religious ideologies, in particular, a struggle between the West and the Muslim world.

However, not all researchers agree that American globalization has a negative impact on the culture and religion of other nations and peoples. Sergei Filatov, a senior researcher at the Institute of Oriental Studies at the Russian Academy of Sciences, says the American Principles of Democracy and the American Concept of Human Rights and Personal Freedom are adequate to the new order, as they “negate traditional honors, privileges and a number of previously agreed rules”.

In this regard, S. Filatov believes that “globalization in the direction of American norms is primarily concerned with the place of religion in society, it is capable of changing religion”. According to the Russian theologian, first of all, the American order establishes “a real equality of religion before the state, the absence of the advantages of state denominations, the functioning of a freely organized religious life”. Second, in his view, American influences have weakened the clerical mood in recent years, as the examples of France and Italy show, which “exclude strong anti-clerical movements”.

Third, such “Americanization” leads to “an increase in democratic norms in the organization of religious life”. For example, he said, the “authoritarian” Catholic Church, which was confronted with the United States, was forced to establish and prepare high democratic principles in accordance with the policy of this country.

Sergei Filatov disagrees with the view that globalization, which is widespread among Russian religious fundamentalists, is destroying religion. According to him, modern globalization has a twofold effect on religion. Secularization began early in globalization and proceeded independently of the new threats of the times. Therefore, the secular order in Germany and France is more secular than the American order today. Admiring the theme of the “clash of civilizations” developed by Samuel Huntington, Mark Jurgensmeier also suggested that the ideological conflicts of the Cold War were a conflict between the competing Western cultural system, and that future conflicts would be primarily intercultural in the field of religious separatism. concludes. Mark Jurgensmeier's examples of religious nationalism are largely based on the experience of third world countries. It begins with well-known political issues posed as Islamic fundamentalism to the social intelligentsia in Algeria, Pakistan, Egypt, Palestine, and Iran. He said the Khomeini revolution in Iran was a surprise to Americans, or that Western social sciences held the main picture of the assumption of a steady spread of secularization. Western scholars suggest that non-Western peoples underestimate the desire to “return” to the past and regain the lost defenses of religion.

From the seventeenth century, that is, from the time of Western colonization to the present day, Muslim states have not posed a strategic threat to Western interests, but have been the result of uprisings and armed conflicts in a number of countries, their internal development and political change. In this regard, the notion that modern Islamic movements are a monolithic force is wrong.

They are very different in their ideological, racist and ethnic structure. At the same time, we believe that all Muslims form a religious community on a single regional level. However, there are significant differences between Muslims in the Middle East, Europe and Asia, as well as linguistic differences, political and ethnic consumption, and adherence to other religious and legal schools and sects. For example, the processes of struggle for power and political influence in the Middle East give a mosaic of national, ethnic, religious and ideological groups. We can rightly say that there are similar relations with other Muslim regions.

The examples of these and other religions do not guarantee that they will serve as a global system. But this means looking for ways to respond to new global facts within different traditions.

However, in the context of globalization of all religious systems, the following conclusion can be made: global systems do not conform to their ideals of equality and progress, and it is religion that is often used to form anti-system sentiments in society. They also offer their own religious answers, a “self-evident” picture of the problem that is a consequence of globalization.

In his study of the changes in Catholicism, Robert Schreiter identifies four main areas related to theological action that are opposed to the globalization system: liberation, feminism, ecology, and human rights [17]. It would be interesting to note that in each case, the clergy, in general, try to mediate between global and local. The religious manifestos of the fundamentalists demand the elimination of modern reality, and sometimes even an attack on various versions of globalization. In virtually all world religions, despite its simplicity, fundamentalism seeks to provide a reliable bulwark against globalization. However,

in reality, fundamentalism, due to its simplicity, is often unable to withstand competition in difficult situations, and as a result, sooner or later they leave the stage of active activity or adapt to new situations.

Another strategy is "ethnicization", which is used to try to gain local identity in the context of rapid social change and cultural instability in countries where a new national identity must be established in an era of colonialism or the decline of Marxist ideology. Attempts to establish and search for ethnic identity are not an easy task.

As for the third version of the cultural response to globalization, in short, it is an attempt to return to the past, to the pre-modernist period of history. All this means that theology wants to seriously consider various aspects of globalization. Globalization is a two-way process that creates significant wealth for some and leads to poverty for others. As a result, the gap between rich and poor will widen; It is said that the homogeneity of a culture, on the one hand, reflects its appearance, and on the other hand, leads to its hybridization.

As we have noted above, ideas and opinions about this phenomenon view the process of globalization from different perspectives and do not cover it in different contexts. Some argue that globalization means "internationalization", while others see globalization as a "transboundary" phenomenon. Roland Robertson agrees that the concept of globalization should be different from the phenomenon of internationalization.

Conclusion. The phenomena of internationalization and globalization are sometimes labeled, and sometimes manifested only by similar trends, because they are two different manifestations. Internationalization represents a process of deepening relations between peoples, at a time when globalization is unique in the sense of frequent crossing of borders between them. At the same time, in modern times, these two processes intersect at a number of points.

If we consider it in connection with religion, or translate it into religion, we will remember the Kazakh version, which speaks of the idea of multi-confessional and inter-religious peace and tolerance and their coexistence.

James Kurt, an American political science professor and clergyman from the Presbyterian Church, speaks of three paradigms in the context of the role of religion in globalization, or of future culture: pre-modernist, modernist, post-modernist.

According to D. Kurt, the modernist perspective may seem more familiar, because it is a space of additional energy and opportunities for many modern intellectuals and scientists. First of all, it should be noted that it has a unique and distinctive view of secularization. Since the Enlightenment, modernists have argued that the process of secularization goes hand in hand in any society and at any time. In other words, different religions must follow a secular and "rational" philosophical path in their development.

This possibility was most natural in the eighteenth and nineteenth centuries, when it became relevant in the context of the development of secular Christianity. Even then, it was clear that secular Protestantism was different from secular Catholicism, even within secular Protestant organizations.

In the simplest form of the modernist view of secularism, it spreads from the center of society, from the educated elite to the masses. If any religious communities were excluded from this process, they were considered to be marginalized in terms of geographical, economic or ethnic relations. Religious communities were considered as social structures.

Of course, sometimes these structures may clash with each other within the same society or with the Enlightenment Center and secular groups. In this case, in today's secular and rational world, there are large-scale conflicts. In the modernist perspective, these religious conflicts are seen as "peripheral" in place, "temporary" in time, and "remote" in importance, and ultimately secularization, fueled by widespread globalization, eliminates this conflict.

At a more complex level, the modernist perspective views the development of religion as a reaction to renewal. According to modernists, entire societies, including not only their peripheral groups, but also their elites, feel the renewal on the basis of "irrational", "fundamentalist" ideology. The Islamic Revolution in Iran (1970-1990) and the Indian Prosperity in India (1990) are the main modern examples of this. However, here, too, the religious reaction of peripheral states was considered "secondary", "temporary" and "too insignificant", even if it was larger and longer than the religious reaction of peripheral groups. The basic premise is that secular movements and, as a result, globalized and even fundamentalist societies can be rebuilt.

Regarding the role of religion in the process of cultural globalization, it can be said that at different stages of cultural development, many nations and societies played an important role in the formation of values and ethical codes underlying different social, political and economic institutions. In this case, it should be noted that the accelerated pace of change has now caused a number of side effects.

The main ones are: the escalation of violence, war, genocide, national and international terrorism, environmental degradation, and the spread of new diseases. Understanding these negative consequences ends with the emergence of a new wave of religiosity, like any mechanism that protects against danger. Therefore, religion tends to play an important role in the formation of a humanitarian system of values that meets the needs and characteristics of the globalized world.

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РУХАНИ-МӘДЕНИ ЖАҒАНДАНУ АЯСЫНДАҒЫ ҰЛТТЫҚ ЖӘНЕ ДІНИ ҚҰНДЫЛЫҚТАР ӨРІСІ

Аннотация. Ұлт бейнесін қалыптастыратын қуатты фактордың бірі – дін. Дін негізгі этикалық нормаларды, сонымен қатар, этностық қауым ішкі және сыртқы өзара қарым-қатынас жүйесін анықтайды. Дін ерекшеліктері белгілі бір шамада ұлттық мәдениеттің дамуын анықтап, өнердің кейбір жанрларының дамуын ынталандырады немесе оны шектей түседі. Ұлттық сипат пен ұлттың этикалық сипаты көп жағдайда ұлттық дінмен байланысты болып келеді.

Ұлттың тіршілігі мен дамуындағы маңызды негіздердің бірі – тіл. Тіл халықтың бүкіл тарихын, мәдениетін, құндылықтар жүйесі мен әлем бейнесін танытады.

Табиғи орта, дін және тіл – барлығы бірлесе отырып, этностық психологияны тудырады. Этностық психология белгілі бір этностық қауым мүшелерінің ойлау сипатын, жүріс-тұрысы мен әрекетін, бүкіл өмір сүру салтын, бір сөзбен айтқанда, әлем бейнесін қалыптастырады. Ата-аналар оны кейінгі ұрпаққа беріп отырады, ал қоғам оған өзінің әлеуметтік-этикалық жүйесі негізінде қолдау көрсетеді.

Адамзат дамуын бағалаудың маңызды бір көрінісі – рухани құндылықтар болса, онда олардың ерекше сипаты қандай деген сұрақ туындайды. Біздің пайымдауымызша, рухани құндылықтар жалпы құндылықтар жүйесінің шыңы, биігі, түп негізі болғандықтан тарихи үдеріс тұтастығын, бірлігін, сабақтастығын қамтамасыз ететін ерекше рухани күш, ықпалды фактор. Олар – адамдардың ұлтына, дініне, нәсіліне, жасына, мамандығына, өмір сүрген тарихи кезеңіне, мемлекеттегі саяси билік қатынасынан да тыс, жалпы адами негіздердің әлеуметтік кеңістік пен уақыттағы жаршысы, жетекшісі, рухани жетілудегі реттеушісі, әрқашан да болашақ көкжиегін белгілейтін шамшырағы болуға тиіс.

Этикалық қалып пен құндылықтардың өз мағынасында қоғамдық санада беки түсуі үшін қоғамдық болмыста терең қайшылықтар белесі болуы керек деген пікір қалыптасқан. Сол қиындықтан өткен соң ғана рухани құндылықтар өзінің әмбебап, адамдық қызметін әрлей түседі. Әрине, өткен тәжірибеге қарап жеке адам да, қауымдастық та, жалпы адамзат тұтасымен қалыптасады, өмір сүруге үйренеді, өсіп-өнеді, кемелденеді. Бірақ «бір ұрпақтың келесі сатыға көтерілуі үшін, рухани көзі ашылуы үшін міндетті түрде өткен ұрпақ құрбандыққа шалынуы міндетті ме?» деген сауал туындайды. Ондай баспалдақты жетілудің қатал детерминациясы болса, онда ешқандай тұлға еркіндікті, бақытты, үйлесімдікті толық мағынада сезіне алмай кетуі тиісті, онда әрбір адам тарихи үдеріс деген механизмнің құралына (тетігіне) айналады. Оның бұл тіршіліктегі адамдық өмірінің барлық мәні қоғамдық қатынастардың механикалық жиынтығы, ансамблі, қоспасы болудан аспайды. Дегенмен де, тарихты сабақтастырушы негіз бұл детерминацияда емес сияқты. Ол адам болмысының рухани бастаулары мен астарында, оның әмбебап қалыптарында, яғни, адамгершілік ұстанымдарында екендігі сөзсіз. Бұл негіздер тұлғаның рухани жетілуінің басымдықтары, әлеуметтік болмыста субъектіге айналдыратын, тетіктіліктен құтқаратын өзек болып саналады.

Ендеше, бұл еңбегімізде жаһандану кеңістігіндегі рухани құндылықтар мәселесі басты орынға шығады. Жалпы жаһандану көпвекторлы, көпқырлы құрылым болғандықтан, оны әр жақты, түрлі тұғырдан зерделеуге де болады. Мәселен, экономистер оның экономикалық жақтарына маңыз берсе, саясаттанушылар саяси негіздерін зерделейді. Ал біз философиялық тұрғыдан жаһанданудың жалпы бейнесін тұтас қарастыра отырып, рухани жағына, оның ішінде діни қырларына көбірек көңіл бөлеміз. Алдымен жаһандану

құбылысын зерттеушілер көзқарасын таразылай келе, бұл түсінікті концепт ретінде қарастырамыз. Содан соң, жаһандану жағдайындағы рухани құндылықтардың келбетін сараптап, ондағы діннің, оның ішінде ислам әлемінің негізгі бейнесін зерделейміз.

Түйін сөздер: ұлттық, діни, құндылықтар, рухани, мәдени, жаһандану.

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ИДЕЯ НАЦИОНАЛЬНЫХ И РЕЛИГИОЗНЫХ ЦЕННОСТЕЙ В КОНТЕКСТЕ ДУХОВНОЙ И КУЛЬТУРНОЙ ГЛОБАЛИЗАЦИИ

Аннотация. Религия является одним из мощных факторов, формирующих образ нации, и определяет основные этические нормы, а также систему отношений внутри и вне этнической общности. Специфика религии будет в определенной степени определять развитие национальной культуры и стимулировать или ограничивать развитие определенных жанров искусства. Национальный характер и этический характер нации во многом связаны с национальной религией.

Одним из важнейших основ жизни и развития нации является язык. Язык отражает всю историю, культуру, систему ценностей и мировоззрение людей.

Окружающая среда, религия и язык – все вместе создают этническую психологию. Этническая психология формирует мышление, поведение и действия членов определенной этнической общности, образ мира. Родители передают все это следующему поколению, и общество поддерживает это своей социально-этической системой.

Если одним из важнейших аспектов оценки развития человека является наличие духовных ценностей, то у нас возникает вопрос, какова особенность их природы. По нашему мнению, духовные ценности — это особая духовная сила, влиятельный фактор, обеспечивающий целостность, единство, непрерывность исторического процесса, так как это вершина, высота, основа системы общих ценностей. Они должны быть глашатаем нации, религии, расы, возраста, профессии, исторического периода жизни, отношения политической власти в государстве, вестником общих человеческих устоев в социальном пространстве и времени, регулятором духовного развития, маяком будущего.

Существует мнение, что для того, чтобы этические нормы и ценности прочно укоренились в общественном сознании, в общественной жизни должны быть глубокие противоречия. Только преодолев эти трудности, духовные ценности завершают свою универсальную, человеческую деятельность. Конечно, человек формируется как личность на основе прошлого опыта, так и сообщество в целом учится жить, расти и взрослеть. Однако возникает вопрос о том, нужно ли жертвовать предыдущим поколением, чтобы одно поколение поднялось на следующий уровень и открыло свой духовный мир. Если существует строгое определение зрелости такой лестницы, то никто не должен быть в состоянии в полной мере ощутить свободу, счастье, гармонию, тогда каждый человек становится инструментом механизма, называемого историческим процессом. Вся суть его человеческой жизни в этой жизни – не более чем механическая совокупность, взаимодействие социальных отношений. Тем не менее, основа непрерывности истории, все-таки, является не детерминация. Несомненно, это находится в духовном происхождении и фоне человеческой природы, в ее универсальных формах, то есть в ее моральных принципах. Эти основы являются приоритетами духовного развития личности, ядром, которое делает его субъектом социальной жизни, спасает его от механизма.

Таким образом, в нашей работе вопрос духовных ценностей в пространстве глобализации находится на первом месте. Поскольку глобализация является многовекторной, многогранной структурой, ее можно изучать с разных сторон. Например, в то время как экономисты фокусируются на его экономических аспектах, политологи изучают его политические основы. Мы же будем уделять больше внимания духовной стороне, включая религиозные аспекты, глядя на общую картину философской глобализации в целом. Во-первых, мы, рассматривая различные мнения исследователей, рассматриваем феномен глобализации как концепцию. Также наряду с этим мы анализируем появление духовных ценностей в контексте глобализации и изучаем базовый образ религии, в том числе исламского мира.

Ключевые слова: национальное, религиозное, ценности, духовное, культурное, глобализация.

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CHARACTERISTICS OF THE “DEMOGRAPHIC COMPENSATION” IN THE SOUTH OF THE KRASNOYARSK REGION IN THE LATE 1940S-1950S

Abstract. The article reveals the specifics of “demographic compensation” of the population of the South of the Krasnoyarsk region in the late 1940s-1950s after the devastating consequences of the Great Patriotic war based on archival material and statistics. The influence of demographic factors on the population's recovery processes was revealed such as changes in gender and age structure, birth rate, mortality, and marriage. The influence of the socio-economic situation in the country on the natural movement is shown. The specifics of reproduction of the region's population among citizens and villagers, various ethnic communities are considered.

The use of general scientific and demographic research methods, the regulations of the general theory of population, the concept of “human potential” allowed us to conclude that there is a tendency to overcome the “demographic hole” which was caused by human losses in wartime. The population of the South of the Krasnoyarsk territory has returned to the expanded historical type of reproduction.

The practical significance of the results and conclusions of the study eliminates the gaps in the territorial and problem aspects in the historiography of the topic of “demographic compensation” of the Siberian population. The obtained materials can become the basis for studying the local history of the population of other Siberian regions.

Key words: birth rate, mortality, natural movement, demographic compensation, population, South of the Krasnoyarsk region.

Introduction. “Human capital”, accumulated in social experience, professional activity, knowledge, health, flexibility and mobility of people, is a valuable resource of national wealth [1, 33]. High-quality and long-term investments in a person bring a long-term effect [2, 97]. However, demographic catastrophes, in particular, wars, have a dramatic impact on a person's private life and change the socio-economic life of the country [3, 12].

The great Patriotic war deformed the structure of the population of the Russian Federation having radically disrupted the progressive processes of demographic development. It launched a cycle of oscillation of successive cohorts. All of that led to the change of the qualitative characteristics of the population (age, gender, marital status, ethnic composition, and family childhood), deterioration of reproductive health, a significant decrease in the standard of living of the population. Due to the inertia of demographic processes, all these factors have a long-term impact on the development of future generations up to the present time.

In the late 1940s and mid-1950s, there were processes of overcoming the demographic catastrophe of wartime, which can be regarded as “demographic” compensation. This period is characterized by the

highest rates of natural population growth for the entire second half of the twentieth century. The purpose of this article is to study this phenomenon, which has both national and regional features.

Research methods are based on the application of the principles of science and objectivity. They are provided with correct methods of analysis and interpretation of statistical, clerical, and legislative sources. The analysis of socio-demographic processes in the South of the Krasnoyarsk region was carried out in dynamics, in a specific historical context. The use of historical-comparative and problem-chronological methods made it possible to assess the dynamics of reproduction of the region's population in the late 1940s-1950s.

Results and discussion. According to the “Memorial Society”, during the great Patriotic war, starting from 1941, 23.2% of the population of the Krasnoyarsk territory (455 thousand people) was mobilized to the front. 165 thousand of them were killed in the course of military operations (36.0%) [4].

The processes of demographic compensation of the population of the South of Krasnoyarsk region in the second half of the 1940s and 1950s was mediated by the task of recovery and conversion of national economy, development of natural resources of the region in terms of the production base moving to the East of the country. During the Second world war, the birth rate fell to a record low. During the first two or three post-war years, the demographic situation in the region was extremely unfavorable. The generation born during the First world war, the Civil war, and the famine of the 1920s hardly reached the reproductive age. Gender disparities were clearly visible. There were not enough men in connection with massive irretrievable military losses. The population was physically weakened by high workload, poor nutrition, and lack of medical care.

Therefore, in 1946 and 1947, even as a result of mass demobilization of front-line soldiers, reunion of old or creation of new families, the number of births per 1000 people rose in urban settlements of the Krasnoyarsk territory only to 24.6 and 33.1%, falling in 1948 to 24.7‰ [5, 324]. In Khakassia during these years, the total birth rate rose in urban areas to 20.2 and 25.6‰, which was about 2/3 of the pre-war values. In rural areas that suffered the highest losses of the male population, this ratio rose only to 16.3 and 18.6. It did not reach the ½ level of 1940 [6, F. P-169. Op. 1. D. 262. L. 6. D. 308. L. 3. D. 314. L. 117. D. 327. L. 218. D. 340. L. 42, 55, 79, 109, 184]. Birth rates were also influenced by regulation in the form of abortions, which were officially banned in 1936.

The low birth rate of this demographic stage showed insufficient effectiveness of the Decree of the Presidium of the Supreme Soviet of the USSR of July 8, 1944 “About increasing state assistance to pregnant women, large and single mothers, strengthening the protection of motherhood and childhood, establishing the honorary title of “Heroine Mother” (*Rus. Мать-Героиня, Mat'-Geroinya*), establishing the Order of “Maternal Glory” (*Rus. Орден «Материнская Слава», Orden “Materinskaya slava”*) and the medal “Medal of motherhood” (*Rus. Медаль материнства, “Medal’ Materinstva”*) [7, 409–417]. Nevertheless, the strategic focus on encouraging the birth of low-priority children was obvious. Cash grants were provided to families who had two children at the birth of the third, instead of having six children at the birth of the seventh. In accordance with the government Decree of 1936, a one-time allowance was issued in the amount of 400 to 5000 rubles, and a monthly allowance - from 300 to 800 rubles. Monthly allowances were paid starting from the second year of the child's life until the age of five.

Article 20 of this Decree completely abolished “the right of a mother to go to court with a claim to establish paternity and collect alimony for the maintenance of a child born of a person with whom she was not in a registered marriage” [8, 184]. But monetary payments were established for single mothers – 100 rubles per month for one child, 150 rubles for two children, 200 rubles or more for three or more children.

Maternity leave was increased from 63 to 77 calendar days. Postpartum leave was increased from 35 to 42 calendar days. Parents, who had three children with earnings up to 400 rubles a month and those who had four children while earning 600 rubles a month, were exempted for 50% of the payment for the maintenance of children in kindergartens and nurseries. The families with five or more children had such benefits regardless of the size of earnings.

According to the plans of the legislators, the Measure that stimulates the birth rate was to increase the tax on singles and childless citizens. This tax was introduced in November 1941. In 1944, an additional tax was imposed on small families who had one or two children [9, 335].

Despite the state's desire to strengthen the family, the objective circumstances such as gender disparities, the growth of single-parent families, a large number of widows and unmarried women, and numerous extramarital relationships have led to an increase in the proportion of children born out of marriage. In 1947, the number of illegitimate births in Khakassia was quite high. In the city, the number was 814 (26.7% of the total), in rural areas – 706 (23.3%) [6. F. P-169. Op. 1. D. 340. L. 14, 46, 49, 102–103, 189, 211]. However, the Decree of July 8, 1944 prohibited identifying paternity in respect of illegitimate children. This reinforced the legal inequality of single mothers and their children. So that, it encouraged unmarried women to have illegal abortions.

The main number of births took place in 1947 for women at the age range of 20-24 years (34.0% of the total number of parturient women), the percentage of women at the age of 25-29 years (20.8%) decreased. At the same time, in 1944-1947, the proportion of births to women aged 30-34 (21.9% on average), as well as to older generations aged 35-39 (13.7%), who married late or delayed the birth of children until peacetime, increased markedly. The percentage of births to women aged 40-44 increased to 4.9% [6. F. P-169. Op. 1. D. 262. L. 6. D. 308. L. 3. D. 314. L. 117. D. 327. L. 218. D. 340. L. 42, 109, 184].

The majority of births in Khakassia in 1944-1947 were for the first or third children (57.5%). Among them, first-born children made up 30.6%, which was explained by the absolute predominance of brides aged 20-24 years (1/3). About 1/5 of the total number of children was the fourth or sixth. The proportion of seventh and ninth children was 6.5%, showing a maximum in 1946 (8.5%). The percentage of tenth or more children in General was 2.0%. At the same time, it was observed that a significant number of births of fourth-sixth, seventh-ninth, tenth and more children were born by women living in rural areas [6. F. P-169. Op. 1. D. 327. L. 218–219. D. 340. L. 41–42, 107, 109, 178, 184]. The decrease in the proportion of children born in later stages was due to the forced interruption of childbearing during the war and the deliberate restriction of the birth rate.

In General, even during the compensatory wave of 1945-1947, it was not possible to return to the pre-war birth rate. This is confirmed by the statement of Isupov V. A. that “every time the country overcame another demographic crisis, the birth rate was lower than before the crisis” [10, 83].

Simultaneously with the growth of the birth rate in the Krasnoyarsk territory, there was an increase in the overall mortality rate, which reached 12.6 and 19.6‰ among citizens in 1946-1947 [5, 324]. The increase in mortality was due to the complexity of the sanitary and epidemiological situation caused by the crowding of the population in cities due to the arrival of demobilized and prisoners of war citizens. There was also a practical lack of improvement in cities (water supply, Sewerage, electricity, lack of fuel for residential and working premises); increased workload, poor nutrition, and starvation as a result of the abolition of the card system in 1946. Sanitary and epidemiological services of the region carried out work to prevent epidemics of typhus, dysentery, measles, malaria, tuberculosis, anthrax and other infectious diseases. So that, the population was vaccinated every year [5, 238–243, 247].

By 1949-1950, there was a positive trend in the process of population reproduction. The birth rate of the population in the South of the region has increased dramatically compared to the war and the first post-war years. It was 33.4‰ [11, 7]. In the RSFSR as a whole, this figure was significantly lower than in the province – 26.9%, due to the Western and Central regions that were occupied and devastated by fighting [12, 84]. For comparison, in Western European countries, the birth rate was significantly lower than in the RSFSR and differentiated between 15-22% (15.5% in England, 16.1% in Germany, 22.8% in Finland) [13, 140].

In 1951-1959, the birth rate decreased, but it was quite high – an average of 29.8 people per 1000 inhabitants (178.2% compared to the level of 1947.) [12, 84]. The increase in the birth rate was associated with the entry into the fertile age of numerous generations born during the demographic compensation period of the second half of the 1920s, as well as the implementation of births postponed during the war.

In the 1950s, the birth rate in Khakassia at the expense of the indigenous population exceeded the all-Union and regional indicators, amounting to 32-33 people per 1000 inhabitants. The mortality rate stabilized at 8.8%, giving an average natural growth rate of 23.7%, which exceeded the data for the region by 2.6 ‰ [14, 161-162, 195-196]. According to V. p. Krivonogov's calculations, in the 1950s the birth rate of Khakass people living in rural area was close to the biological maximum-47.8%. The main share of births occurred in the first and second children (41.5%). However, the proportion of third and fourth children (32.7%), fifth and sixth children (18.0%), and seventh and more children (7.8%) was still significant [15, 13-14]. This indicated the predominance of traditional reproductive attitudes among the Khakass population.

At the same time, in the 1950s, the mortality rate in the Krasnoyarsk territory decreased by more than 2 times, amounting to 12.3%, compared with 1940 (in the RSFSR, the mortality rate was lower-10.1%). However, due to the higher birth rate in the Krasnoyarsk region than in the country as a whole, the natural increase was 4.3% higher than in the RSFSR [12, 84]. At the same time, the villagers maintained a certain advantage in the birth rate. This gave a greater natural increase in rural residents compared to urban residents even if they exceeded the mortality rate [12, 86-88].

By the end of the 1950s, as a result of the development of health care, improvement of housing and communal services, and improvement of the standard of living of the population in the Krasnoyarsk region, serious progress was made in the fight against infectious diseases and infant mortality. The total mortality rate in the South of the Krasnoyarsk territory decreased to 6.8‰ (in the RSFSR – 6.7%). However, the natural growth of the region's residents was 2.3% lower than in 1950, due to the short duration of the compensatory period of birth rate, amounting to 18.8‰ (13.7% – in the RSFSR) [11, 7].

In the course of demographic compensation, it was not possible to overcome gender disparities in the region's population. according to the all-Russian population census, 47.7% of the region's 2.6 million inhabitants were male and 52.3% were female by 1959 (109.8 women per 100 men). At the same time, the bias towards women was observed from the age of 30-34. This was significantly reflected in the military generations of 40-44, 45-49 years old, where there were 134.1 and 136.9 women per 100 men, as well as 50-54 and 55-59 years old – 176.0 and 232.2, respectively. However, the situation was the opposite in children's and middle age groups [16, 70-71].

In the age-and-sex pyramid, the generation born during the war and the first post-war years was the smallest: at the age of 10 to 14 (184.5 thousand people), and teenagers of 15–19 years old (205.0 thousand). However, especially significant “failures” were in the age-sex pyramid of age groups 35–54 (front-line soldiers, home front workers). It also included the older generation whose health was undermined by the war and post-war difficulties. The population categories of the average working age and reproductive age born during the second half of the 1920s – 1930s (20–24, 25–29, 30–34 years) were significant in number. The most numerous were the generations of the 1950s: 0-4 years (335,9 thousand), 5-9 years (306,0 thousand people). It is characterized as the period of the short-term Soviet “baby boom” [16, 70-71].

Gender and age disparities, which were the “echo” of the war, affected all the peoples and ethnic groups of the South of the Krasnoyarsk region. for example, in the Kuraginsky district, according to the census of 1959, Ukrainians had a male-to-female ratio of 48: 52, Belarusians – 46:54, Jewish – 35:65, Khakas – 30:70, Tatars – 28:72, Kazakhs – 14: 86 [17. F. 9. Op. 1. D. 110. L. 22].

During the period of demographic compensation, significant changes occurred in the population structure in the Southern of the region and the RSFSR. The share of people of working age increased to 60.5% (in the RSFSR – 64.3%). The share of residents over 60 years old decreased to 7.2% (in the RSFSR – 5.0%). The decline in the proportion of older people was caused with deaths at the front and increased mortality during the war and the postwar period [16, 70-71]. The percentage of children at the age of 0 to 15 decreased to 32.3% (30.7%). However, it was significant [12, 42]. The reduction of children's age groups in the South of the Krasnoyarsk territory was slower than in the RSFSR. This indicated that the population of the region was “demographically young”, and the prospects for its reproduction in the subsequent period were more favorable.

Conclusion. In General, assessing the results of socio-demographic development of the population of the South of the Krasnoyarsk region in the late 1940s-1950s, it should be noted that the population composition was more balanced compared to the average indicators of the RSFSR on such grounds as the ratio of men and women, different age groups. An important indicator of the high demographic potential of the region's population was the presence of a high proportion of children and youth. This created conditions for the formation in the subsequent period of more stable marriage and family relations, more numerous households, and higher rates of childbearing.

The birth rate of the population in the South of the Krasnoyarsk region was higher than in the RSFSR, especially among the rural population. The highest rates occurred during the late 1940s-1950s, when a high level of compensatory birth rate with a steady decline in mortality gave a higher natural increase.

However, the complexity of socio-economic and political development of the post-war years, the increased use of female labor in production, gender disparity, family breakdown or appearing broken

families in relation to the circumstances of the war and postwar period, the weakening of the health of the population, measures to limit the birth rate, changes in reproductive attitudes etc. laid the foundations for further stabilization and reduction of the birth rate.

The reduction of mortality in the South of the region was delayed for a long period and was carried out inconsistently. However, this was due to the implementation of state policy aimed at forming the health system, preventing epidemics and fighting the mortality of the population, including women and children, as well as improving the social infrastructure and the standard of living of society.

Due to the fluctuating dynamics of birth and death rates, natural population growth in the South of the Krasnoyarsk region was subject to ups and downs over the following years.

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1940-1950 ЖЫЛДАРДЫҢ СОҢЫНДАҒЫ КРАСНОЯР ӨЛКЕСІНІҢ ОҢТҮСТІГІНДЕГІ «ДЕМОГРАФИЯЛЫҚ ӨТЕМАҚЫ» ЕРЕКШЕЛІКТЕРІ

Аннотация. Краснояр өлкесінің оңтүстігінде 1940-1950 жж. екінші жартысындағы демографиялық үдерістерді зерттеу ерекше ғылыми қызығушылық тудырады, өйткені соғыс уақытынан бейбіт уақытқа көшуге байланысты тарихи дәуірлердің сынуындағы, қайта өндіру саласындағы жаңа және дәстүрлі белгілердің негізгі белгілерін анықтауға, оның өзгеру себептері мен мәнін анықтауға мүмкіндік береді.

Мақалада мұрағат материалдары, статистика, іс қағаздарын жүргізу және заң шығару көздері негізінде Ұлы Отан соғысының жойқын қорытындыларынан кейін Краснояр өлкесінің оңтүстігіндегі халықтың демографиялық «өтемақы» ерекшелігі ашылды. Демографиялық факторлардың қалпына келтіру процестеріне әсері анықталды: жыныстық-жас құрылымының, туудың, өлім-жітімнің, некенің өзгеруі. Елдегі әлеуметтік-экономикалық жағдайдың табиғи қозғалысына әсер етуі көрсетілген. Қала тұрғындары мен ауыл тұрғындары, түрлі этностық қоғамдастықтар арасында өңір халқының өсіп-өну ерекшелігі ескерілді. Аймақтық тақырыпқа жүгіну РКФСР-да және оның перифериясында «демографиялық өтемақы» процестерінде жалпы және ерекше анықтауға мүмкіндік береді.

Зерттеу әдістері ғылыми, объективтілік принциптерін қолдануға негізделеді. Краснояр өлкесінің оңтүстігінде әлеуметтік-демографиялық үдерістердің сипаттамасы динамикада, нақты-тарихи контексте жүргізілді. Тарихи-салыстырмалы, проблемалық-хронологиялық әдістерді қолдану зерттелетін кезеңде өлке халқының сандық және сапалық параметрлерін бағалауға мүмкіндік берді. Зерттеудің жалпы ғылыми және демографиялық әдістерін, халық қоныстануының жалпы теориясының ережелерін, «адами әлеует» тұжырымдамасын кешенді пайдалану соғыс уақытының адам шығынынан туындаған «демографиялық шұңқырды» енсерудің белгіленген үрдісі туралы қорытындыға келуге мүмкіндік берді. Краснояр өлкесінің оңтүстігіндегі халық қайта қалпына келтірудің кеңейтілген тарихи түріне қайтып келді.

Ұлы Отан соғысы әлеуметтік-демографиялық дамудың үдемелі барысын бұзды, РКФСР халқының және оның өңірлерінің құрылымын өзгертті, бір-бірін ауыстыратын когорттың тербеліс циклын іске қосты. Алайда өлкенің оңтүстігі халқының құрамы РКФСР орта көрсеткіштерімен салыстырғанда едендер мен әртүрлі жас категорияларының арақатынасы сияқты параметрлер бойынша теңестірілген болды. Өңір халқының жоғары демографиялық әлеуетінің индикаторы – балалар мен жасөспірімдер жасы үлесінің айтарлықтай болуы. Бұл келесі кезеңде құрамы жағынан көп үй шаруашылықтарының, отбасының үлкен балаларының неғұрлым тұрақты некелерін қалыптастыру үшін алғышарттар жасады.

Краснояр өлкесінің оңтүстігіндегі халықтың тууының жалпы коэффициенті РКФСР-ға қарағанда, ең алдымен, ауылдықтар арасында жоғары болды. Бала туудың ең жоғарғы көрсеткіштері 1940-1950 жж. аяғындағы кезеңге келді, ол кезде өлім-жітімнің тұрақты төмендеуі кезінде туу деңгейі неғұрлым жоғары табиғи өсім берген.

Сонымен қатар елдегі күрделі әлеуметтік-экономикалық және саяси жағдай, өндірісте әйел еңбегін қолдануды кеңейту, гендерлік тепе-теңдік, халықтың репродуктивті денсаулығының нашарлауы, отбасылардың ыдырауы және толық емес отбасылардың едәуір үлесі, бала тууды шектеу жөніндегі шаралар, көп балалы халықтың репродуктивті ұстанымдарын орташа отбасыға ауыстыру бала тууды кейіннен тұрақтандыру мен төмендетудің негізін салды.

Зерттелетін кезең ішінде денсаулық сақтау жүйесін нығайту, індеттің алдын алу, әлеуметтік-тұрмыстық инфрақұрылымды жақсарту, халықтың өмір сүру деңгейі нәтижесінде өлім-жітім көрсеткіштерінің қысқаруы болды. Алайда өңірдегі бұл процесс ұзақ уақытқа созылып, үздіксіз жүзеге асырылды.

Туылу серпіні мен өлім-жітімнің әркелкілігі мен ауытқуы салдарынан Краснояр өлкесінің оңтүстігіндегі халықтың табиғи өсімінің көрсеткіштері ұшып көтерілу мен құлдырауға ұшырап, кейінгі ұрпақтың дамуына ұзақ мерзімді әсерін тигізді.

Зерттеу нәтижелері мен қорытындыларының практикалық маңыздылығы Сібір халқының «демографиялық өтемақы» тақырыбындағы тарихнамадағы аумақтық және проблемалық аспектілердегі олқылықтарды белгілі бір шамада жояды. Алынған материалдар басқа Сібір өңірлері халқының жергілікті тарихын зерттеу үшін негіз бола алады.

Түйін сөздер: туу, өлім, табиғи қозғалыс, демографиялық өтемақы, Краснояр өлкесінің халқы, оңтүстігі.

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ОСОБЕННОСТИ «ДЕМОГРАФИЧЕСКОЙ КОМПЕНСАЦИИ» НА ЮГЕ КРАСНОЯРСКОГО КРАЯ В КОНЦЕ 1940-Х–1950-Е ГГ.

Аннотация. Исследование демографических процессов во второй половине 1940-х–1950-е гг. на юге Красноярского края представляет особый научный интерес, так как позволяет на переломе исторических эпох, обусловленных переходом от военного к мирному времени, выявить основные признаки нового и традиционного в сфере воспроизводства, выяснить причины и сущность его трансформации.

В статье на основе архивного материала, статистики, делопроизводственных, и законодательных источников раскрыта специфика демографической «компенсации» населения юга Красноярского края после разрушительных итогов Великой Отечественной войны. Выявлено влияние на восстановительные процессы демографических факторов: изменение половозрастной структуры, рождаемости, смертности, брачности. Показано воздействие на естественное движение социально-экономической ситуации в стране. Учтена специфика воспроизводства населения края среди горожан и сельчан, различных этнических сообществ. Обращение к региональной тематике дает возможность выявить общее и особенное в процессах «демографической компенсации» в РСФСР и на ее периферии.

Методы исследования базируются на применении принципов научности, объективности. Характеристика социально-демографических процессов на юге Красноярского края проведена в динамике, в конкретно-историческом контексте. Применение историко-сравнительного, проблемно-хронологического методов позволило оценить количественные и качественные параметры населения края в исследуемый период. Комплексное использование общенаучных и демографических методов исследования, положений общей теории народонаселения, концепции «человеческого потенциала» позволило прийти к заключению о наметившейся тенденции к преодолению «демографической ямы», вызванной людскими потерями военного времени. Население юга Красноярского края вернулось к расширенному историческому типу воспроизводства.

Анализ социально-демографических процессов юга Красноярского края в конце 1940-х – 1950-е гг. дает основания для констатации, что Великая Отечественная война нарушила поступательный ход социально-демографического развития, деформировала структуру населения РСФСР и ее регионов, запустила цикл колебаний сменяющих друг друга когорт. Однако состав населения юга края являлся более сбалансированным по сравнению со средними показателями РСФСР по таким параметрам, как соотношение полов и различных возрастных категорий. Индикатором высокого демографического потенциала населения региона явилось наличие значительной доли детских и юношеских возрастов. Это создавало предпосылки для формирования в последующий период более устойчивых браков, более многочисленных по составу домохозяйств, большей детности семей.

Общий коэффициент рождаемости населения юга Красноярского края был выше, чем в целом в РСФСР, прежде всего, среди сельчан. Наивысшие показатели рождаемости пришлись на период конца 1940-х–1950-е гг., когда высокий уровень компенсаторной рождаемости при устойчивом снижении смертности давали более высокий естественный прирост.

Вместе с тем, сложная социально-экономическая и политическая обстановка в стране, расширение применения женского труда в производстве, гендерные диспропорции, ухудшение репродуктивного здоровья населения, распад семей и значительная доля неполных семей, меры по ограничению рождаемости, смена репродуктивных установок населения с многодетности на среднететность заложили основы последующей стабилизации и снижения рождаемости.

На протяжении исследуемого периода в результате укрепления системы здравоохранения, предотвращения эпидемий, улучшения социально-бытовой инфраструктуры, уровня жизни населения происходило сокращение показателей смертности. Однако этот процесс в регионе затянулся на длительный период и осуществлялся непоследовательно.

Вследствие неравномерности и колебаний динамики рождаемости и смертности показатели естественного прироста населения юга Красноярского края были подвержены взлетам и падениям, оказывали долговременное воздействие на развитие последующих поколений.

Практическая значимость результатов и выводов исследования в определенной мере ликвидируют пробелы в территориальном и проблемном аспектах в историографии темы «демографической компенсации» сибирского населения. Полученные материалы могут стать основой для изучения локальной истории населения других сибирских регионов.

Ключевые слова: рождаемость, смертность, естественное движение, демографическая компенсация, население, юг Красноярского края.

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POLITICAL AND SOCIAL SITUATION OF GERMANS IN SOUTH KAZAKHSTAN DURING THE FIRST WORLD WAR

Abstract. At the beginning of the twentieth century, the South Kazakhstan region, namely Aulieata and Shymkent (Chernyaev) districts, was one of the main German settlements. These areas, which belong to the Syrdarya region of the Turkestan region, have been inhabited by Germans since the last quarter of the 19th century and are considered to be one of the main European ethnic groups. The Germans interacted with the local population and contributed to the development of ethno-demographic processes in the region. However, the development of such processes and the political and social life of the Germans had a negative impact on the First World War. At the beginning of the twentieth century, this war, which was a major international factor, created a great war between the empires, and it also divided the peoples.

From the first days of the First World War, 1914-1918, relations between the Russian Empire and Germany were at war. This situation changed the political life of the Germans and the German community living in the Russian Empire. Such changes took place especially in the lives of German settlers in the European part of the empire. His main examples were the military persecution of Germans, the stigmatization of Germans in society, the establishment of chauvinistic attitudes among ethnic groups, and similar factors. In Russia, local Germans have been labeled "internal enemies." The fate of German communities in all regions of the Russian Empire was closely monitored in 1914-1918, and in general, since 1914, the fate of the Germans has been very constructive. At the same time, there is a legitimate question as to whether the situation in the Turkestan region is the same as in other regions of the Russian Empire. Similarly, the article raises questions about the situation of Germans in Shymkent and Aulieata districts of the Syrdarya region, and seeks answers in this regard. The article examines the political situation and social life of Germans in the South Kazakhstan region during the First World War. The main task of the article is to show the life of local Germans and their place in society. In addition, the political and social history of other peoples in the region will be considered.

Key words: Germans, South Kazakhstan, World War I, People, Social life.

Introduction. The migration of Germans from the interior of the Russian Empire to the Steppe and Turkestan regions, which began in the last quarter of the XIX century, gained momentum over time. In particular, the arrival of Germans in the Turkestan region, in the southern regions of modern Kazakhstan, along with other European peoples - is the basis for their increase in population and local settlement. However, the development of such ethno-demographic processes was influenced by the First World War in many ways. The main examples of this are the changes in the political and social life of the Germans living in South Kazakhstan, as in all regions of the Russian Empire, the damage to the reputation of the Germans in society, and so on. The reason for this was the war between Russia and Germany. The two empires were the main participants in the war, which affected not only the life of the state and society, but also the fate of peoples, including social life, demographic situation, as well as prisoners of war were brought from Germany, settled in Turkestan and recruited.

Materials and methods. In writing the scientific work, the fundamental theoretical views and conclusions of domestic and foreign scientists were introduced. In writing the scientific article, the materials of archival funds and collections of documents were introduced into scientific circulation. Traditional historical-comparative, historical systematization methods of historical science were used in conducting scientific research. Also, as a theoretical and methodological basis, modern and auxiliary methods of historical science were used in the study of political and historical processes in the narration of historical events. Such methods allowed to study the political and social life of Germans living in the

Turkestan region and South Kazakhstan during the First World War, to determine the fate of Germans who came to the region voluntarily. The research is based on scientific principles and approaches to the study of domestic and world history. In the analysis of the social history and destiny of the Germans living in the region, in determining the political and historical factors, the main focus was on the views and principles of objectivity, neutrality and versatility.

BASIC SECTION. The situation on the eve of the war. Before the First World War, national associations of German settlers were formed in large and small cities. In the last quarter of the XIX century, the Germans settled in Kazakhstan from different parts of Russia, and during the First World War in Kazakhstan, along with the European part of Russia, there were movements of people from Germany, Austria-Hungary. Direct migration of German families to the territory, which began in the previous period, was intensified. In the pre-war years, the Germans were scattered in the central regions and districts of the whole geographical area of Kazakhstan. This situation distinguished the ethno-social image of the Germans in Kazakhstan and Central Asia from the social image of the Germans in the far corners of Russia. Also, the arrival of Germans in the territory has retained its horizontal character, as a result of which different social groups of German settlers in Kazakhstan are separated from each other geographically and socially. It should be noted that in the XIX century, the Germans settled in Turkestan in large numbers, but since the beginning of the new century, and in the pre-war years, the Germans began to settle in large numbers in the steppe regions. Researchers explain this in different ways. There were a number of reasons for this, first of all, the predominance of Muslims in Turkestan, in what is now South Kazakhstan, which hindered the settlement of Catholic Germans. Second, the weakness of the Russian language among the local population in the region, on the contrary, the widespread use of the Russian language in the steppe regions, contributed to the settlement of the Germans in these areas. 1901-1910 During this period, the Germans settled in 30 small settlements in the northwest, and in the center and in the north-east, where most of the German settlers are located (Turgai region, northern districts, Akmola and Semipalatinsk regions) were concentrated Germans [1, pp. 160-165].

It should be noted that in the pre-war period in the Syrdarya region and other districts of Turkestan, the Stolypin reform had a significant impact on the social life of the Germans in the Russian Empire. The approved conditions and requirements of this reform seemed to adapt the Germans to the political and social life that would take place in the future. Since the implementation of the Stolypin agrarian reform, German migration to Kazakhstan and Central Asia has been growing rapidly. Before the war, three major influxes of Germans and migrants were identified. The largest of them came from the German districts on the banks of the Volga, the second from the Black Sea region in the south of the Russian Empire, and the third and the smallest and the least from the Volyn region and other provinces. The migration of Germans from the European part of Russia and Western countries to Kazakhstan and Central Asia was mainly attracted from the western regions of the Russian Empire. This was mainly due to agricultural policy. The Germans from the western regions were directed towards the plan of large-scale development of the steppes of Kazakhstan and arable lands in the South, which was an important part of the German migration process before the war. This was primarily accompanied by the development and mass settlement of remote areas in the southern regions of Kazakhstan. The migration of Germans to the migration system, their main factors, goals and specific plans for migration, living conditions, government agencies that influence it, or bodies that monitor migration at various levels were the main focus of the main state [2, pp. 110-113].

Scholars who have studied the methods and mechanisms of resettlement of Germans in the southern and other regions of Kazakhstan, their relations with local migratory communities have also tried to study their social history. In our opinion, given the established structural complexity of the German migration nature, it is necessary to distinguish the individual types of settlements of the former migration systems. This allows us to give a comprehensive, comprehensive description of the migration of Germans in the central regions of the Russian Empire in the period before the October Revolution. The voluntary migration of Germans to Russia lasted for almost two centuries, while the voluntary migration from Russia to Kazakhstan lasted for 20-30 years, ie the end of the XIX century and before the First World War. Among the peasants and craftsmen who migrated, the number of Germans increased.

Although a relatively large number of Germans initially came to South Kazakhstan, on the eve of the war the Germans settled in large numbers in the steppes. Its own growth dynamics has been formed. According to general data, 106 settlements were established in Akmola and Semipalatinsk regions with

the arrival of German peasants [2, p. 114]. In other regions of Kazakhstan, Germans were rare. For example, no German village was established in Zhetysu region. According to historian V.E.Krieger, on the eve of the First World War, the absolute increase in the total German population in modern Kazakhstan was observed in Akmola region - 31248 people, Torgay - 11633, Semipalatinsk - 6900 and Syrdarya - 5.741 people [3, p. 61].

On the eve of the First World War, the total average population of the German population in Kazakhstan by region was more than 63 thousand. This is nine times more than in the 1897 census. The total population of these ethnic groups in the region in question was about 0.8% [4, pp. 176-177]. The materials of the first All-Russian census of the Russian Empire in 1897 showed that the proportion of local urban Germans in the country was 7% higher than the level of German ethnic groups in the all-Russian urbanized country. This distinguished the ethno-social image of the German diaspora in South Kazakhstan and Central Asia from the social image of Germans in Russia. Also, the arrival of German settlers in the territory has retained its former character, as a result of which different social groups of German settlers in Kazakhstan were separated from each other geographically and socially [5, pp. 79-80].

Migration processes. One of the factors that reflected the social life and level of the Germans during the war was the migration process. On the eve of and during the First World War, the largest migration processes took place not only in the South, but in all of Kazakhstan and Central Asia, ie in the steppes and Turkestan. One of the main directions was the migration of Germans to South Kazakhstan and Central Asia. There were also two main types of migration. The first was internal migration, ie the migration from one region to another, and the second was a large-scale, forced relocation of Germans from abroad to Russia and its Central Asian provinces. Another important factor was the importation of prisoners and surrendered people into Kazakhstan.

In this regard, first of all, the process of German migration to Kazakhstan and Central Asia during the First World War, the impact of the war on the arrival of the German ethnos from the European and interior regions of the Russian Empire to the Kazakh lands was significant. The war was intensified by the influx of Tripartite prisoners of war into Kazakhstan, a source of raw materials for the colonial empire. Among the first groups of prisoners of war were Germans, who were delivered to Kazakhstan from the very beginning of the war. As the war between the Kaiser German and Russian empires intensified, the number of prisoners of war increased and the General Staff of the Russian Army sent tens of thousands of Germans and other prisoners of war to South Kazakhstan, including Aulieata, [6, pp. 20-22], Shymkent, North, Began to send to military institutions under the jurisdiction of East and Central Kazakhstan. Tens of thousands of prisoners of war were also sent to the Turkestan military district [7].

Among the prisoners who came to Turkestan were Germans from Germany and Austria-Hungary, who settled in the Syrdarya region, near Tashkent and Aulieata districts. They were involved in the construction of new construction sites, factories and workshops in Shymkent and Aulieata districts. As prisoners from hostile lands, they were initially offered free labor. However, over time, working in the field became a little easier. All this is due to the fact that the local Muslim peoples are Kazakhs, Uzbeks, etc. showed them compassion and humane support. The German prisoners, who had good relations with the local population, settled in the area after such support. Many of them were very interested in agriculture and light industry.

At the same time, in the pre-war period, the migration of foreign Germans in Kazakhstan, in addition to Germans from Russia, was particularly strong. Foreign Germans, despite their small size, also spread to different regions of Kazakhstan to find a source of livelihood. They settled mainly in regional and district city centers [8]. In addition, groups of German migrants from urbanized Germany and Austro-Hungary decided to settle in Turkestan, Semirechye, Kostanay, Pavlodar, Semipalatinsk, and in the south of Kazakhstan, where the largest German communities had been concentrated since the last century on the eve of World War I [9]. Self-study of the largest number of applications for the right to reside in the steppe settlements of the region and the Turkestan region by direct visitors from Germany and Austria-Hungary shows that the vast majority of voluntary migrants were literate and had their own professions. Most of them are small businessmen, engineers, artists, doctors, pharmacists, acrobats, musicians and many other freelancers.

During the war, there was a significant difference in the number of migrants compared to the 1897 census. Although no official census was conducted at the time, statistics from the time confirm this. Twenty years after the census, the number of Russian and foreign Germans living in Kazakhstan has increased, largely due to peasant migrants. As a result, the share of urban Germans decreased by 19% compared to 1897, and in 1914 the number of Germans in all six regions was 11.4%. Although this

time it did not form a large part of the Germans in South Kazakhstan, this region remained the main concentration of Germans, and among them there were political and social processes at their level.

Due to the political and social life of the Germans during the war, the main migration waves were more in the steppe regions than in Turkestan. Here, the absolute number of representatives of the urbanized German ethnic group has grown significantly due to the increase in the number of local military contingents in the territory as a whole, reaching about 9,000 people. Urban Germans were still formed during this period, mainly by mass migration. They moved from the cities of the European part of Russia to the cities of the Steppe, including mostly Omsk and Orenburg [10, pp. 51-55]. He also moved to major administrative centers such as the South, Central Asia and Tashkent. Migration processes in the south at that time were still very slow. German peasants rarely left the countryside and moved to densely populated areas. One of the main factors of the political regime in the country during the war was the internal migration of these Germans. On the face of it, German migration flows within the country and individual migration were of an economic nature at that time. The main reasons for emigrating to Kazakhstan during the war and to be closer to each other from the interior were their religion. In general, the Germans, who first came to South Kazakhstan in the 19th century, were mostly religious, and according to some sources, they were the preachers of the religion among the local Christians. Even during the war, the religious factor was important among the Germans. It was known from the beginning that the Germans who moved to South Kazakhstan had great religious differences. They followed three religions: Lutheran, Catholic, and Mennonite. Most Germans in southern Kazakhstan followed the Mennonite trend. At the turn of the 19th and 20th centuries, 4,556 Lutherans and 62 Catholics moved to Central and Northeast Kazakhstan. Thus, the role of religion in the internal migration of the Germans was strong.

However, during the war, not only the religion of the Germans, but also their hatred as a nation led to cultural and religious isolation among the Germans in Kazakhstan. This situation contributes to a critical understanding of the current problems of the Germans who settled in Kazakhstan and Central Asia by analyzing the processes of their migration and adaptation in the period before the October Revolution. Homogeneous national and religious communities also made it possible to determine the location and social status of Germans. This is because only Germans with the same religion and culture were able to live together in a certain geographical area [11].

Political and social situation of Germans. Just as Germans had different levels of social status, Germans in the regions had different occupations. In the 80s of the XIX century, the vast majority of Germans in South Kazakhstan were engaged in agriculture, and later this figure was occupied by Akmola region. In 1897 and before the First World War, a campaign was launched in the Akmola region to purchase land from German settlers, who owned 73,234 tenths of 89 plots of land. Among the Germans were Germans who were able to buy land from private individuals and government officials. In addition, German entrepreneurs moved here and revived their economic activities [12]. As we can see, on the eve of the war the situation of the Germans reached a high level. But the war changed the situation.

During the first world years, there were differences in the social structure of the Germans in Kazakhstan and Central Asia, and in the Russian Empire in general. This included the war between the Russian Empire and the German Empire in a political-military bloc. It should be noted that German prisoners of war moved to Kazakhstan during the war. Earlier, Germans came from the western, central and southern regions of Russia voluntarily, but during the war prisoners of war were forcibly evacuated. Among them were prisoners of war, innocent people captured during the war, and prisoners of war. During the war, the Germans deported to Kazakhstan did not have a high social status and their role and prestige in Kazakhstani German society was low. Although the decision was made to employ prisoners of war only in certain jobs and to ban them from learning German, this decision was not fully supported by the population. Once again, trust was restored between prisoners of war and the local population.

The local Germans wanted to ask the prisoners about the real state of the war and invited them to share their thoughts. This is because the Germans who had previously immigrated to Kazakhstan were very interested in the political situation in their historical homeland and the general political and economic situation in Germany [13]. The imperial authorities wanted to keep the Germans who had emigrated to Russia and Kazakhstan at the lowest level of society. This situation had a significant impact on the social structure of the Germans in the Russian Empire. It also undermined the growing prestige and prestige of the Germans, who had long lived in the Russian Empire and Kazakhstan. There was a special, bad attitude among the local population towards the Germans and Germany in general [14]. However, such factors did not radically change the place and social status of Germans, who by nature and nature were very prone to

life. After all, the Germans who came from Germany as prisoners of war had no lineage with the ancient Germans who had lived in Russia and Kazakhstan for centuries.

Since 1915, anti-German laws have been strengthened, and one of its main areas has been language and education. Small German-language schools and clubs were closed. Germans, as is the case with all peoples, were taught in Russian at the request of the Ministry of Education, and this was only possible after the recognition of Russian as the language of instruction. Unregistered schools were considered "secret" and were subjected to violent protests and Russian teachers were sent to them. This often led to clashes between teachers and residents, and a German boycott of the school. Such circumstances led to the need for the Germans to adapt to the Russian language in the future.

German active propaganda against the First World War and the associated tyranny in the country practically prevented the voluntary economic settlement of German burghers and peasants in the Kazakh steppes. During the First World War, there was a process of forcible relocation of Germans to the Asian part of Russia, mostly from East to West and from West to East. The first version of this type of migration was the forcible relocation of "unreliable" groups and those from the "enemy state" to the territory of the Steppe Governor-General [15]. The official activities of the empire were carried out in the form of large groups of German prisoners of war from the center and the western provinces of Russia to the Steppe and Turkestan regions, including modern South Kazakhstan, from Germany and Austria-Hungary.

Thus, as in the whole region, the social situation of the Germans in South Kazakhstan varied from time to time. The social situation of the Germans during the war, who moved to South Kazakhstan in the last quarter of the XIX century and settled in different parts of the Kazakh land, is a separate issue. Upon arrival in the Kazakh lands, the Germans sought, found and worked for a variety of livelihoods in order to improve their living and social conditions. Among them were Germans belonging to different social groups [16]. In short, the Germans were divided into different social groups. In the period before the October Revolution, as noted above, the Germans had a high social status, propagating Lutheran, Mennonite, Evangelical, Adventist and other aspects of Christianity. The livelihood of the rest of the ordinary Germans depended on agriculture.

The majority of Germans were religious in Aulieata district. The people of this region were very hardworking and continued to live despite any political and social obstacles. The Germans, who joined during the war, settled in Kordai, on the right bank of the Shu River, on the northern slopes of the Kyrgyz Alatau. The local administration has resolved the issue of accommodation of newcomers, and for this purpose special organizations have been established, which are financed by collecting taxes from the population. The Germans saw the hardships of war with the local population and showed their vast experience in everyday life. The Germans have been living in these areas since the end of the 19th century. Therefore, this area seemed very hot for them [17, pp. 534-535]. One of the main features is that in South Kazakhstan, the Germans used to be a separate village, separate from the Russians or the locals. However, the state of war led the Germans to coexist with other ethnic groups in any settlement. This, firstly, brought the Germans closer to the local population, and secondly, they tried to regulate their political situation in this way, because among the population, the Germans lived with the Russians, so they were not given much attention.

By the time World War I began, their position had expanded. And the number of settlements inhabited by them increased due to the growth of the total population of peasants in Kazakhstan. During the implementation of the basic provisions of Stolypin's agrarian reforms, the German diaspora grew significantly, and they tried to open a variety of sources of livelihood. The most important of them were agriculture and related small-scale production. Such life and work of the Germans played a special role in the socio-economic life of the region. However, in the period after the October Revolution, the situation began to change slightly. Formerly chaotic practices and religious beliefs began to decline. After the Bolsheviks came to power and became fully established, this situation affected the social situation of both the local population and the Germans..

In 1917, Russia was expelled from the war due to the October Revolution in the Russian Empire. The Bolsheviks who came to power completely abolished the former imperial policy, including changes in the laws concerning the peoples, and the Germans began to live on an equal footing with the Soviet people, like other European peoples. These factors had a positive impact on the political and social life of German prisoners of war. They even enlisted in the Red Army and fought in the Civil War. He received a Soviet passport and became a citizen of Soviet Russia and then Soviet Kazakhstan. World War I ended early for Russia, where the coming to power of the Bolsheviks was a major breakthrough in German political and social life.

Conclusion. World War I affected many nations. In particular, the peoples of the war-torn countries have suffered. During the war years, imperial policy had a significant impact on the fate and political and social life of the Germans living in South Kazakhstan, Shymkent and Aulieata districts and adjacent areas. The study identified two main areas, one related to the arrival of pre-war Germans in Turkestan and the other to the arrival of prisoners of war from Austria-Hungary and Germany, and their political and social life underwent significant changes during the period under review. However, the pressure on the Germans before the war was not severe. They were formerly considered to be the people of the Russian Empire and were closely associated with the local population in the South. German and Austro-Hungarian Germans who escaped and were taken prisoner on the battlefields of Europe were considered captives and continued their lives in faraway Turkestan, including Shymkent and Aulieata. Although German prisoners were initially subjected to hard labor, they were later released. The largest of these was the October Revolution of 1917 in the Russian Empire, which granted benefits to all peoples, including the Germans, who were considered Soviet people. Despite the difficulties, the Germans became one of the equal European ethnic groups in the region, interacting with the local Kazakhs, and their fate continued for many years.

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БІРІНШІ ДҮНИЕЖҮЗІЛІК СОҒЫС ЖЫЛДАРЫНДА ОҢТҮСТІК ҚАЗАҚСТАНДАҒЫ НЕМІСТЕРДІҢ САЯСИ-ӘЛЕУМЕТТІК АХУАЛЫ

Аннотация. XX ғасырдың басында Оңтүстік Қазақстан өңірі, дәлірек айтқанда, Әулиеата және Шымкент (Черняев) уезі немістер келіп қоныстанған негізгі аймақтардың бірі саналды. Түркістан өлкесінің Сырдария облысына қараған бұл аймақтарда немістер XIX ғасырдың соңғы ширегінен бастап қоныстанған олар мұндағы негізгі еуропалық этностардың бірі саналды. Немістер жергілікті халықтармен араласып, аймақта этнодемографиялық үдерістердің дамуына ықпал етті. Алайда осындай үдерістердің дамуына және немістердің саяси-әлеуметтік өміріне Бірінші Дүниежүзілік соғыс теріс әсер тигізді. XX ғасырдың басында аса ірі халықаралық фактор саналған бұл соғыс империялар арасында үлкен соғыс жағдайын тудырып, халықтар арасына да іріткі салды.

1914-1918 жылдары болып өткен Бірінші дүниежүзілік соғыстың алғашқы күндерінен бастап, Ресей империясы мен Германия арасындағы қарым-қатынас ашық соғыс жағдайында өтті. Бұл жағдай Ресей империясының құрамында өмір сүріп жатқан немістер мен неміс қауымдастығының саяси өміріне үлкен өзгеріс әкелді. Мұндай өзгерістер әсіресе империяның еуропалық бөлігіндегі неміс қоныстанушыларының өмірінде кеңінен орын алды. Оның басты мысалдары немістердің әскери қудалауға ұшырау, қоғамда немістерге қырын қарау, этностар арасында шовинистік көзқарастың орнауы және осы сияқты факторлар арқылы сипатталды. Ресейде жергілікті, яғни ресейлік немістерге «ішкі жаудың» айдары тағылды. Ресей империясының барлық аймақтарында неміс қауымдастығының тағдыры 1914-1918 жылдары өте мұқият бақылауда болып, тұтастай алғанда 1914 жылдан бастап немістердің тағдырында сындарлы жағдай орын алды. Осы орайда, Түркістан өлкесінде де Ресей империясының басқа аймақтарындағы сияқты жағдай орын алды ма деген заңды сұрақ туындайтыны сөзсіз. Мақалада Сырдария облысының Шымкент және Әулиеата уездеріндегі немістер жағдайына қатысты мәселелердің жауабы іздестірілді. Сонымен қоса, Бірінші Дүниежүзілік соғыс жылдарында Оңтүстік Қазақстан өңіріндегі немістердің саяси жағдайы мен әлеуметтік өмірі зерттеледі. Жергілікті жерде өмір сүрген немістердің тұрмысы, тіршілігі және олардың қоғамдағы орнын көрсету мақаланың басты міндеттері саналады. Сондай-ақ, аймақтағы өзге де халықтардың саяси-әлеуметтік тарихы қарастырылады.

Түйін сөздер: немістер, Оңтүстік Қазақстан, Бірінші Дүниежүзілік соғыс, халық, әлеуметтік өмір.

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СОЦИАЛЬНО-ПОЛИТИЧЕСКАЯ СИТУАЦИЯ НЕМЦЕВ В ЮЖНОМ КАЗАХСТАНЕ В ГОДЫ ПЕРВОЙ МИРОВОЙ ВОЙНЫ

Аннотация. В начале XX века Южно-Казахстанский уезд, а именно аулиеатинский и Чимкентский (Черняевский) уезды считались одним из основных регионов, куда переселялись немцы. В этих регионах, относящихся к Сырдарьинской области Туркестанского края, немцы расселились в последней четверти

XIX века, считаясь одним из основных европейских этносов. Немцы общались с местными народами, способствовали развитию этнодемографических процессов в регионе.

Однако на развитие этих процессов и политико-социальную жизнь немцев отрицательное влияние оказала Первая мировая война. Эта война, считавшаяся крупнейшим международным фактором начала XX века, способствовала установлению военного противостояния среди империй, а также посеяла вражду между народами.

Это обстоятельство привело к значительным изменениям в политической жизни немецких диаспор и немцев, живущих в составе Российской империи. Такие изменения имели особенно широкое распространение в жизни немецких поселенцев европейской части империи. Его основные примеры характеризовались вооруженными преследованиями немцев, негативным отношением к ним в обществе, установлением шовинистского подхода среди этносов и другими подобными факторами.

В России за местными, то есть российскими немцами был закреплен ярлык – «внутренний враг».

В 1914-1918 годах судьба немецких сообществ во всех регионах Российской империи была под пристальным наблюдением, в целом с 1914 года в судьбе немцев сложилась очень конструктивная ситуация.

В связи с этим и возникает законный вопрос, такова ли ситуация в Туркестанском крае, как и в других регионах Российской империи. Кроме того, в предлагаемой статье рассматриваются вопросы, касающиеся состояния немцев в Чимкентском и Аулиеатинском уездах Сырдарьинской области. В статье изучается политическое положение и социальная жизнь немцев Южного Казахстана в годы Первой мировой войны. Основными задачами статьи является описание быта, жизнедеятельности немцев, живущих на местах, и их место в обществе. Кроме того, рассматривается социально-политическая история других народов региона. В статье также даны результаты исследования вопроса происхождения казахских родов Старшего жуза: сарьуйсун, дулат, албан, суан, ысты, шапырашты, ошакты, сиргелы с точки зрения популяционной генетики и данных шежире.

Ключевые слова: немцы, Южный Казахстан, Первая мировая война, население, социальная жизнь.

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KAZAKHSTAN’S RUSSIAN DIASPORA: BETWEEN MIGRATION AND SEARCH OF A NEW IDENTITY

Abstract. The article proposes the Hirschman’s model of studying the changes in the Russian Diaspora’s perception of Kazakhstan as their new host-state. After the demise of the Soviet Union, their responses to decline of their political, social and cultural status varied from voicing discontent to exiting and loyalty throughout the non-Russian former Soviet republics, where they found themselves living in a new political reality. Not surprisingly their observable public sentiment went through a variety of negative expressions, such as confusion, desperation and even feelings of betrayal resulting from the need to learn new national languages and adapt to emerging nationalizing policies and practices of their new host-states. Many Russian people perceived the unexpected collapse of their common Soviet homeland as a personal drama, and some of these continue to identify more as countrymen of Russia rather than their homeland. This has become and will remain the main source of emigration aspirations among Russian Diasporas living in the former Soviet republics. The article draws upon the case of the Russian Diaspora living in Kazakhstan, where, even after three decades of national independence, many Russians still remain confused and too aloof to actively participate in the political and social life of the country.

Key words: Russian Diaspora, Kazakhstan, emigration, exit, voice, loyalty, host-state, identity, language policy.

Introduction. The collapse of the Union of Soviet Socialist Republics at the end of 1991 created not just new boundaries between the 15 states that emerged from it, but it also birthed new economic, political, and ideological problems. The government of Kazakhstan, as had the governments of other newly independent post-Soviet states, not only faced the need to transform its economy, but it had to find a way to unite its diverse population under a single political and ideological identity.

The impact of this new problem became immediately apparent, as Kazakhstan and other post-Soviet republics experienced large-scale migration in response to the breakup of the USSR. This included not only extensive internal movement of ethnic Kazakhs toward better living conditions in its population centers, but also significant emigration of ethnic Russians to destinations beyond the country’s northern border within the newly emergent Russian Federation. This article intends to examine the search for a new identity among Russian Diaspora in Kazakhstan and determine why Russians have chosen in the post-Soviet era to stay in or leave Kazakhstan; specifically, this brief investigation will identify circumstances and other factors that affected past and current nation-building processes, as well as emigration dynamics within this population group.

Methodology. Albert Hirschman’s “Exit, Voice and Loyalty” theory that this study uses can be applicable to analyze the causes of Russian Diaspora’s emigration from Kazakhstan. I argue that of all the migration theories, the Hirschman’s model of the relationship between state and citizen appears to be the most appropriate for describing the factors that influence Russians’ emigration from Kazakhstan. It outlines exactly how their new reality drives them to choose to immigrate to Russia.

The Hirschman’s model provides an explanation for the conditions under which the categories of exit, voice and loyalty come into existence, conceptualizing “exit and voice as two contrasting, though not mutually exclusive” reactions by discontented customers of a firm or organization to a decrease in its quality of goods or services provided [1, p.15]. Drawing a parallel between discontented customers and potential emigrants from the theory’s perspective would mean that “exit” should be interpreted as

changing one's place of permanent residence, while "voice" should be interpreted as the option of articulating discontent. If we apply this "exit" and "voice" conceptualization to the relationship between Russians and the state (Kazakhstan), then the Russian diaspora exiting from Kazakhstan should be defined, in the words of Nigerian professor Eghosa Osaghae, as "disengagement or retreat from the state by disaffected segments of the citizenry" [2, p.47].

Hirschman's latest work, which he described as "an essay in persuasion on behalf of voice" [3, p.431], offers us a better understanding of why "voice" fails in the case of Russian Diaspora's migration, leaving "exit" as their main response to state policies in Kazakhstan. This was most clear in the case of replacement of ethnic Russians by ethnic Kazakhs in administrative positions and adoption of a new national language policy after Kazakhstan's independence in 1991.

Unlike in the German Democratic Republic in 1989, when "the escalating dynamic of out-migration led those who wanted to stay to take to the streets to demand change" (Brubaker 1990) [4, p.12-13], the large-scale emigration of Russians from Kazakhstan in 1994 could not similarly inspire the use of the "voice" option by those left behind. Hirschman's original model that "exit subverts voice" proved to be much more reliable than what he supposed in his latest work. A lack of loyalty towards the state, stimulated by political, economic and social instability, still dominates and motivates migration aspirations amongst Kazakhstan's Russian population. This case can be assessed only in terms of their loss of faith in the state. Meanwhile, the gradual and inevitable rise of Kazakh speaking population in the country reduces the very probability that the voice option among Russians will ever take place. It might be possible, but only with external support. What's more, Hirschman's perspective is useful in understanding the relationship between Russian Diaspora and Kazakhstan (as their host-state), it does provide a complete picture, although there are various contexts referring to broader non-migration issues, including identity, nation-building, and ideology, which will be described later in this paper.

Why do most Russians want to leave Kazakhstan? Consider the lives, realities, and sentiments of Kazakhstan's Russians today, in the wake of nearly three decades after national independence. How do they perceive their situation? What kind of feelings do they feel today? Are they feeling left behind or are they still searching for a new national identity?

The imperial nature of the deposed Soviet state left in all of its newly-independent republics (with the exception of the Russian Federation) a legacy of a vast array of philosophical controversies. Foremost among these was a long-established psychological assumption among Russians that their culture would have not only permanence in the farthest flung reaches of the former Soviet territory, but indeed superiority over cultures that originated there. Russian families in Kazakhstan, whose ancestors settled in Central Asia no more than a few generations ago under the rule of the last Romanov tsars or during the 70-year lifespan of the Soviet Union, had always identified themselves as "empire-builders." They were wholly unprepared for that identity to transform into today's post-Soviet "Russian diaspora," as they are officially portrayed, or just another "ethnic minority," a term only recently applied to Russians in the so-called "Near Abroad" [5, p.473-492].

Acceptance of the newly empowered Kazakh majority imposed upon ethnic Russian political power and authority a demand even more pronounced than simply sharing the cultural tableau of Kazakhstan; it invoked a complete reversal of their cultural dominance. Under the new political order, ethnic Kazakhs soon displaced Russians in key positions they held under Soviet rule, which challenged the social and political status that the one-time "empire-builders" enjoyed. Perceiving a zero sum situation, Russians viewed with distress their loss of power, which only contributed to negative sentiment in their community. Most were not ready to be consigned to the margins of power and authority, which led in part to large-scale migration back to their ancestral homeland.

The majority of Russian sentiment in Kazakhstan suggested that it wasn't easy for them to witness the emergence of a new Kazakh state; the crash of the USSR as a sovereign political power effectively meant the crash of the earlier messianic ambition of Moscow's great empire extending across Central Asia, and this undoubtedly undermined their collective psychological state. The new political reality was clearly at odds with the Russian image of how things should be. As such, those that were left behind in Kazakhstan publicly spoke of their considerable preoccupation with the need to adapt to a new political order.

Meanwhile, the concept of the Russian Federation serving as an "external homeland" became popular among many Russian Diasporas in all of the non-Russian post-Soviet states. This led to the emergence of

two competing identities among Russians living in post-Soviet space - an ethnic identity and a national identity. Among the Russian Diaspora in Kazakhstan, this competition continues today, and one of the main questions that observers of Russian diasporas seek to answer is which identity will eventually dominate. Of course, one can only speculate on the ultimate outcome of this competition as many Russians have not yet come to a final decision about whether they will return to Russia (repatriate), or continue to make their home in Kazakhstan (remain in their host-state).

The dilemma of Russian Diaspora in Kazakhstan. Should they stay or should they go - that's the dilemma of the Russian Diaspora in Kazakhstan. Before the breakup of the Soviet Union in 1989, approximately 6.2 million Russians resided in Kazakhstan, and they all faced the new reality of being demoted to the second largest ethnic group in the country. Kazakhs consisted of 40.1 percent of Kazakhstan's 16.5 million people, or 6.6 million people total, while Russians consisted of only 37.8 percent [6, p.247]. Alongside Russians in Kazakhstan were also those who were culturally Russified, but not of Russian ancestry. This varied group of nationalities who did not associate with the titular nationality of the host-country typically held strong ties to and affiliation with the Russian Federation. Pilkington and Flynn claim that at the end of the 1990s there were about 11 million people who could be classified as "culturally Russified non-ethnic Russian" residents of "Near Abroad" post-Soviet states [7, p.180-183]. However, despite the strong connection and affiliation with Moscow, these Russian-speaking people usually had little in common with ethnic Russian communities. Their differences ranged from the degree of integration they permitted themselves with their host-state to the economic prosperity of individual families. Crucially, they varied from each other particularly in political participation, social activities, and general expectations regarding perspectives about the future, including whether or not they intended to migrate [8, p.52-53]. The diversity of these groups, whether they migrated to Russia or remained as members of the Moscow-protected Russian Diaspora in the so-called "Near Abroad," presented a unique challenge to that country's authorities in figuring out how to integrate such a multi-faceted Russian-speaking population into a homogeneous, cohesive community.

Some Russians and culturally Russified populations of Kazakhstan had already made the decision to stay in the new republic, maintaining it as the place of their permanent residence and destiny. They adapted to new circumstances and adopted their new identity as citizens of their host-state. Others chose to migrate northward out of Kazakhstan to the newly created Russian Federation, thus returning to their ancestral pre-Soviet Russian identity, which of course differed substantially from their own personal former Soviet identity [9, p.29-31].

Those Russians that did return to Russia often perceived emigration as one of many adaptation strategies to unexpected political changes. The usual motivation for choosing this particular option was that it restored a perceived "historical norm;" migrants were repatriating themselves to "their" national state (i.e., the state whose name coincides with their ethnicity), rather than living in the past glory of the failed Russian Empire/Soviet Union. The concept of "repatriation," adapted from the decolonization experience of the developing world and other historic migrations, appeared to many who exercised it as a "politically correct" response. "Repatriation" is defined here as, first and foremost, the "return" of Russians to the territory of the Russian Federation, regardless of how long they'd lived outside Russia, and regardless of their employment and social status [10, p.42].

Taking into account the fact that quite a lot of Russians left the country for the past three decades after Kazakhstan's independence, one should ask a question: "Could Kazakhstan's national policies and practices have a negative effect on an ethnic Russian's decision to emigrate?" That's a tricky question.

Related academic literature analyzing the nature of those nation-building processes used by post-Soviet states tend to show a positive bias when qualitatively describing the lives of those who stay, whereas the statistical data on migration tend to show a more negative picture. What's known for certain is that steps taken to create a new republic in Kazakhstan have been more controversial than straightforward, and that the current debate over how to construct an indivisible nation is today just as complicated as it has ever been.

After carrying out extensive observations on the nationalist discourse of post-Soviet successor states in the period just after the breakup of the USSR, Brubaker categorized each of the newly independent countries as "nationalizing successor states" [11, p.166]. About Kazakhstan in particular, he noted this tendency in both the "distinction between the titular ethnic group and others," and "the claim to titular primacy." The resulting political hegemony exercised by the Kazakh majority as the titular ethnic group

resulted in the “nationalization of government and administrative personnel through recruitment and promotion practices” [12, p. 179]. In other words, Russians were replaced by Kazakhs in administrative positions shortly after independence, demonstrating a clear expression of their political dominance.

This dominance later extended into the private and state industrial sectors, when it was later observed that in Kazakhstan, “nationalization is evident in all key industries, major business and the labor market” [13, p.181].

The selection of Kazakhstan’s official language also proved to be an important early controversy. In order to promote the use of the Kazakh language, a new national language policy was formulated and implemented through a series of regulatory acts that some scholars labeled as “Kazakhization.” Despite this being the norm among the newly emerged post-Soviet states, the existence of the policy was officially denied. Nevertheless, academic observers frequently testified to its actual implementation. According to Karin and Chebotarev, this implementation appeared to take the form of harsh administrative measures actually aimed at forcing non-Kazakh speaking Russians to leave [14, p.22]. If this was the intent, though, such measures soon seemed futile. “Constructing a nation in a primordial sense in this multi-ethnic country (Kazakhstan) might well prove to be mission impossible” [15, p.265].

But to what extent is language a vehicle of identity? That’s difficult to answer for Kazakhstan because, within the country, ethnic identity is not perceived as being incompatible with a sense of national identity. It’s fair to say that this case is going to bring up issues, issues even ethnic Kazakhs will have to deal with.

Another common motivation behind a certain percentage of Russian Diaspora choosing to emigrate from Kazakhstan is about education-related problems. It is not a secret that quality education in Kazakhstan is becoming less accessible to an ordinary people. In this regard, the Hirschman model is again suitable for use, as it assumes that emigration aspirations often arise in families where quality-conscious parents display their disappointment with the quality of schools or education by changing their permanent place of residence instead of simply withdrawing their children from one school and sending them to another [16, p.16].

The issue of education in mother tongue is a very sensitive and emotional one. Many Russian families can’t even hypothetically imagine prospects for a loss of education in their mother tongue, meanwhile the ongoing debates about it in Kazakhstan had already motivated some people to migrate. Sebastien Peyrouse, a noted research professor who specializes in the geopolitics of Central Asia, summarized their feelings best. “The fear of an inability to offer younger generations a quality education in their mother tongue contributes to the push to emigrate. In addition, the majority of Russians cannot cope with the cultural and linguistic ‘nationalization’ of education and continue to regard the development of national languages with contempt. Many of them wish that Russian-speaking schools would operate according to the curriculum of Russia, rather than that of the state in which they live. They complain of the lack of textbooks coming from Russia, the willingness of the authorities to remove references to Russian culture from literature textbooks, and the negative vision of Russia developed in the new history books” [17, p.19].

Another interesting factor that often contributed to a family deciding to leave Kazakhstan and resettle in Russia was their response to external signals, particularly those broadcasted to the Central Asian country by Moscow-based media channels. These signals, speculating on the fate of Russians living in the countries of the so-called “Near Abroad,” became louder after the early 1990s. Particularly during Boris Yeltsin’s second term as the first President of the Russian Federation (1996-1999), it was normal to watch chat shows and news programs on Russian TV stations featuring footage of such populist Russian politicians as Vladimir Zhirinovskiy, Sergey Glazyev, Dmitry Rogozin, Konstantin Zatulin, Alexander Prokhanov and others. All of these personalities accused non-Russian post-Soviet leaders (even the relatively friendly Nursultan Nazarbayev, the first President of Kazakhstan), of violating human rights of Russians within their country.

Meanwhile, those Russians in Kazakhstan who chose to stay, rather than repatriate, often had to come to terms with and accept a peaceful transition from their Soviet-era empire-builder identity to that of an ethnic minority group. How families did this was often an ambiguous process, but for those who elected to integrate into the society of the host-state in which they resided at the end of the Soviet era, such coming to terms and accepting was inevitable.

Another interesting aspect of Russian emigration patterns involves the demographic distribution of the migrants: older, younger and middle-aged generations. In general, one can rely on the tendency that the older the individual, the less interested they would be in moving; this is true whether the move was within the nation's borders or to a whole other country. The ailments of old age tend to make people less mobile, or certainly less willing to be mobile.

After people settle into long-established lifestyles, they often will consider before moving the amount of prosperity they have at stake. Older generations are more likely to be retired, and thus, more concerned about their savings in their current host-state, and less driven by the potential to earn from new sources of income in a new country, where they can also face different obstacles to naturalization. It's easy to understand why emigration is not popular among this demographic.

In the case of Kazakhstan, the older generation of Russian Diaspora is no exception. They are the least likely to emigrate from Kazakhstan, regardless of income, education and employment status. They know well the many difficulties and obstacles they face in gaining employment and adapting to a new country. Therefore they usually reject repatriation to Russia or moving to anywhere elsewhere, for that matter. However, there is another reason that is less visible, but nevertheless subtly dominates this older demographic. It deals with the psychological issues connected to the fact that the representatives of the older generation have never been citizens of the newly independent Russian Federation. They used to belong to the former Soviet Union and they had affiliated their identity to being a citizen of the Soviet Union at best. It reminds the situation, when the older generation, in the words of Hirschman, "can remain loyal without being influential" [18, p.78].

Still, at the same time, older generations fully support repatriation of younger and middle-aged Russians to Russia. In the event that migration debates arise in the family, these younger members are traditionally urged on by the eldest family members.

Such individuals, of course, are not in the same category as those who consider themselves part of the Kazakhstan's Russian Diaspora. Nevertheless, in practical terms, there isn't much of a difference between the Russian who maintains his or her presence in the "Near Abroad" as part of the so-called diaspora, and someone who accepts the role of an ethnic minority in the society of that person's newly-adopted country. What differentiates the two is that the latter group of people, once dominant under the Soviet Union, has subordinated itself within the post-Soviet order. The process of subordination is hardly ever easy or simple. Indeed, having to constantly work through the problems of self-determination within the ever-changing reality of the developing Central Asian world means that Russians in Kazakhstan, as with anywhere else in the so-called "Near Abroad," will always remain at a crossroads. In the long run, some, but not all, will eventually remain lifelong citizens of their adopted country, saying "yes" to integration within their host-state. Others will eventually refuse to adapt, saying "no" to subordination to Kazakh society, thus provoking the younger generation to adopt pessimistic assumptions about their host-country and favor an eventual return to Russian society, which they will come to believe can only exist under the sovereignty of the Russian Federation. From that perspective, it is reasonable to consider that "a state's inability or unwillingness to supply public goods, including social justice and political liberty, is likely to decrease loyalty and thereby encourage exit" [19, p.47] of ethnic Russians from Kazakhstan. Loyalty, in the words of Hirschman, is key concept in the battle between exit and voice because it implies the possibility of disloyalty, that is, exit [20, p.82].

Anyway, Kazakhstan looks like one of the most favorable places for Russians to adopt as their home today. A 2015 pilot poll held in Kazakhstan in order to examine Russians aspirations revealed that 60 percent of all Russian respondents were not interested in emigration from Kazakhstan at any point in the future [21, p.102]. "The existing political system is allowing Russians to feel themselves relatively welcomed and comfortable in all spheres of a life," said Lobanov, a leader among the Russian Diaspora in Kazakhstan [22].

What can be said for certain from this latest poll, alongside the positive feedbacks and sentiments expressed by the leading representatives of the Russian Diaspora in Kazakhstan, is that a majority of Russians are adapting themselves quite readily to their new host-state environment.

Russia's demagogues who aggressively seek to restore nationalist or populist sentiments in their nation's contemporary political discourse, meanwhile, will find a ready audience among not only those Russians who return, but also those within the Diaspora. Their election campaigns invariably employ slogans that suggest Russia adopt the mantle of serving as the main protector and guarantor of rights of

Russians and Russian-speaking people in all of the post-Soviet republics. The past popularity of nationalist sentiment among Russian voters has led authorities in Moscow to adopt a new approach that has led to a whole new Russian compatriot policy. In the words of Barrington, Herron and Silver, the Kremlin “officially started to perceive itself to be the ‘external national homeland’ for all Russians outside the Russian Federation and claim a right and even a duty to monitor their treatment and status in other post-Soviet states” [23, p.293-295].

Over the decade that Vladimir Putin has ruled as President of Russia, this perception of an “external homeland” has transformed into a full-blown doctrine. Following up his nation’s declared annexation of Crimea, President Putin initiated on July 1, 2014, an intensified new wave of discussion and debate over the fate of Russian compatriots in non-Russian post-Soviet states by warning the world, “Russia will continue to defend the rights of Russian compatriots using the entire range of available means – from political and economic to operations under international humanitarian law and the right of self-defense” [24].

For better or worse, the Russian Federation today considers Russian Diasporas, Russian-speaking people, culturally Russified populations, or anyone else who feels sympathy for or has close cultural or political ties to Moscow, as significant factors in any strategic decision they adopt with respect to the post-Soviet “Near Abroad” republics, including Kazakhstan. It has taken two decades for Russian foreign policy to transform the concept of “external homeland” from a concept that appeared only in academic discourse (in particular, post-communist ethnic studies discussions conducted by such noted experts as Rogers Brubaker) to a subject of the most intense public discussion about Russian foreign policy.

Analysis and Migration Statistics of Kazakhstan’s Russians. Not surprisingly Kazakhstan’s policies and practices governing its continued development, including the establishment of those regulations that define the country’s language policy, only fueled Russian worries about their future prospects in the country during the first decade of Kazakhstan’s independence. Indeed, during the 1990s such policies served to strengthen anxiety among non-Kazakhs that national authorities would pursue nationalist policies and practices, at least at the local level.

Nevertheless, when analyzing the available statistical data from the early 1990s, it appears that emigration of Russian Diaspora from Kazakhstan was more likely to result from economic reasons rather than political. Although their migration out of Kazakhstan actually started during the administration of Mikhail Gorbachev in the late 1980s, it did not intensify immediately after the demise of the USSR at the end of 1991, when travel restrictions were effectively lifted for those who wanted to leave, but rather a bit later.

The Early Post-Soviet Period (1992-1997). According to statistical data, Russian emigration from Kazakhstan reached its peak in 1994 when some 283 000 people left the country. In other words, the evidence seems to show that outward migration of Russians didn’t coincide with their political opportunity to pick up and leave, but rather it corresponded instead with a period of difficult economic stagnation and crises that took place in Kazakhstan between 1992 and 1997, as it seen in figure 1.

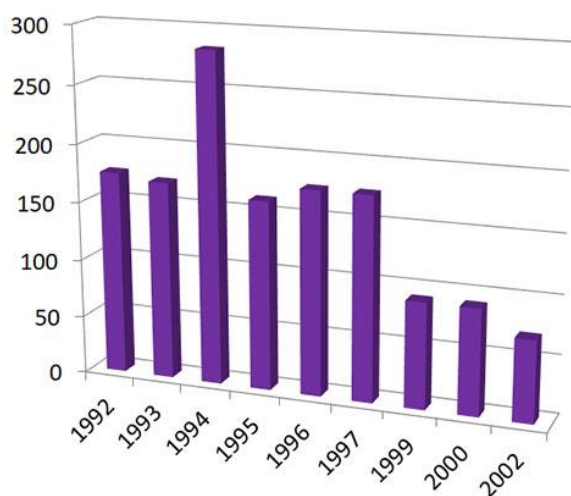


Figure 1 – Russian emigration from Kazakhstan, in thousand. Source: The figure is developed by author’s calculation based on: Kulekeyev, Zh. [25, p.58]; Khustnitdinova, R. [26, p.23]; Smailov, A. [27, p.11]; Smailov, A. [28, p.12]

Meanwhile, starting in 1992, the year following independence, most leaders that headed post-Soviet republics literally worshipped liberal ideas and encouraged their adoption, if not by regulation, then by the collective consciousness of their societies. However, Kazakhstan was not so quick to follow this path. Under Kazakhstan's first president, Nursultan Nazarbayev, the creation of a market economy became the key pillar upon which the national administration would base its ambitions during the country's first years. The former leader often expressed his firm belief that the "invisible hand" of the free market would ultimately take control and put everything in its place, even within the state sector. His conviction inspired a lot of people to believe as he did and become confident that they would eventually live better, once Kazakhstan succeeded in creating its new market economy.

It was popular back then to believe in Adam Smith's theory, suggesting that "without the market economy we may fail," "only the free market economy is able to organize things properly," and so on. Nevertheless, the transition from a planned economy to one driven by the market itself was a painful process, one that was shared by nearly all post-Soviet states. These years, characterized by the implementation of "shock therapy," the sudden removal of socially protective price and currency controls that had existed in the socialist economy that operated under Soviet authorities, promised rapid and positive enrichment for anyone clever enough to find their niche in the open market, regardless of their ethnicity.

Kazakhstan sold off much of its state property during the years of rapid economic and social transformation that defined the period between 1992 and 1997. The Soviet-era social welfare system was phased out entirely, and new laws were implemented to eliminate state monopolies on ownership of land, significantly changing the socio-economic structure of the country's agricultural sector. Ambitious agricultural reforms led to the large-scale transfer of land into private hands, going well beyond simply re-introducing private ownership of land.

In the midst of these historical changes, ethnic identity ceased to be the main driving force for social interaction between and within different ethnic communities in Kazakhstan. On the contrary, changes left an ideological vacuum that was rapidly filled with a ubiquitous concern for one's own survival rather than the survival of a group based on ethnicity or social behavior. As a result, people began to idealize individualism. Some even believed that the tradition of the American dream - where social mobility was possible through hard work, ability, and achievement - was somehow being transplanted into the mindset of the citizens of Kazakhstan.

In short, the period between 1992 and 1997 represented a tectonic shift that led to a complete change in the migration dynamics for Russians and other ethnic minorities. Although economics drove large numbers of non-Kazakhs from the country, most of the residents of Kazakhstan favored retaining that country as their host-state. "We can talk about the migratory flow of Russians, but it's not a large-scale migration since many of them tend to return back to Kazakhstan. Those who left Kazakhstan now make up a small percentage. One thing, however, is clear. They keep returning home," said G. Belyakov, who took the reins of the Executive Committee of the Organization of Russians in Kazakhstan in 1997 [29].

Nevertheless, this is a time when the only constant factor is change. In Kazakhstan, change is forcing its citizens to question quite fundamental aspects of the life, including the search for both their origins and their ultimate destiny. With this in mind, it could be said that Russians tend to migrate from Kazakhstan in search of greener pastures.

The Middle Post-Soviet Period (1997-2015). Whereas increased Russian emigration from Kazakhstan in the years before 1997 could be shown to correspond fairly faithfully with the economic crises and political reforms that took place during those years, migration in the years that followed 1997 showed the opposite tendency. Kazakhstan enjoyed strong economic growth in the first decade of the new millennium as a result of large-scale exploitation of the country's huge oil reserves in the western part of the country. This prosperity continued through 2015 as a result of high oil prices, which allowed the country to gradually stabilize its national economy. The average citizen likewise enjoyed economic prosperity during these years, and this was reflected in Russian sentiments favoring staying rather than emigrating from Kazakhstan.

By 2003, conditions changed dramatically when Russian emigration from Kazakhstan started a lengthy period of steady decline. In 1994, the record high for emigration was set at 283 000. In 2003, this number was reduced seven-fold when the number of Russians leaving Kazakhstan dropped to 41 000 people. After 2003, emigration stayed relatively constant at a level between 20 000 and 40 000 people per year (figure 2).

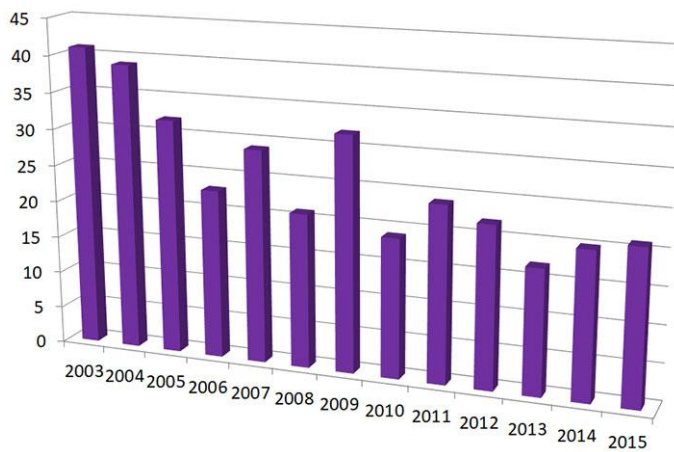


Figure 2 –
Stabilization of Russian emigration from Kazakhstan, in thousand.
Source: The figure is developed by author’s calculation based on Statistical data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, from 2003 to 2015. Astana, 2016, published online January 2016 <<http://stat.gov.kz>> accessed October 11, 2017

This period of stabilization in emigration demonstrated that during periods of relative economic success, when the social welfare system provided improved support for its citizens, Kazakhstan became a host-state that generated much greater loyalty among its Russian compatriots. This apparent change in attitude among Russians in Kazakhstan shown in the statistical data is an indicator that most of them felt quite comfortable in the country’s political environment. The stabilization of the rate of emigration demonstrated that Russians, once they found a suitable living strategy in their host-state, quite easily co-existed with Kazakhs within the post-Soviet political order, social environment, and economic marketplace of Kazakhstan.

The decrease in Russian emigration, however, also indicated that certain social factors that would have accentuated the significance of their ethnicity and created conditions of ethnic isolation (perhaps even driving ethnic separation) were absent in Kazakhstan. This was important as Russian Diaspora and other minority groups found themselves in the same position as that of the Kazakh majority during this important period in the transition of Kazakhstan from a planned to a market economy.

Meanwhile, as noted earlier, the years 2003 and 2004 provided the first truly significant change in the migration dynamics affecting Kazakhstan. This was when the number of Russian emigrants decreased from 41 000 to 39 000, marking the start of a steady decline in outward migration. At the same time, the number of Russians who arrived in Kazakhstan during its period of improved economic prosperity began to increase, peaking at 20 000 immigrants in 1999. In the four years that followed, through 2004, the number of new arrivals from the country’s northern neighbor remained relatively stable, and then dropped to less than 10 000 in 2005. Ever after, the rate of Russian immigration gradually decreased, and short-term projections suggest that their numbers will drop even further (figure 3).

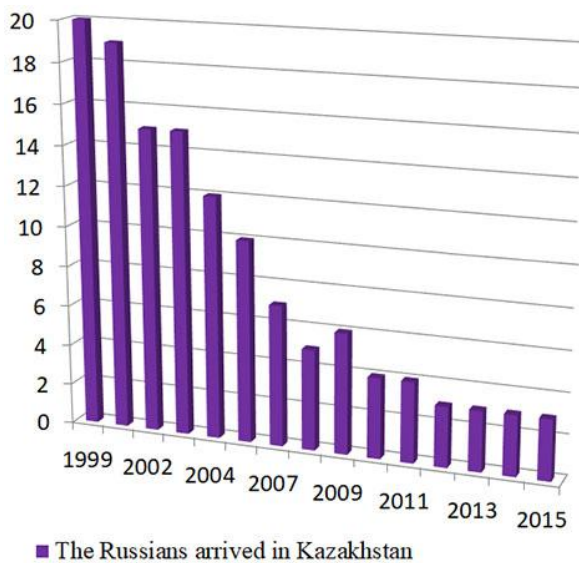


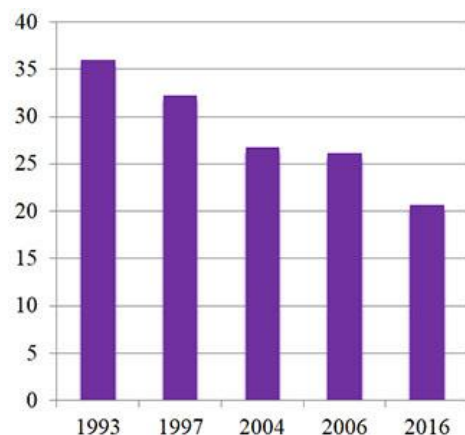
Figure 3 –
Russians’ immigration to Kazakhstan, in thousand
(The figure is developed by author’s calculation based on statistical data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, from 1999 to 2015. Astana, 2016, published online January 2016, <<http://stat.gov.kz>> accessed January 3, 2018

The Late Post-Soviet Period (2015 to Present). There is every reason to believe that Kazakhstan has today become a relatively ideal place of multi-ethnic harmony and coexistence. Fears in the early 1990s that the process of re-defining interethnic relations in Kazakhstan would become aggressive appear to have been unfounded. The process can be characterized as having been more moderate than expected, if not entirely friendly and peaceful. In the words of local scholars, Kazakhstan, unlike in many parts of the former USSR, has actually pursued a policy that avoided ethnic strife, and fostered “zero ethnocentric” nationalist movements in its borders [30].

By pursuing an interethnic relations policy that respects tolerance as a national value, authorities have avoided negative events occurring during the transformation of interethnic relations in Kazakhstan. This was particularly apparent when a 2015 pilot poll was held in Kazakhstan in order to examine ethnic Russian aspirations. According to its results, 60 percent of the Russian respondents indicated that they were not interested in pursuing emigration from Kazakhstan at any point in the foreseeable future [31, p.102].

Nevertheless, over time, the post-Soviet migratory development among Kazakhstan’s Russian Diaspora did result in significant changes in the ethnic composition of its population. According to the most recent national census, held in 2009, Russian Diaspora now accounts for less than a quarter of the total population in Kazakhstan. In contrast, back in 1989 and 1993, Russian Diaspora comprised 37 and 36 percent of the total population of Kazakhstan, respectively. The period of greatest change, as noted earlier, took place in the 1990s, with the decline becoming more gradual from the year 1999, through 2005 and 2009, specifically amounting to 30, 26.7, and 23.7 percent of the total population, respectively. By 2016 Russian Diaspora constituted only 20.6 percent of the population of Kazakhstan (figure 4).

Figure 4 –
Russian Diaspora in Kazakhstan (late 20th-beginning of the 21st century), (per cent of total population).
Source: The figure is developed by author’s calculation based on statistical data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, from 1993 to 2016, Astana, 2016, published online January 2016 <<http://stat.gov.kz>> accessed April 15, 2019



Despite the fact that past emigration of Russians have left a noticeable impact on the amount that remain today in Kazakhstan, they still reside in large numbers in the northern, central, and eastern parts of the country. Certainly, their numbers are not as dominant as before the ethnic and demographic changes that resulted from the large-scale emigration that took place in the 1990s. Nevertheless, we can infer from the statistical data that the geographic distribution of any future outward migration by Russians would likely remain unchanged, even if, as expected, the rate of net outward migration increases over the near future. However, very soon it might be reasonably argued that a Russian Diaspora might reduce in quantity further in any of these administrative districts.

Conclusion. In 1991, when Kazakhstan gained its independence, Russian Diaspora made up slightly less than 40 percent of total population of the country, while Kazakhs, the country’s titular ethnicity, had approached 50 percent or the threshold to majority, according to the 1999 census. The near parity that Russians enjoyed at that time did not prevent large-scale migration from Kazakhstan which started in earnest in 1992, the year after independence. The peak of Russian migration, however, took place in 1994, when some 284 000 people left the country. This dynamic remained high through 1997, which corresponded to the years of economic stagnation and crises in Kazakhstan.

With the emergence of a new political reality, the country’s Russian Diaspora experienced the painful process of transformation from the enviable status of being Soviet-era empire-builders to becoming either

an expatriated Diaspora, or just another minority group in a foreign land. Regardless of the eventual outcome of the demographic transformation that is still in progress, the migration process in which Russian Diaspora became a minority within the new host-state of Kazakhstan is almost complete. It is quite likely that in the not-too-distant future that the share of population held by Russian Diaspora will soon remain stable, year after year.

Although areas of professional interest and the resulting competition between the titular ethnic group in Kazakhstan, Kazakhs, and the second largest ethnic group, Russians, are quite different, Russians nevertheless keep feeling that they are mostly marginalized, while remaining unwilling to step ahead and learn the locally-spoken language of the country. This has always been the biggest obstacle to the advancement of Russian integration within the dominant Kazakh society. It is language that will likely be the disadvantage that will stimulate further massive departures of Russians from Kazakhstan. In the worst case, this problem can even foster the emergence of new challenges, such as agitation of separatist aspirations among Russians within those parts of Kazakhstan where they still dominate.

However, Kazakhstan's ethnic policy and its relations with Russia have been stable and productive for the last 28 years. This has allowed non-Kazakh minorities to feel themselves almost satisfied living in Kazakhstan. At the same time, the widely recognized status of Russian as one of the official languages strongly contributes to the stability of Kazakhstan, which differs considerably from some of the other post-Soviet states.

Nevertheless, many Russians remain unable to speak Kazakh. Therefore recognition of the official status of Russian as the "language of interethnic communication" in Kazakhstan will continue to serve as a successful example of creating a platform for mutual cooperation between the host-state and its Russian Diaspora. This is an excellent example of how an efficient policy in relation to languages can contribute to the attainment of national goals. This case, though, serves as a point of specific importance for Kazakhstan, since it is also the home of a number of other ethnic minorities for whom Russian must also serve as the primary language of inter-ethnic communication.

As Russian is still spoken widely by a significant part of the population, it's quite understandable why it remains also an integral part of public life. In this regard such language policy has become a clear message that Kazakhstan actually somehow cares about Russian Diaspora and entire Russian-speaking population. Nevertheless, Kazakhstan has to keep relying not only on effective domestic policies, but also on a supportive international political environment, which is crucial for the preservation of civil peace and inter-ethnic harmony in the country.

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ҚАЗАҚСТАННЫҢ ОРЫС ДИАСПОРАСЫ: ЭМИГРАЦИЯ ҒӘМ ЖАҢА БІРЕГЕЙЛІК ҮРДІСІ

Аннотация. Мақалада Қазақстандағы орыс отандастарымыздың тұрып жатқан мемлекетінің (Қазақстанның) бейнесін ұғынудағы өзгерістер мен олардың елден қоныс аудару себептері миграция теориясындағы Альберт Хиршманның 1970 жылы шыққан «Шығыс, дауыс таныту және адалдық таныту: кәсіпорындағы, ұйымдағы және мемлекеттегі құлдырауға реакция» атты кітабында айқындалған моделін пайдалану арқылы қарастырылған. Модель шығыс (көшу), дауыс таныту (наразылық білдіру) және адалдық таныту (бейілділік) стратегияларының пайда болу шарттары туралы мәселені түсіндіреді. Аталмыш теория тұрғысынан алғанда, наразы клиенттер мен потенциалды эмигранттарды қатарластыру дегеніміз «шығысты» тұрғылықты мекенді ауыстырумен, ал «дауыс танытуды» наразылық танытумен және белсенді күреспен теңестіреді.

Орыс диаспорасының 1994 жылғы жаппай қоныс аудару мәселесін егжей-тегжейлі түсінуімізге Альберт Хиршманның 1980 жылы шыққан «Шығыс, дауыс таныту және адалдық: одан арғы ойлар және соңғы зерттеулерге шолу» атты кітабы қол ұшын бере алады. Бұл кітапта ол 1989 жылы ГДР-ден ФРГ-ге бағытталған немістердің эмиграциялық ұмтылыстары жайлы оқиғаны қарастырады. Сол жылдары ГДР-де қалғысы келген немістер бірігіп, шығыс неміс қоғамында жүйелі өзгерістерді қолға алуды талап етіп, билікке қарсы жаппай ереуілге шыққандығы көрсетілген.

Қазақстанның орыс диаспорасының 1994 жылғы қоныс аудару үрдісінің ГДР-дегі қоныс аудару үрдісінен айырмашылығы, Қазақстанда қалғысы келген орыстардың билік тарапына бағытталған талаптарының айқындалуына ешқандай септігін тигізбегендігінде болып отыр. Себебі оларда аталмыш жылдары тұрып жатқан мемлекетіне деген бейілділік болмады, ал сол жылдары Қазақстанда орын алған экономикалық және әлеуметтік тұрақсыздық орыс диаспорасындағы қоныс аударуға деген ұмтылыстарды ынталандырып отырды.

Осы орайда, авторлар үшін миграция теориялары арасында Альберт Хиршманның мемлекет пен азаматтар арасындағы қарым-қатынас моделі Қазақстандағы орыс отандастарымыздың тұрып жатқан мемлекетінің (Қазақстанның) бейнесін ұғынудағы өзгерістері мен олардың елден қоныс аудару себептерін түсіндіруде ең жарасымды екендігі аңғарылады.

Кеңес одағы ыдырағаннан кейін, пост-кеңестік республикалардағы орыс диаспоралары кенеттен өздерінің жаңа саяси, экономикалық және идеологиялық ақиқатында қалғанын түсінеді. Бұл орайда саяси, әлеуметтік және мәдени мәртебесінің азаюына байланысты олардың реакциясы өздері тұрып жатқан мемлекетке адалдық танытудан бастап, бұл жерден басқа мемлекетке қоныс аударуға дейін барды. Олардың әлеуметтік ортасында абыржу мен қажудан бастап елден біржолата көшіп кетуге дейінгі эмоциялар кеңінен орын алды, себебі бұл жағымсыз көңіл күйге түрткі болған нәрсе – олардың пост-кеңестік республикалардағы ұлттық тілдерді үйренуі және ұлттық саясат пен жергілікті тәжірибеге бейімделуі керек еді. Қазақстан тәуелсіз болғалы және саяси тұрақтылықты сақтап келгелі ширек ғасырдан астам уақыт өтсе де, Қазақстанда тұратын орыс халқы болашаққа негізінен сенімсіздікпен қарап, республиканың саяси-қоғамдық өміріне белсенді араласпай отырғандығын атап өтуімізге болады. Алайда, олардың ортасында елден қоныс аударуға деген талпыныс азайған. Аталмыш модельді пайдалану барысында қол жеткізілген нәтижелерді қазақстандық орыстардың эмиграциялық үрдістеріне және жалпыға ортақ кейінге қалдырылған миграциялық үрдістерге болжам жасау мақсатында қолдануға болады.

Түйін сөздер: орыс диаспорасы, Қазақстан, Ресей, миграция, Хиршман моделі, мекендеу мемлекеті, бірегейлік, ұлттық саясат, тіл саясаты.

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РУССКАЯ ДИАСПОРА КАЗАХСТАНА: МЕЖДУ ЭМИГРАЦИЕЙ И ПОИСКОМ НОВОЙ ИДЕНТИЧНОСТИ

Аннотация. В статье рассматриваются изменения в восприятии русских Казахстана образа их страны проживания (Казахстан) и анализируются причины их эмиграции из страны путем использования в теории миграции модели Альберта Хиршмана, описанной в вышедшей в 1970 году его первой книге «Выход, голос и преданность: реакция на упадок фирм, организаций и государств». Модель дает объяснение условиям, при которых возникают стратегии выхода (исхода), голоса (протеста) и преданности (лояльности). Проведение параллели между недовольными клиентами и потенциальными эмигрантами с точки зрения теории означало бы, что «выход» следует интерпретировать как изменение места постоянного проживания, а «голос» следует интерпретировать как вариант выражения недовольства и активной борьбы.

Более детально объяснить ситуацию с массовой эмиграцией представителей русской диаспоры Казахстана в 1994 году поможет нам вышедшая в 1980 году работа Альберта Хиршмана «Выход, голос и преданность: дальнейшие размышления и обзор последних наблюдений». В ней он описывает аналогичное событие, которое наблюдалось в ГДР в 1989 году, когда наметился большой миграционный отток в сторону соседней ФРГ. Тогда немцы, пожелавшие остаться в восточной части, объединились и вышли с мощным протестом против властей ГДР с требованием немедленного проведения структурных перемен в обществе.

В отличие от восточных немцев, эмиграция представителей русской диаспоры Казахстана в 1994 году никак не могла воодушевить тех, кто решил остаться в Казахстане на вербализацию их требований в адрес властей страны, поскольку в их среде в те годы наблюдалось отсутствие лояльности к государству пребывания, а наблюдаемое в эти годы экономическая и социальная нестабильность в Казахстане мотивировало эмиграционные настроения среди русской диаспоры.

В этой связи, из всех теорий миграции описанная в теории Альберта Хиршмана модель взаимоотношений между государством и гражданами представляется авторам наиболее подходящей для описания факторов, влияющих на изменения в восприятии русских Казахстана образа их страны проживания (Казахстан) и на эмиграционные настроения в их среде.

После распада Советского Союза русские диаспоры постсоветских республик в одночасье оказались в новых для себя политических, экономических и идеологических условиях. В этих условиях реакция на

снижение их политического, социального и культурного статуса варьировалась от лояльности (верности) новому строю до эмиграции (выходу) из страны. Наблюдаемые в их среде общественные настроения прошли через множество негативных эмоций: от растерянности и отчаяния до желания эмигрировать, вызванных необходимостью изучения местных национальных языков и адаптации к возникающей национальной политике и практике в независимых постсоветских республиках. На примере проживающих в Казахстане русских можно сделать вывод, что даже после трех десятилетий национальной независимости и политической стабильности в республике многие из них по-прежнему живут с чувством неопределенного будущего и не случайно отказываются от активного участия в политической и общественной жизни страны. В то же время эмиграционные настроения в их среде пошли на спад. Результаты, полученные в ходе применения данной модели, могут быть использованы для прогнозирования эмиграционных настроений русских Казахстана и в целом для исследования феномена отложенной миграции.

Ключевые слова: русская диаспора Казахстана, Россия, миграция, модель Хиршмана, государство пребывания, идентичность, национальная политика, языковая политика.

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ЗАЯВЛЕНИЕ Национальной академии наук Республики Казахстан

Дорогие соотечественники!

В 1994 году Первый Президент Республики Казахстан Н.А. Назарбаев выступил с поистине исторической лекцией в МГУ им. М.В. Ломоносова, где предложил идею создания Евразийского экономического союза, призванную вместе выбраться из сложной социально-экономической ситуации, в которую попали многие постсоветские республики. Как известно, основными и базовыми принципами создания будущего сугубо экономического объединения были:

1. Приоритетность решения, прежде всего и более всего, экономических задач;
2. Разрешение любых судьбоносных вопросов на основе национальных референдумов;
3. Построение взаимоотношений государств, планирующих войти в новый экономический союз, на принципах равенства, невмешательства во внутренние дела друг друга, обеспечения территориальной целостности и неприкосновенности государственных границ.

Создание с 1 января 2015 года Евразийского экономического союза по своему первоначальному замыслу имело важное историко-культурное значение. Это добровольное экономическое сообщество независимых стран. Между пятью странами началось свободное движение товаров, услуг, капитала и людских ресурсов. Были убраны многочисленные таможенные барьеры и бюрократические препоны. Мы все получили огромный рынок, охватывающий почти 170 миллионов человек. Отечественные предприятия вышли на путь конкурентоспособности, начиная выпуск более качественных, дешевых и ходовых товаров. Уменьшились многочасовые заторы на границах. Каждая страна, вошедшая в Евразийский экономический союз, осуществляет взаимовыгодную и неуклонно растущую торговлю, особенно в приграничных зонах.

Вместе с тем, в последние годы со стороны некоторых современных политиков участились случаи попыток нарушения основных принципов, на которых держится это экономическое образование. Так, некоторые общественные деятели отдельных государств на протяжении последних лет открыто пытаются превратить его в политическое объединение. Об этом свидетельствуют их некорректные предложения о создании наднационального парламента, введения союзной валюты, единых пограничных войск и общего бюджета, за которыми, безусловно, стоит потеря нашей независимости, что в принципе недопустимо.

В этом году исполняется 555 лет казахской государственности. В 1465 г. Керей и Жанибек, отделившись от Золотой Орды (ей исполнилось 750 лет), создали независимое Казахское ханство. Эту юбилейную дату необходимо торжественно отметить.

Многие проекты Евразийского экономического союза так и остались на бумаге и требуют очень серьезной экспертно-аналитической работы и кропотливого организационного согласования со стороны представителей стран в Евразийской экономической комиссии.

Более того, со стороны некоторых общественных деятелей России не раз осуществлялись не соответствующие действительности заявления о якобы отсутствии у казахов государственности до 1991 года. Хотелось бы им напомнить, что первое чисто казахское государство, не говоря о древнетюркских государствах-каганатах, вершивших судьбы многих народов Евразийского континента, появилось в 1465 году. Раздаются некорректные заявления о том, что следует создать «Среднеазиатский федеральный округ» с центром в г. Алматы. Были грубые выпады в адрес Казахстана по поводу якобы исконной принадлежности северных и северо-восточных областей соседнему государству.

Все эти и другие провокационные действия волнуют нас, граждан суверенного Казахстана, в том числе и нас, ученых. Казахстанский народ живет и работает на своей исконной территории, со всеми соседними государствами у нас подписан договор о делимитации границ и установлены добрососедские отношения. Мы глубоко убеждены, что шаңырақ независимого Казахстана будет

обязательно передан будущим поколениям казахстанцев. К этому призывает нас и общенациональная идея «Мәңгілік Ел».

В этом же ключе следует рассматривать и недавнее участие и выступление Президента Касым-Жомарта Токаева на очередном заседании Высшего Евразийского экономического совета, прошедшего в формате видеоконференции. Как известно, лейтмотивом выступления Главы государства на этом заседании стало неприятие Казахстаном «Стратегии развития евразийской экономической интеграции до 2025 года».

По нашему глубокому убеждению успех любой экономической интеграции измеряется повышением уровня жизни народа наших государств вследствие реализации конкретных проектов, а не заверениями отдельных политиков, ставящих под сомнение саму идею национального суверенитета и возможности равноправного сотрудничества.

В этой связи Президиум Национальной академии наук Республики Казахстан, внимательно **ознакомившись** с ходом последнего заседания Евразийского экономического союза, **принимая во внимание** конструктивное выступление Президента РК Касым-Жомарта Токаева, **учитывая** незыблемость независимости страны как высшей ценности, твердо **заявляет**:

во-первых, мы всецело поддерживаем идею нашего Президента о том, что включение вопросов здравоохранения, образования и науки в сферу компетенций Евразийской экономической комиссии может существенно поменять ее экономическую направленность и будет противоречить сути Договора о создании этого союза.

во-вторых, мы полностью разделяем предложение нашего лидера о том, что двустороннее сотрудничество между странами Евразийского экономического союза многогранно и затрагивает практически весь спектр экономических, социальных, гуманитарных отношений, при этом совершенно не требуется рассмотрение этих вопросов в пятистороннем формате.

в-третьих, абсолютно прав наш лидер и в том, что интеграционная работа должна учитывать особенности национальной правовой системы, а попытка так называемой «гармонизации и унификации» законодательства в рамках Евразийского экономического союза не будет принята национальным общественным мнением.

в-четвертых, мы всецело разделяем озабоченность нашего Президента по поводу необходимости обеспечения равного представительства в Евразийской экономической комиссии, когда квотирование в зависимости от объема финансирования сторонами не должно влиять на формирование состава этого органа.

в-пятых, мы поддерживаем предложения Главы государства о необходимости не увеличивать полномочия Евразийской экономической комиссии. Мы уверены, что наш Президент Касым-Жомарт Токаев разумно предложил отложить принятие нового документа для дальнейшей тщательной проработки.

Как представители научной общественности мы поддерживаем подход Главы государства о соблюдении принципа «разумной достаточности» при согласовании и гармонизации национальных правовых норм в отношении тех или иных экономических проектов.

Общественное мнение казахстанцев, в том числе и ученых, однозначно не приемлет любые попытки расширить сферу компетенции Евразийского экономического союза, когда идет ничем не прикрытая попытка перевести задачи этого экономического объединения в политическую плоскость, которая может привести к потере суверенитета Казахстана. Евразийский экономический союз, прежде всего, должен способствовать улучшению благосостояния народов государств – участников этого объединения, а не ограничивать их независимость, которая является незыблемой и главной ценностью любого государства. В противном случае Казахстан должен выйти из этого и любого подобного союза. Независимость дороже всего!

Мы поддерживаем мнение Президента Казахстана Касым-Жомарта Кемелевича Токаева о том, что главный акцент предлагаемого стратегического документа целесообразно сделать не на абстрактное видение стратегического партнерства и не на политизацию тех или иных вопросов, а на разработку и реализацию конкретных программ взаимовыгодного экономического сотрудничества, направленного на улучшение благосостояния народов стран-участниц.

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